TRUSTPOWER
AUSTRALIA (NZ) LTD

Dundonnell Wind Farm EES

June 2015

0107773 EES EXHIBITION

VOLUME 1-4

This page is intentionally blank

Contents

This page is intentionally blank

Trustpower Australia (NZ) Ltd

VOLUME 1

Dundonnell Wind Farm EES

June 2015

0107773 EES EXHIBITION

This page is intentionally blank

Contents

This page is intentionally blank

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

EXECUTIVE SUMMARY

This page is intentionally blank

EXECUTIVE SUMMARY

Overview

Dundonnell Wind Farm Pty Ltd (DWFPL) is a wholly owned subsidiary of Trustpower Australia (NZ) Ltd (Trustpower) and is seeking approval for the construction and operation of the Dundonnell Wind Farm (the Project).

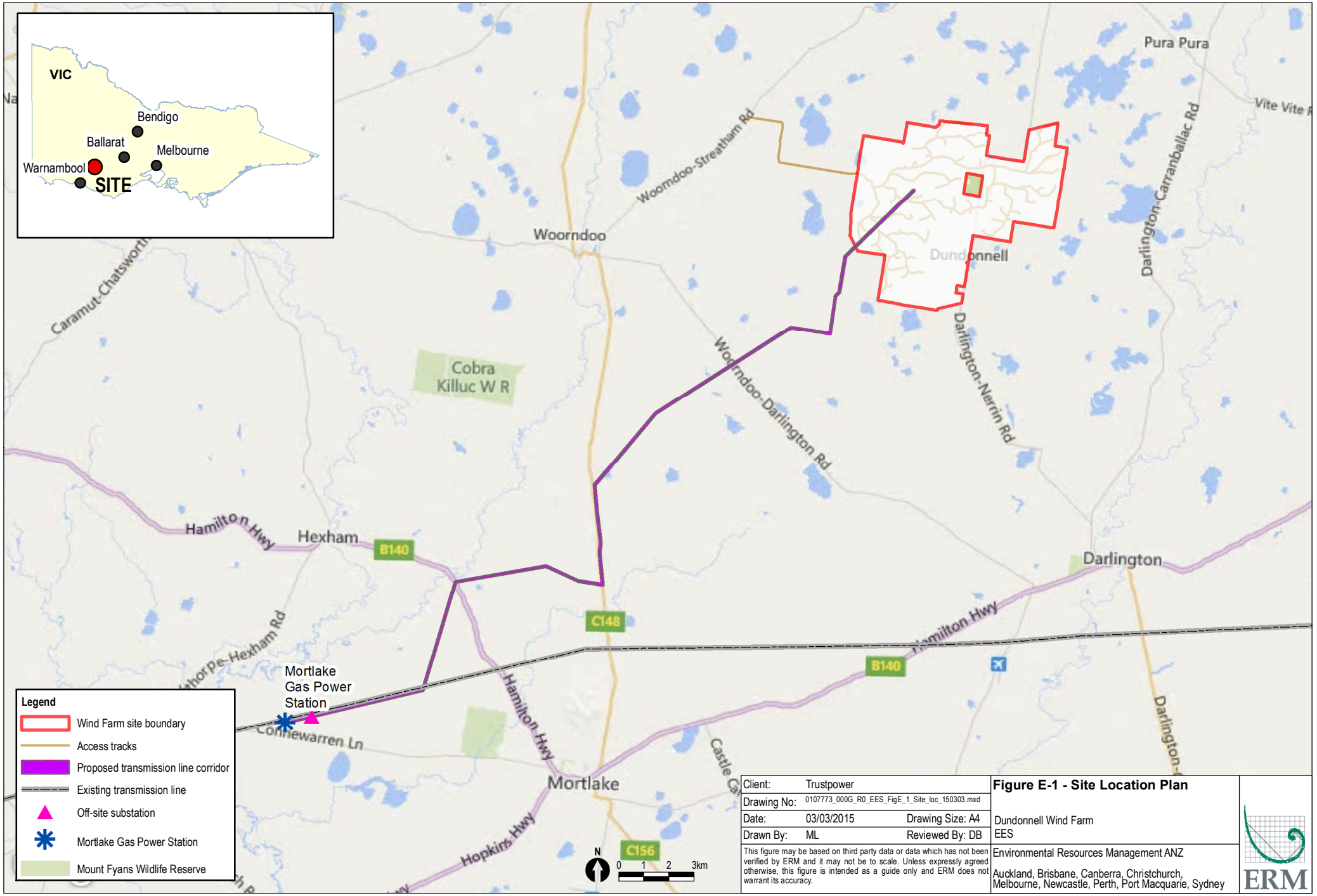
The Project will involve the construction of up to 104 wind turbine generators (WTGs) with a maximum tip height of 165 metres (m) above ground level (AGL) and an indicative generation capacity of approximately 312 Megawatts (MW).

Support infrastructure includes an on-site substation, access tracks, and for the construction period, on-site concrete batching plants and on-site quarry. In addition, a 220 kilovolts (kV) overhead transmission line approximately 38km in length is proposed to connect the on-site substation to the 500kV Heywood-Moorabool network at the Mortlake Gas Power Station (MOPS).

The Project will have an estimated capital investment value of approximately $670 million, and is expected to create over 200 direct, full time equivalent jobs during construction, an additional 100 indirect jobs, approximately 10 direct and six indirect full time jobs during operation.

The Project is located approximately 23km north-east of Mortlake and 21km west of Derrinallum and wholly within the Shire of Moyne Local Government Area (LGA). The location of the Project is shown in *Figure E-1.*

The Project has been determined to be a 'controlled action' requiring assessment and approval under the Commonwealth *Environment Protection and Biodiversity Act 1999* (EPBC Act 1999). The Victorian Minister for Planning also determined that an assessment under the *Environment Effects Act 1978* (EE Act) was required. The Project will be assessed under the bilateral agreement that allows the Commonwealth Minister for the Environment to make a decision on whether to approve the Project based on an assessment under the EE Act. The Project also requires several planning permits, pursuant to the provisions of the *Planning and Environment Act 1987* (P&E Act) and the Moyne Planning Scheme.



Client:	Trustpower		
Drawing No:	0107773_000G_R0_EES_FigE_1_Site_loc_150303.mxd		
Date:	03/03/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure E-1 - Site Location Plan

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

The Proponent

Trustpower is a publicly listed company on the New Zealand stock exchange. Trustpower is an energy and telecommunications company that owns and manages 38 hydro generation power stations, and three operating wind farms globally, including one in Snowtown, South Australia. Trustpower has also recently acquired ownership of several hydro power and wind farm projects within New South Wales.

Trustpower has been operating in Australia since 2001 and the company currently employs over five full time staff based in Melbourne and Adelaide. The Project was commenced in 2009 by NewEn Australia Pty Ltd and subsequently acquired by Trustpower in 2013.

Project Benefits

The Project will make a significant contribution to renewable energy generation in Victoria and to the achievement of Commonwealth and State policy objectives. In addition to delivering clean energy, the Project will deliver significant economic benefits at the broader State, regional and local level, particularly through the creation of construction employment opportunities and increased demand and support for local goods and services. As a result, the Project will make a net contribution of $309 million to the Gross State Product over the three year construction period. The Project will also diversify existing income streams for farmers and local businesses and provide employment opportunities.

Dundonnell Wind Farm Key Environmental Benefits	
Maximum number of wind turbines	104
Rated capacity of each turbine	Approximately 3MW
Total installed capacity	Approximately 312MW
Annual Electricity Output	Approximately 1000 GWh
Equivalent household consumption (Victorian homes)	150,000 households
Carbon dioxide displaced per annum	770,000 tonnes

Need for the Project

The global emission of greenhouse gases is one of the most important environmental challenges facing the planet with the emission of greenhouse gases, principally carbon dioxide, leading to a warming of the earth's atmosphere.

Australia per capita greenhouse gas emissions are among the highest in the world. In 2012-2013, per capita emissions (including emissions from land use, land-use change and forestry) were 249 tonnes carbon dioxide equivalent (CO_2-e) per person. Australia's per capita emissions are nearly twice the OECD average and more than four times the world average (Garnaut, 2011). The generation of electricity from fossil fuels is a significant contributor to these emissions. Victoria generates in the order of 100 million tonnes (Mt) of CO_2 emissions per year and in Victoria, electricity from coal accounts for over 60 percent (%) of total emissions.

Investment in renewable energy is needed to contribute to the additional generating capacity needed to meet growing energy demand, support the transition to a low carbon economy and reduce greenhouse gas emissions.

Future energy demand in Victoria is likely to result in further increase in greenhouse emissions if met through existing energy providers (i.e. coal fired power plants). The Project will make a significant contribution to renewable energy generation in Victoria and to the achievement of Commonwealth and State policy objectives.

Project Objectives

The objectives of the Project are to:

- provide a source of renewable energy to supplement Victorian and National energy requirements;
- contribute to current Commonwealth and State Government targets for renewable energy;
- provide value-added contributions at the broader State, regional and local levels in terms of labour and returns to capital;
- create new income streams for farmers and local businesses;
- provide employment opportunities, including over 200 direct full time and additional 100 indirect (e.g. local retail, mechanic, hospitality and other service industries) jobs during construction and approximately 10 direct and six indirect full time jobs during operation;
- liaise and work with the community and all potentially affected stakeholders in the identification, mitigation and/or monitoring of any potential environmental effects;
- ensure quality, safety and environmental standards are maintained;
- recycle and reuse materials where practically and economically feasible;
- minimise all potential negative environmental effects and where practical, maximise all potential positive environmental effects; and
- deliver responsible innovation and service excellence.

Site Suitability

The Project location is ideally suited to the development of a wind farm. Wind monitoring at the wind farm site commenced in 2009, which has confirmed a high and consistent wind resource. The wind farm site is located in relatively close proximity to the electricity grid to enable connection to the 500kV Heywood-Moorabool network.

Additionally, the wind farm site is isolated from major townships and tourist areas. It is made up of and surrounded by relatively few landholders, and as a result there are only a small number of dwellings within and surrounding the site.

The wind farm site has been substantially cleared of native vegetation and has been primarily used for grazing for many years. The clearing and subsequent development has resulted in a substantially altered landscape.

Project Description

The Project will have a capacity of approximately 312MW and an expected operational life of 25 years, with the potential for an additional 25 year operational period.

If the Project is then decommissioned, the site will be restored in accordance with a Decommissioning and Rehabilitation Plan prepared in accordance with the *Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria* (DELWP, 2015) (the Wind Energy Guidelines).

Electricity generated by the Project will be distributed to the 500kV Heywood-Moorabool network.

The Project will consist of the following components:

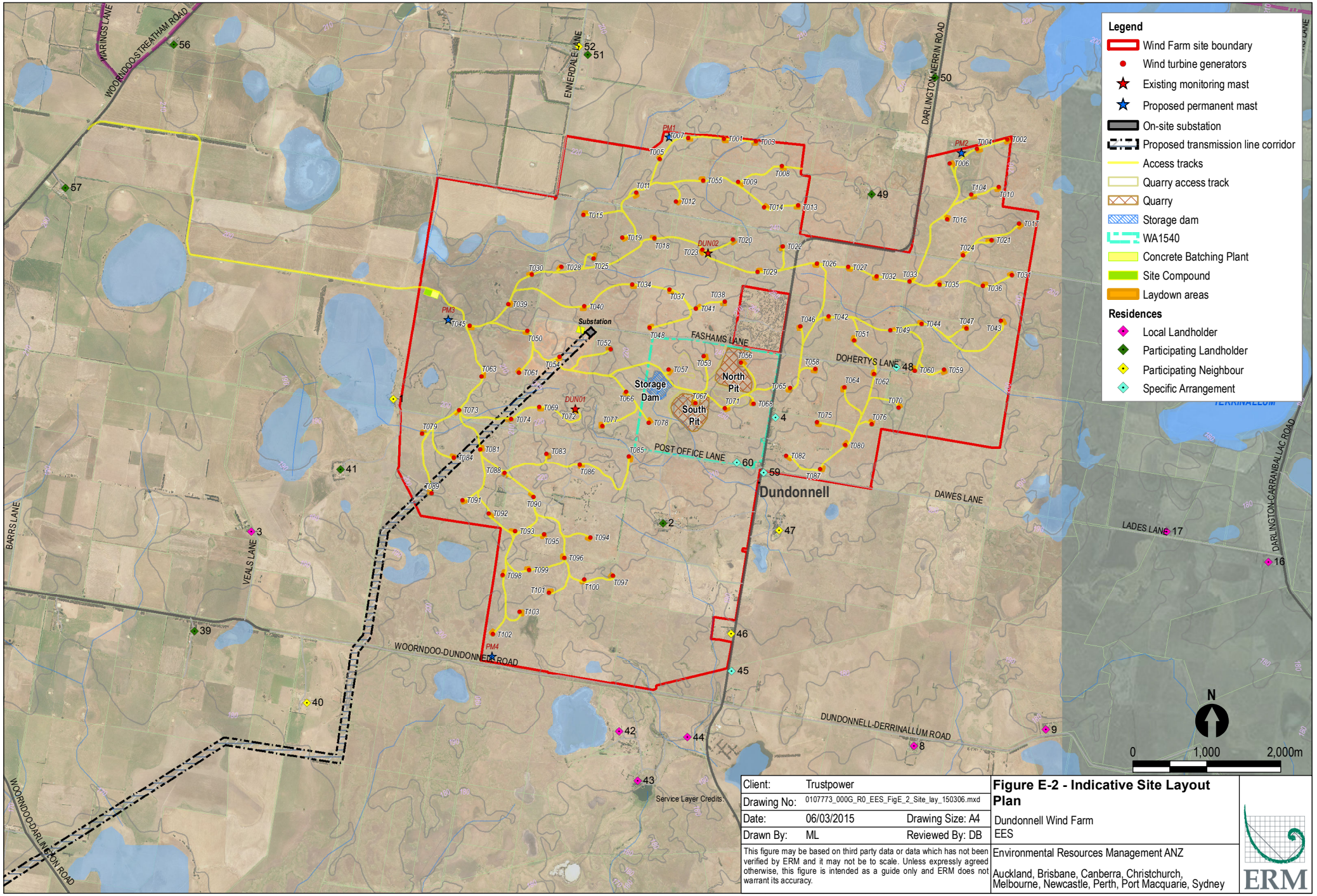
- up to 104 WTGs with a maximum height of 165m AGL (to the blade tip) and adjacent hardstands for the generation of electricity within the wind farm site;
- up to 104 transformer kiosks externally housed adjacent to each WTG. Alternatively transformers may be located inside the WTGs;
- up to four permanent wind monitoring masts within the wind farm site with a height of approximately 110m AGL (hub height of the WTGs);

- a permanent operations and maintenance building;
- a central electrical 220/33kV substation/switchyard building, including a control room, transformers, switchgear, insulators and other ancillary equipment;
- an off-site electrical 500/220kV substation, to be located on land immediately adjacent to the MOPS;
- a single or double circuit, 220kV above ground transmission line connecting the on-site electrical substation/switchyard building to the off-site substation. The transmission line would be established within a corridor approximately 50m wide and generally on monopoles (with double pole structures being utilised only where absolutely necessary) up to a maximum height of 35m AGL. A 500kV transmission line (up to 1km in length) will connect the off-site substation to MOPS;
- underground 33kV electrical reticulation and fibre optic cabling connecting the WTGs to the on-site substation/switchyard building; and
- an internal private access road network (approximately 75km in length) connecting the WTGs and the wind farm site to the public road network.

The following elements will also be required during construction of the Project:

- earthworks for access tracks, WTG platforms and foundations;
- on-site quarry;
- concrete batching plants;
- water supply for concrete batching and construction activities (potentially groundwater extraction from bores subject to an appropriate water resource being available on-site and obtaining the necessary approvals to do so);
- cleared hardstand areas for construction equipment and storage (construction laydown areas);
- temporary buildings, ablutions facilities and sit parking; and
- the use and storage of hazardous substances.

An indicative site layout plan showing the wind farm site and Project components is shown in *Figure E-2*.



Client:	Trustpower		
Drawing No:	0107773_000G_R0_EES_FigE_2_Site_lay_150306.mxd		
Date:	06/03/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure E-2 - Indicative Site Layout Plan

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

Project Approvals

The Project will require a series of approvals and assessments, as summarised following.

Environment Protection and Biodiversity Conservation Act (EPBC Act)

The Project was referred to the Commonwealth under the EPBC Act and deemed a 'controlled action' to be assessed under the bilateral agreement between the Commonwealth and Victoria.

Environment Effects Act 1978 (Vic)

The State Minister for Planning has determined that the Project requires an EES under the EE Act.

Planning and Environment Act 1987 (Vic) and Moyne Planning Scheme

Three separate planning permit applications pursuant to the P&E Act will be considered concurrently for the Project and are summarised as follows:

1. Use and development of a wind energy facility, comprising up to 104 WTGs, main site access track, internal access tracks, on-site substation, electrical reticulation, up to four wind monitoring masts, permanent operations/maintenance facility, temporary concrete batching plants and site office buildings; removal of native vegetation; business identification signage; and alterations to roads located in a Road Zone Category 1.
2. Use and development of a utility installation (power lines designed to operate at 220,000 volts or more) for a length of approximately 38 kilometres and associated removal of native vegetation, to enable the connection of the Dundonnell Wind Farm to an off-site substation and subsequent connection into the electricity grid at the Mortlake Gas Power Station.
3. Use and development of a utility installation associated with the off-site substation.

Aboriginal Heritage Act 2006

The Project requires the preparation of Cultural Heritage Management Plans (CHMPs) under the *Aboriginal Heritage Act 2006*.

Mineral Resources (Sustainable Development) Act 1990

A work plan and work authority for extractive industry are required for the Project under the *Mineral Resources (Sustainable Development) Act 1990*.

Site Locality and Surrounding Land Use

The wind farm site sits on the western Victorian volcanic plains and comprises flat to gently undulating terrain. Remnant native vegetation generally occurs in patches with shrubland identified on basalt stony rises and along some roadsides and within the Mt Fyans Wildlife Reserve. The reserve is surrounded by the wind farm site, but is not included within the boundary and therefore, will not be impacted by the Project.

The wind farm site and adjoining areas are primarily pastoral land used for grazing with surrounding land uses also including cropping.

Existing infrastructure at the wind farm site and on the surrounding land is predominantly agricultural in nature and includes isolated homesteads, sheds, access tracks and fencing.

Trustpower has entered into commercial agreements with 11 landholders to host the wind farm and 15 landholders to host the transmission line easement.

Stakeholder Consultation

Trustpower is committed to ongoing, effective and genuine engagement with the local community, and has undertaken a comprehensive and detailed consultation process. Consultation activities are detailed at *Chapter 7* of this EES.

Consultation undertaken for the Project has been guided by the *Dundonnell Wind Farm EES Consultation Plan* and is included at Volume 2. The EES Consultation Plan includes the following objectives:

- to proactively engage with the community and project stakeholders about the Dundonnell Wind Farm and its associated EES studies;
- to identify stakeholders and possible stakeholder issues;
- to provide a framework to seek and encourage input from stakeholders throughout the EES process;
- to detail the consultation that will occur throughout the EES process;
- to provide response mechanisms for effective and accurate feedback through the course of the Project; and
- to identify opportunities for future community collaboration and engagement when the Project proceeds to construction and operation.

Engagement activities commenced in 2011, and have included:

- initial identification of stakeholders;
- direct engagement including face to face meetings with landholders, government departments and agencies, and negotiations with participating landholders and participating neighbours with WTGs proposed within 2km of dwellings;
- two community information sessions held in October 2011 and another in March 2014 which was attended by consultants responsible for the EES technical studies;
- three newsletters distributed within an approximate 12km radius of the windfarm site;
- a Project website, information line and project email address; and
- sets of fact sheets describing the Project and specific aspects of the environmental assessment.

The consultation process identified a number of issues that were addressed through the design of the Project and through the course of the environmental assessment. These included the potential impacts to the Brolga, construction impacts of the Project including traffic impacts, impacts on groundwater and cumulative impacts from a number of major projects in the region.

Trustpower is committed to continued ongoing community engagement with all stakeholders during the public notification period for the EES and throughout construction and operation. This will include the formation of a Community Liaison Group (CLG), if required, to provide a forum for open discussion between representatives of the wind farm, the community, Council and other stakeholders.

Environmental Assessment

The specialist technical assessments have been conducted in accordance with:

- EES Scoping Requirements - Dundonnell Wind Farm (DTPLI, 2013);
- the Wind Energy Guidelines; and
- other relevant guidelines and policies.

The specialist technical assessments for the Project and this EES Report have been prepared by suitably qualified personnel with relevant expertise and experience.

The EES Scoping Requirements include draft EES Evaluation Objectives to guide the assessment of the potential effects of the Project. The evaluation objectives reflect the key matters to be investigated by this EES and also included matters required to be addressed under the EPBC Act.

A Technical Reference Group (TRG) was established for the Project. The objective of the TRG was to enable relevant State government departments and agencies as well as Moyne Shire Council to provide input and guidance throughout this EES process.

The results of the assessments are contained in this EES, incorporating Volume 1: Main Report, Volume 2: Technical Assessments and other documentation, Volume 3: Land Titles and Volume 4: Letters of Consent. The following section provides an overview of each of the chapters in this EES, along with results of the environmental assessment and measures to mitigate potential impacts associated with the Project.

Geomorphology and Soils

An assessment of the significance and sensitivity of geomorphological features within the wind farm site and transmission line corridor was undertaken as part of this EES. This assessment also addressed issues associated with sedimentation and erosion, providing recommended measures to manage these potential impacts.

The wind farm site is part of a broad landform referred to as Western Volcanic Plain, which is characterised by flat to gently undulating terrain derived from numerous short lived volcanoes with multiple low eruption points. The wind farm layout has been developed taking into consideration the geomorphological features and areas of significance identified in the specialist assessment. Construction of the WTGs and other project infrastructure will not result in direct impact to any of the known eruption points, including the Mt Fyans scoria and lava cone or other recognised eruption points in the Dundonnell-Woorndoo area. The nature of the construction required for the transmission line (i.e. periodically spaced poles along the corridor) means that direct impacts to areas of geoheritage significance are able to be avoided.

The construction process will expose soil and has the potential to cause erosion and sedimentation in run-off. Through the implementation of the recommended mitigation measures, and the use of current best practice guidelines, the construction and operational impacts of erosion and sedimentation on water quality associated with the Project will be manageable and are unlikely to be significant.

While there will be localised reduction of geoscience values as a result of the Project, the fundamental details of the geological origin and geomorphological character of the wind farm site and transmission corridor site will be retained. The overall residual impact to geomorphology, geology and soils as a result of the construction and operation of the Project is therefore considered to be minor.

Hydrogeology

A hydrogeological assessment was undertaken to characterise the groundwater environment within the wind farm site. The assessment identified and considered the potential effects of the Project on groundwater flow and quality, including any potential impacts on beneficial uses of groundwater. Project activities have the potential to impact on groundwater in the context of depth to the water table, groundwater quality, regional groundwater flow, and local groundwater receptors.

Given the depth of the water table identified during the hydrogeological investigations, Project activities (such as the quarry) are unlikely to intercept the water table and therefore, this is not expected to be an issue.

In relation to groundwater storage within the wind farm site, storage occurs predominantly in the more weathered zones of the basalt, as well as in fractures. Groundwater discharge from the basalt aquifer occurs in the form of

springs located in the south-eastern portion of the wind farm site. The springs are likely supplied by groundwater derived from the stony rise recharge area located on-site higher in the catchment with potentially a component of flow from deeper in the basalt. Groundwater that does not discharge at the springs, wetlands or drainage lines would continue to flow down hydraulic gradient to discharge areas (e.g. rivers and wetlands) lower down in the catchment. The Project has been designed so that WTGs and other infrastructure are not located in the near vicinity of identified spring discharges or wetlands.

Water supply for the concrete batching plants, dust suppression and other activities will be required during construction of the Project. It is anticipated that the majority of water will be supplied from groundwater sourced within the wind farm site, subject to appropriate approvals being obtained. If the groundwater volume is not sufficient, water required for construction activities will be obtained from local water sources, subject to appropriate approvals.

Appropriate mitigation measures have been identified to minimise the potential impacts in relation to groundwater. These will be implemented through the Environmental Management Plan (EMP) for the Project, including Sediment, Erosion and Water Quality Management Plan and a Hydrocarbon and Hazardous Substance Plan.

Surface Water

An assessment of potential impacts on surface water quality within the vicinity of the Project has been undertaken. The wind farm site is located at the high point of the catchment. It is not within a designated water supply protection area and does not drain to a designated water supply catchment. Lava flows have blocked and diverted numerous streams which have formed a series of wetlands and ponds, including an active groundwater discharge zone in the south-west of the wind farm site.

The Project has been designed to ensure that Project infrastructure within the wind farm site will not impact designated waterways. The proposed transmission line corridor intersects 14 designated waterways, however these are intermittently flowing and all considered to be minor.

Appropriate erosion and sediment control mitigation measures have been identified to minimise the potential construction related impacts in relation to increased runoff to waterways and wetlands. These will be implemented through the EMP, with Project activities being undertaken in accordance with Sediment, Erosion and Water Quality Management Plan and a Hydrocarbon and Hazardous Substance Plan.

Heritage

Cultural Heritage

Draft Cultural Heritage Management Plans (CHMPs) have been prepared for the wind farm site and transmission line corridor in consultation with the Office of Aboriginal Affairs Victoria (OAAV), Kuuyang Maar Aboriginal Corporation and Eastern Maar Aboriginal Corporation. An assessment of potential impacts to areas of cultural heritage sensitivity within the wind farm site and transmission line corridor area was undertaken.

The Draft CHMPs identified six registered Aboriginal cultural heritage places within the wind farm site. No registered Aboriginal cultural heritage places were identified within the transmission line corridor.

During construction of the Project, impacts to four of the registered Aboriginal cultural heritage places will be avoided by ensuring construction and ground disturbance does not occur within these places and management measures will be implemented to avoid inadvertent harm to these places. Subsurface testing identified two artefact scatters in locations to be impacted by Project infrastructure. In accordance with measures identified within the CHMPs, the artefacts will be managed appropriately with some salvage being undertaken.

The presence of local resources in the study area and previously recorded places, suggests that it is possible that additional Aboriginal cultural heritage may be present than that identified to date. As such, areas of archaeological

potential have been identified which will be subject to management measures during construction. Areas considered more likely to contain cultural heritage within the wind farm site and the transmission line corridor have been identified and will be subject to additional testing during construction. If any unexpected Aboriginal cultural heritage is discovered during construction, contingency measures will be implemented and impacts will be appropriately managed through the CHMP process.

Historic Heritage

Historic Heritage Assessments (HHAs) have been undertaken for the wind farm site and transmission line corridor. There are five statutory registered historic heritage places inside or within a 10km radius of the centre of the wind farm site. The HHAs found that there were two historic heritage places within the wind farm site (Fasham House Complex (H7422-0006) and dry stone walls) with the potential to be impacted by the Project. Impacts to these places will be avoided where possible, by siting Project infrastructure away from known historical places and utilising existing access tracks to avoid impacts to dry stone walls. While there is potential for additional historic heritage to be present in the Project area, the HHAs have found that it is unlikely that the Project area contains places of high historical significance.

Flora and Fauna

Continued flora and fauna assessments have been undertaken for the Project to assess matters of Commonwealth and State ecological significance.

The Project has been sensitively designed to avoid areas of ecological sensitivity, including Brolga habitat, wetland areas and rocky outcrops. The flora and fauna assessments informed WTG exclusion zones which have been placed around Brolga breeding and flocking sites, wetlands and drainage lines.

Flora

The majority of the wind farm site is dominated by improved pasture, with remnant native vegetation limited to scattered patches of shallow grassy wetland, areas of escarpment shrubland, scattered patches of plains grassland and scattered River Red Gum trees.

Two critically endangered ecological communities listed under the EPBC Act occur in the wind farm site; Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (SHWTLP) and Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP). In addition, one threatened ecological community listed under the *Flora and Fauna Guarantee Act, 1988* (FFG Act); Western (Basalt) Plains Grassland Community (WPGC) was identified.

Targeted surveys for listed flora species were undertaken on the wind farm site in areas of native vegetation with the potential to be impacted by Project infrastructure and no EPBC or FFG Act listed flora species were found. There are two critically endangered (EPBC Act) ecological communities and one threatened ecological community (FFG Act) that occur within the wind farm site. The Project will result in the removal of 1.285 ha of native vegetation for the wind farm and main access track, including 1.023 ha of the EPBC Act listed NTGVVP.

The transmission line route contains a mixture of indigenous and exotic vegetation, with two critically endangered ecological communities (EPBC Act) highly likely to occur in areas of remnant vegetation and one threatened ecological community (FFG Act). In addition, 83 scattered trees were recorded within the corridor. A total of 14 EPBC Act and/or FFG Act listed flora species have potential to occur in remnant vegetation within the route, with one species (the Spiny Rice-flower) incidentally recorded during the overview vegetation assessment, but not proposed to be removed. The current proposal will result in the removal of approximately 5ha of remnant native vegetation along the transmission line corridor and 14 scattered trees.

Targeted surveys will be undertaken prior to construction, once pole and access track locations are determined, to clarify the impact of the transmission line on threatened species and communities. These will inform detailed mitigation measures, such as the micro-siting of poles and access tracks as well as use of existing farm tracks where available, to minimise any impacts to threatened species or communities.

The vegetation removal will require referral to DELWP and will be appropriately offset as required, to ensure no net loss results to Victoria's biodiversity. In addition, the Commonwealth Department of Environment (DoE) may require offsets for the removal of the EPBC listed ecological communities.

Fauna

The majority of the wind farm site is of low quality habitat for fauna as the modification of the site for agriculture has resulted in the removal of most suitable habitat elements. Scattered trees, small patches of grassland, shrublands, woodlands, wetlands and creek lines on the site could provide moderate to high quality habitat for fauna species. A total of 21 threatened species, including 15 birds, two mammals, two reptiles, one frog and one invertebrate, were considered to have potential to occur within the wind farm site.

Potentially suitable habitat was detected for a number of EPBC Act listed species within the wind farm site. Potential habitat was found for the Corangamite Water Skink and Growling Grass Frog in areas in and around ephemeral and permanent wetlands and drainage lines. These areas are located within a WTG-free buffer zone to avoid impacts to these species. There is potential for the presence of the Striped Legless Lizard to occur within suitable habitat consisting of remnant native grassland and shrubland, however none were detected during targeted surveys and therefore, no significant impact is expected to this species. An area of suitable habitat for the Golden Sun Moth has been identified, however this will be avoided and no habitat loss for this species is anticipated.

Surveys identified one EPBC Act listed species; the Southern Bent-wing Bat, however due to the low number of calls confirmed from this species, the Project is not expected to have a significant impact on this species. In addition, two bird species listed under the EPBC Act Migratory Species list were recorded in wetlands on-site; Latham's Snipe, and the Common Greenshank, however no wind farm infrastructure will be located in these areas.

Five fauna species listed under the FFG Act were detected, however these are considered unlikely to occur regularly on the wind farm site due to a lack of quality habitat. One species, the Fat-tailed Dunnart (listed as lower risk-near threatened on the DELWP threatened species advisory list), was recorded at the wind farm site in very low numbers and mitigation measures have been identified.

A total of 15 EPBC Act listed species are considered to have potential to occur within the transmission line corridor, including ten bird species, one mammal, two reptiles, one frog and one invertebrate species.

The majority of threatened birds that have been recorded, or are likely to occur along the transmission line corridor, are waterbirds. It is unlikely however, that they would occur in significant numbers on a regular basis along the transmission line as individual habitats are limited in extent, many are ephemeral and they vary in quality.

Potential impacts on ground-dwelling mammals, lizards and frogs are considered to be negligible due to the small size of the development footprint for transmission line infrastructure. The transmission line corridor does not represent key habitat for EPBC Act or FFG Act species, however some impacts may occur, specifically due to habitat removal for the Striped Legless Lizard, Corangamite Water Skink and Golden Sun Moth. Once the design of the transmission line is determined, targeted pre-construction surveys will be undertaken to clarify potential impacts upon these species. These will inform mitigation measures to be implemented to ensure any impacts to flora and fauna are appropriately managed and can be reduced to an acceptable level so not to significantly impact threatened species or communities.

Brolga

A specialist assessment has been undertaken in accordance with the *Interim Guidelines for the Assessment, Avoidance, Mitigation and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population 2011, February 2012 Revision, DSE 2012* (the Brolga Guidelines). The assessment has also been peer reviewed.

The investigations indicate that the region supports a small number of breeding pairs of Brolga that use a variety of wetland sites. A small proportion of Brolga occurred within a sensitive distance of the wind farm (3.2km) and were taken into account in defining WTG-free buffer areas. A 300m buffer was established around identified breeding and

flocking sites to address both direct impacts, such as WTG collision, and indirect impacts, such as disturbance. The application of the Brolga Guidelines has informed the layout of the Project. The assessment has provided estimates of residual population impacts and has identified a corresponding scale of residual impact compensation, through enhancing the breeding success of the species for the life of the Project. This provides assurance that the Project will have a zero net impact on the Victorian Brolga population over the life of the Project.

Noise and Vibration

An assessment has been undertaken to assess the potential construction and operational noise and vibration impacts of the Project, focussing on potential impacts on sensitive receptors. The assessment for the Project was undertaken in accordance with the New Zealand Standard 6808:2010 *Acoustics – Wind farm noise* (NZS 6808:2010) as required by the Wind Energy Guidelines.

The assessment predicted noise levels at 26 residential properties within 5km of the wind farm site. The assessment has been conducted for all locations required in accordance with NZS 6808:2010, in addition to participating landholders and neighbours who have entered into a noise agreement with Trustpower. Dwellings where the owners have entered into agreements for Trustpower to acquire, remove or make uninhabitable for the duration of the wind farm operation were not been included in the assessment.

Predicted noise levels associated with the operation of the wind farm comply with NZS 6808:2010 at all properties without a noise agreement. In addition, predicted noise levels for properties with a noise agreement comply with the guidance sourced from the *European Working Group on Noise from Wind Turbines* (ETSU-R-97). Accordingly potential impacts as a result of noise from the wind farm are expected to be minimal.

The construction of the Project will involve the use of heavy earth-moving and excavation equipment, such as bulldozers, graders, rock hammers and excavators. It is likely to cause an increase in localised ambient noise levels during the construction phase, however such noise impacts will be localised and of short-term duration. Construction works may need to occur outside of standard working hours on some occasions, however quarry operations will be restricted to the daytime period until a detailed noise assessment is submitted to the relevant authority detailing the noise control treatments required to achieve compliance with the evening time noise limit. Potential noise impacts during the construction phase of the Project will be controlled by a Construction Noise Management Plan to ensure compliance with relevant standards and include mitigation measures to ensure the Project does not result in undue noise impacts.

Shadow Flicker and Blade Glint

An assessment has been undertaken to assess the impacts of shadow flicker as a result of the Project, with results assessed in relation to the limits outlined in the *Draft National Wind Farm Development Guidelines* (EPHC, 2010) (the Draft National Guidelines).

The analysis of shadow flicker has determined that four dwellings have the potential to be impacted by shadow flicker, with only two of these predicted to receive in excess of the recommended limit of 30 hours per year outlined in the Draft National Guidelines. When considering the actual shadow flicker duration, which takes into account the reduction in shadow flicker due to WTG orientation and cloud cover, only one dwelling is expected to experience shadow flicker in excess of the recommended limit of 10 hours per year. Three of these dwellings are owned by participating landholders and one dwelling is a participating neighbour of the Project. Potential impacts will be dealt with through mitigation measures, such as the installation of screening structures or planting and the use of WTG control strategies, if required.

Blade glint from the Project will be negligible as blades will be finished with low gloss, non-reflective coatings.

Electromagnetic Interference

An assessment of Electromagnetic Interference (EMI) has been completed to investigate potential impacts on the performance of radiocommunications systems through the introduction of EMI.

Broadcast towers and transmission paths listed in the Australian Communications and Media Authority (ACMA) database within 75km of the wind farm site were investigated to determine the potential for EMI. The ACMA database search identified 449 radio communication towers within a 75km radius of the wind farm site. The investigation confirmed that the Project is unlikely to cause any unacceptable impacts to these radio communication systems.

The Project has the potential to impact on television broadcasting, mobile phones, wireless internet and radio broadcasting in the vicinity of the Project; however these impacts will be rectified if necessary, with the implementation of mitigation measures.

Landscape and Visual Impact

An assessment has been completed to evaluate the potential visual impacts of the Project and the assessment has been peer reviewed.

The Project is located within a highly modified rural landscape and the existing rural activity, associated structures and other infrastructure have created a landscape that can readily absorb change.

On-site assessment at 40 publically accessible viewpoints within the viewshed of the Project has not identified any publicly accessible locations that have a high degree of visual impact, with visual impacts to all groups of publicly accessible viewpoints assessed as negligible to minor, with the exception of one viewpoint from a local road which is assessed as moderate.

There is potential for residential properties within 2km to 4km of the Project to be impacted, and appropriate measures to mitigate visual impacts for these properties will be implemented if required. Landscape mitigation measures have been recommended, and if necessary will be offered to reduce visual impact to these residential dwellings.

Planning and Land Use

An assessment has been undertaken to assess the potential planning and land use impacts of the Project. This determined that the Project accords with the relevant planning policy provisions and represents an appropriate planning and land use outcome that supports the development of renewable energy in Victoria and will result in economic and social benefits for both present and future generations.

The wind farm site and adjoining areas predominantly comprise pasture used for grazing. The Project will not adversely impact on the continuation of this land use.

Planning permit approvals are required to facilitate the Project under the provisions of the Moyne Planning Scheme. The Project is compatible with the zoning of the land, is appropriate from a land use planning perspective and is consistent with facilitating sustainable agricultural activity in the area. The Project will have minor impacts on existing and future land uses within and surrounding the Project area, including farming activities, residences and public infrastructure.

The Project will be undertaken in accordance with planning permit conditions which will ensure compliance with the general objectives of relevant policies and provisions of the Planning Scheme.

Traffic and Transport

An assessment has been completed to assess the potential impacts of the Project on traffic and transport, both during the construction and operational phases of the Project, including recommended measures to manage potential traffic and transport impacts.

The majority of the wind farm materials and components will be transported from the Port of Portland to the wind farm site. Transformers for the on-site and off-site substation will be transported from the Port of Geelong. Subject to obtaining relevant approvals and permits from VicRoads, it is expected that OD vehicles will use haulage routes previously approved for other projects. Beyond Woorndoo, the proposed OD haulage route specific to the Project will be east via the Mortlake-Ararat Road, then Woorndoo-Streatham Road ending at the site access point south of Warings Lane.

These routes consist of roads that are generally well-maintained, with sufficient road widths and intersections to accommodate OD vehicles. The assessment concluded that the surrounding road network has capacity to absorb predicted levels of construction traffic. The majority of vehicle movements associated with the operation of the Project will be internal to the wind farm site with minor impacts on the surrounding road network.

A Traffic Management Plan will be prepared prior to construction, in consultation with Moyne Shire Council and VicRoads, to ensure impacts to local roads and the broader road network is minimal.

Socio-Economic Impacts

A socio-economic assessment has been undertaken to consider the potential socio-economic effects which may result from the construction and operation of the Project. Management and mitigation measures have also been identified to provide support for local employment opportunities, local businesses and the existing agricultural sector and to minimise potential negative impacts.

The assessment found that the majority of socio-economic impacts resulting from the Project are expected to be positive for the broader State, regional and local community. In particular, the Project will make a net contribution of $309 million to the Gross State Product over the three year construction period. Once operational, the Project is also estimated to provide $12 million of value added contributions at the State level each year (i.e. in labour and returns to capital).

The Project supports increased direct and indirect employment opportunities at the State, regional and local level during the construction and operational phases of the Project. This includes the creation of over 200 direct and 100 indirect jobs (full time positions) during the three year construction period and up to 10 direct and six indirect jobs (full time positions) during operation of the wind farm.

In addition, the Project will diversify income streams for participating landowners and contribute to the sustainability of continued agricultural practices in the area. The Project will also result in significant direct expenditure in the local area during construction and ongoing operational expenditure with flow on stimulus effects to the regional, State and National economy.

Aviation Impact Assessment

An aviation impact assessment has been undertaken and determined that the Project will not present risks of operational significance to aircraft activity.

The Project will not infringe any existing Obstacle Limitations Surfaces (OLS), Procedures for Air Navigation Services – Operations (PANS-OPS) surfaces, or any existing clearance planes for Air Traffic Control (ATC) radar/navigation aids. An Obstacle Lighting Review undertaken as part of the Assessment concluded that obstacle lighting is not required for the Project.

The Project has potential to restrict aerial agricultural and aerial fire-fighting opportunities in the vicinity of the Project, given the potential for collision between aircraft and the WTGs and wind monitoring masts. Management and mitigation measures have been identified to address these issues. Nonetheless, the introduction of the wind farm access tracks will improve ground based access.

Following approval of the Project, notification of WTG locations and heights will be provided to emergency services and local and regional aircraft operators for inclusion in databases and navigational charts of the area.

Fire Management

An evaluation of potential bushfire risks associated with the Project has been completed as part of this EES, and has provided recommendations to mitigate construction related fire impacts, bushfire risk to Project infrastructure, and the risk of the operation of the Project influencing the spread or containment of bushfire.

Construction of the Project may result in increased risk of bushfire due to the use of machinery and presence of ignition sources on-site, however these impacts are considered low and able to be reduced through the application of standard construction management measures.

The wind farm site and surrounding area predominantly consist of cleared grassland and are not identified as being at high risk of bushfire. Each WTG will be situated next to a cleared construction pad further reducing the available fuel load and the internal access roads will act as firebreaks. Monitoring systems installed in the WTGs detect temperature increases and will automatically slow or shut down the WTG if the temperature or wind speed exceeds an assigned threshold. In the event of bushfire, aerial fire-bombing operations in the vicinity of WTGs will be restricted, however as discussed above, improved ground access, to and throughout the wind farm site, will mitigate these impacts.

Cumulative Impacts

An assessment of potential cumulative impacts arising from the Project has been undertaken, considering impacts arising from the operational, approved or proposed wind farms within the vicinity of the Project. Given the separation distances to the surrounding wind farms, the Project is not expected to contribute to unreasonable cumulative impacts. All approved projects will have identified environmental safeguards, which are developed in accordance with the relevant environmental standards and in response to the conditions of approval. This ensures that any potential adverse cumulative impacts would be minimised.

Environmental Management Framework

Trustpower will implement EMPs in accordance with the requirements specified in the Wind Energy Guidelines for construction, operation and the decommissioning and rehabilitation of the Project. The EMPs will be procedural documents which outline the environmental goals of the Project, the safeguard measures to be implemented, the timing of the implementation in relation to the progress of the Project, responsibilities for implementation and management, and a review process.

The EMPs will include:

- an overview of activities applicable to the design, construction, operational and decommissioning and rehabilitation phases of the Project;
- measures to ensure that works are undertaken in accordance with planning permit conditions and environmental statutory requirements:
  - in a manner so as to minimise the occurrence of environmental impact; and
  - In a manner so as to minimise the impacts generated from the construction and operation of the Project (e.g. noise, traffic) on nearby residential properties.

- clear procedures for the management of identified environmental and social impacts;
- an outline of any monitoring programs that may be required;
- management responsibilities and reporting requirements to demonstrate compliance with the EMPs; and
- measures to ensure that employees engaged in the works comply with the requirements of the EMPs and are provided with appropriate training.

The EMPs will be prepared following assessment of this EES and planning permit applications, and approval of the Project by the responsible authority. The EMPs will serve as working documents to be used throughout the detailed design, construction and operation phases. Implementation of the EMP and the performance of the Project's environmental management framework will be subject to periodic independent reviews and corrective action, if required.

Conclusion

Potential impacts of the Project have been assessed in accordance with the EES Scoping Requirements. Impacts arising from the Project in all the areas assessed have been identified, and corresponding mitigation measures proposed to reduce adverse impacts where avoidance strategies have not been feasible.

The Project has evolved significantly based on input from the community, local government and State Government. The wind farm layout has been subject to an iterative design process and adjusted multiple times in order to ensure compliance with relevant standards including noise and vibration, Brolga guidelines and shadow flicker, and to meet the conditions of landholder agreements. The wind farm layout has also been adjusted to reduce impacts on ecology, geomorphological values and cultural heritage.

This EES demonstrates that the Project appropriately responds to State and Commonwealth policy objectives in relation to renewable energy. It has been modelled to save 870,000 tonnes of GHG equivalent per annum. With a generating capacity of approximately 312MW and an estimated capital value of approximately $670 million, the Project will provide significant benefits to the State, regional and local community. It will also provide stimulus to the local and regional economy through increased employment and demand for goods and services. The Project will result in the direct injection of approximately $33 million to Moyne Shire during the construction of the wind farm, and approximately $1.7 million per annum once operational.

This EES has demonstrated that the proposed Dundonnell Wind Farm will comply with all relevant standards and Guidelines, and will deliver significant environmental and economic benefits.

This page is intentionally blank

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 1 - INTRODUCTION

This page is intentionally blank

Contents

Figures

Tables

Acronyms and Glossary

ACRONYM	DESCRIPTION
AAAA	Aerial Agricultural Association of Australia
AADT	Annual Average Daily Traffic
ABARE	Australian Bureau of Agricultural and Resource Economics
ABS	Australian Bureau of Statistics
Access Tracks	Internal roads / service roads within the site boundary
ACHRIS	Aboriginal Cultural Heritage Register and Information System
ACMA	Australian Communications and Media Authority
ADSB	Automatic Dependent Surveillance Broadcast
AEOM	Australian Energy Market Operator
AGL	Above Ground Level
AH Act	*Aboriginal Heritage Act 2006*
AHC	Australian Heritage Council
AHD	Australian Height Datum
AHO	Australian Heritage Database
ALARP	As low as reasonably practicable
AM	Amplitude Modulation
ARI	Average Recurrence Interval
A-SMGCS	Advanced Surface Movement Guidance and Control System
ATC	Air Traffic Control
BEU	Biodiversity Equivalency Unit
BMO	Bushfire Management Overlay
BoM	Bureau of Meteorology
CAMBA	China–Australia Migratory Bird Agreement
CAR	Civil Aviation Regulation
CASA	Civil Aviation Safety Authority
CEMP	Construction Environmental Management Plan
CFA	Country Fire Authority of Victoria
CHMP	Cultural Heritage Management Plan
CLG	Community Liaison Group
CLP Act	*Catchment and Land Protection Act 1994*
CNMP	Construction Noise Management Plan
Comm	Commonwealth
CRM	Collision Risk Model
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSM	Conceptual Site Model
CTMP	Construction Traffic Management Plan
dB	decibel

ACRONYM	DESCRIPTION
DEDJTR	Department of Economic Development, Jobs, Transport and Resources (formerly DSDBI)
DELWP	Department of Environment, Land, Water and Planning (formerly DTPLI and DEPI)
DEPI	Department of Environment and Primary Industries (formerly DSE)
DoE	Department of Environment (formerly SEWPAC)
DPCD	Department of Planning and Community Development
DRC	Department of Premier and Cabinet
DSDBI	Department of State Development, Business and Innovation
DTM	Digital Terrain Model
DTPLI	Department of Transport, Planning and Local Infrastructure (formerly DPCD)
DWFPL	Dundonnell Wind Farm Pty Ltd
EE Act	*Environmental Effects Act 1978*
EES	Environment Effects Statement
EIA	Economic Impact Assessment
EMAC	Eastern Marthudunera Aboriginal Corporation
EMF	Environmental Management Framework
EMI	Electromagnetic Interference
EMP	Environmental Management Pan
EP Act	*Environmental Protection Act 1987*
EPA	Environment Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ERM	Environmental Resources Management Australia Pty Ltd
ESM	Environmental Significance Overlay
ETSU-R-97	European Working Group on Wind Turbine Noise
EU ETS	European Union Emissions Trading System
EVC	Ecological Vegetation Class
FFG Act	*Flora and Fauna Guarantee Act 1988*
FZ	Farming Zone
GHCMA	Glenelg Hopkins Catchment Management Authority
GIS	Geographic Information System
GSA	Geological Society of Australia
GSM	Golden Sun Moth
GWh	Gigawatt hours
ha	Hectares
HHA	Historic Heritage Assessment
HO	Heritage Overlay
HV	Heritage Victoria
IAP	Instrumental Approach Procedures
ICAO	International Civil Aviation Organization
ISO	International Standards Organisation
JAMBA	Japan-Australia Migratory Bird Agreement

ACRONYM	DESCRIPTION
km	Kilometre
KMAC	Kuruma Marthudunera Aboriginal Corporation
kt CO2 e/GWH	Kilo tonnes of CO2 per gigawatt hour
kV	Kilovolt
LPP	Local Planning Policy
LPPF	Local Planning Policy Framework
LRET	Large-scale Renewable Energy Target
LSALTs	Lowest Safe Altitude
LVIA	Landscape and Visual Impact Assessment
Minister	Victorian Minister for Planning
MNES	Matters of National Environmental Significance
MOS	Manual of Standards
Moyne Shire Council	Relevant Local Government Authority
MOPS	Mortlake Power Station
MRET	Mandatory Renewable Energy Target
MRSD Act	*Mineral Resources (Sustainable Development) Act 1990*
MSC	Moyne Shire Council
MSS	Municipal Strategic Statement
Mt	Million tonnes
MWh	Megawatt hours
NCG	Noise Control Guidelines
NEM	National Electricity Market
NHMRC	National Health and Medical Research Council
NIRV	Noise from Industry in Regional Victoria
NSP	Network Service Providers
NSW RNP	New South Wales Road Noise Policy
NTGVVP	Natural Temperate Grasslands of the Victorian Volcanic Plain
NVMF	Native Vegetation Management Framework
NZS	New Zealand Standard
OAAV	Office of Aboriginal Affairs Victoria
OD	Over-dimensional
OECD	Organisation for Economic Cooperation and Development
OEMP	Operational Environmental Management Plan
OH&S	Occupational Health and Safety
OLS	Obstacle Limitation Surface
P&E Act	*Planning and Environment Act 1987*
PANS-OPS	Procedures for Air Navigation Services - Aircraft Operations Surface
PLUA	Planning and Land Use Assessment
PRM	Precision Runway Monitor
PVA	Population vulnerability analysis

ACRONYM	DESCRIPTION
RECs	Renewable Energy Certificates
RET	Renewable Energy Target
RM A	*Road Management Act 2004*
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
RSA	Rotor Swept Area
SAA	Seen Area Analysis
SEAV	Sustainable Energy Authority Victoria
SEPP	State Environmental Protection Policies
SEPP (WoV)	State Environmental Protection Policies (Waters of Victoria)
SHWTLP	Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains
SIO	Socio-Economic Impact Assessment
SLO	Significant Landscape Overlay
SPPF	State Planning Policy Framework
SRES	Small-scale Renewable Energy Scheme
SRET	Small-scale Renewable Energy Target
SWLAS	Southwest Landscape Assessment Survey
TDS	Total dissolved solids
The Project	Dundonnell Wind Farm Project (includes transmission line, off-site substation, access tracks and all components within wind farm boundary)
TJ	TeraJoule
TRG	Technical Reference Group
Trustpower	The Proponent
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VAHR	Victorian Aboriginal Heritage Register
VGS	Victorian Greenhouse Strategy
VPO	Vegetation Protection Overlay
VPPs	Victorian Planning Provisions
WAM	Wide Area Multilateration
WPER	Wildfire Prevention and Emergency Response Plam
WPGC	Western Plains Grassland Committee
WTG	Wind Turbine Generator
ZVI	Zones of Visual Influence

This page is intentionally blank

1 INTRODUCTION

1.1 Overview

Dundonnell Wind Farm Pty Ltd (DWFPL) is a wholly owned subsidiary of Trustpower Australia (NZ) Ltd (Trustpower) and is seeking approval for the construction and operation of the Dundonnell Wind Farm (the Project). The Project will involve the construction of up to 104 wind turbine generators (WTGs) at a maximum tip height of 165 metres (m) above ground level (AGL) and an indicative generation capacity of approximately 312 Megawatts (MW).

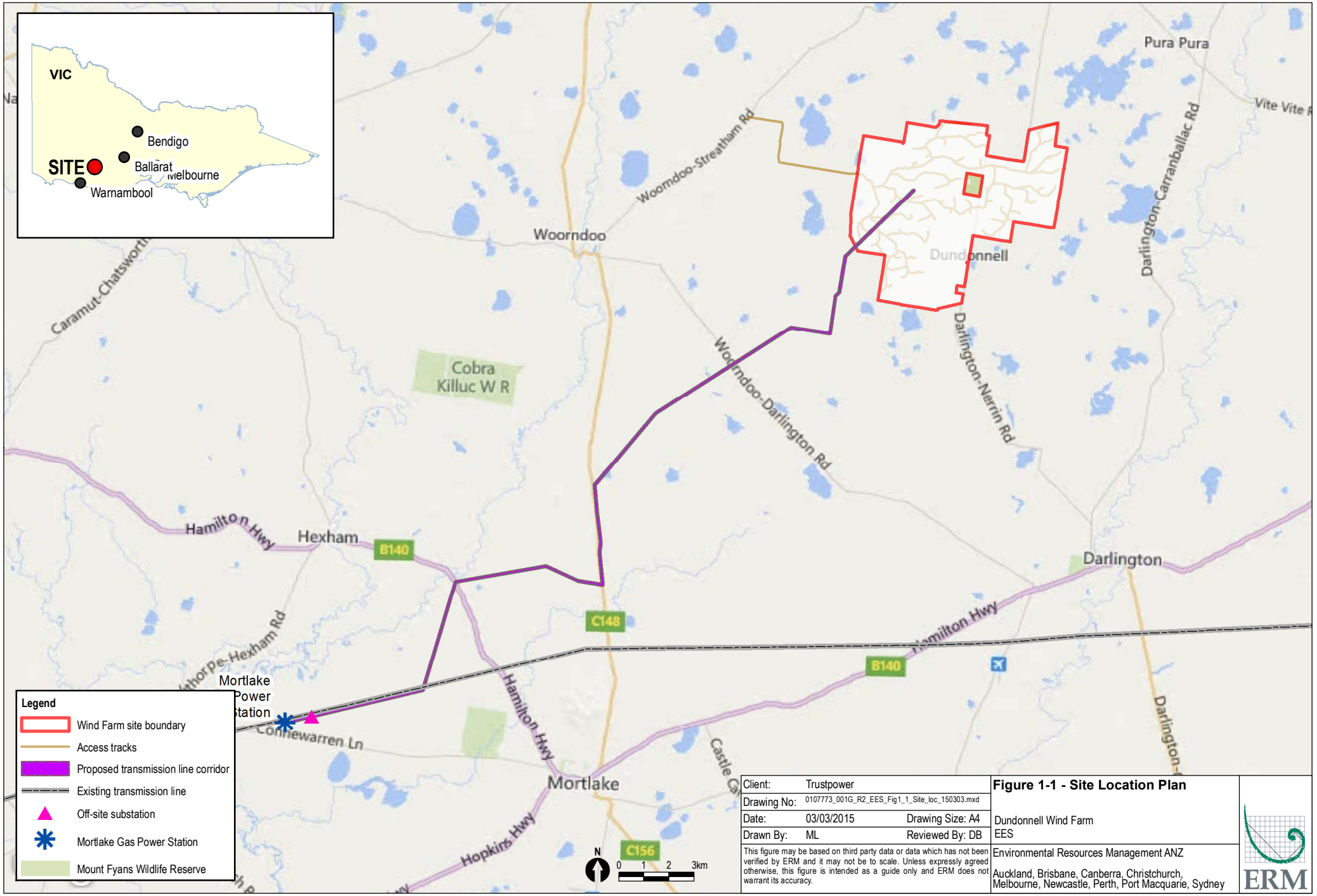
Support infrastructure includes an on-site substation, access tracks, and for the construction period, on-site concrete batching plants and on-site quarry. A 220 kilovolts (kV) overhead transmission line is proposed to connect the on-site substation to an off-site substation that then connects to the 500kV Heywood-Moorabool network at the Mortlake Gas Power Station (MOPS), approximately 38 kilometres (km) south -west of the wind farm site.

The Project will have an estimated capital investment value of approximately $670 million.

The Project is located approximately 23km north-east of Mortlake and 21km west of Derrinallum and wholly within the Moyne Shire Council local government area (LGA). The location of the Project Area which includes the wind farm site, transmission line corridor and off-site substation, is shown in *Figure 1-1.*

The Victorian Minister for Planning decided that an assessment under the *Environment Effects Act 1978* (EE Act) is required. The Project will be assessed under the bilateral agreement that allows the Commonwealth Minister for the Environment to make a decision whether to approve the Project based on an assessment under the EE Act. Moreover, the Dundonnell Wind Farm is determined to be a 'controlled action' requiring assessment and approval under the Commonwealth *Environment Protection and Biodiversity Act 1999* (EPBC Act). The Project meets a number of triggers for a planning permit under the Moyne Planning Scheme, pursuant to the provisions of the *Planning and Environment Act 1987* (P&E Act). Three separate planning permits will be sought for the wind farm, transmission line and off-site substation.

The Minister for Planning has determined that an Environment Effects Statement (EES) is required for the Project to inform the consideration of statutory planning and environmental approvals required. The EES will inform decision-makers about the potential environmental impacts of the Project. The EES and supporting documentation has been developed in accordance with relevant policy, including the *Policy and planning guidelines for development of wind energy facilities in Victoria* (DELWP, April 2015) (the Wind Energy Guidelines) and the *Scoping Requirements - Dundonnell Wind Farm Project Environment Effects Statement* (EES Scoping Requirements) released by the former Department of Transport, Planning and Local Infrastructure (DTPLI) now the Department of Environment, Land, Water and Planning (DELWP) in September 2013, provided at Volume 2.



Client:	Trustpower		
Drawing No:	0107773_001G_R2_EES_Fig1_1_Site_loc_150303.mxd		
Date:	03/03/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 1-1 - Site Location Plan

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

1.2 The Proponent

Trustpower is a wholly owned subsidiary of Trustpower Ltd, a publicly listed company on the New Zealand stock exchange. Trustpower Ltd is an energy and telecommunications company that owns and manages 38 hydro generation power stations, and three operating wind farms globally, including one in Snowtown, South Australia. In June 2014, Trustpower acquired assets from Green State Power in New South Wales, including the 58MW Hume hydro power station, the 9.9MW Blayney wind farm and 80% of the 4.2MW Crookwell wind farm.

Trustpower began investigating potential wind farm sites in Australia in 2001 and is actively identifying further wind farm projects in South Australia, New South Wales and Victoria.

The Dundonnell Wind Farm Project was commenced in 2009 by NewEn Australia Pty Ltd and acquired by Trustpower in 2013.

In developing and operating this Project, DWFPL, a wholly owned subsidiary of Trustpower, will:

- comply with all environmental legislation and avoid, remedy or mitigate all significant adverse environmental effects and seek to minimise any adverse environmental effects;
- accurately record and report on environmental monitoring;
- implement inclusive, open and flexible stakeholder engagement;
- continually seek to improve its resource use efficiency; and
- ensure that all DWFPL employees receive adequate training to ensure that they are aware of and understand the requirements imposed on the company by environmental legislation.

Further information on Trustpower can be found at: www.trustpower.co.nz

1.3 Project Rationale

1.3.1 Objectives

The objectives of the Project are to:

- provide a source of renewable energy to supplement Victorian and National energy requirements;
- contribute to current Victorian and Federal Government targets for renewable energy;
- provide value added contributions at the broader State, regional and local levels in terms of labour and returns to capital;
- create new income streams for farmers and local businesses;
- provide employment opportunities, including over 200 full time direct and an additional 100 indirect (e.g. local retail, mechanic, hospitality and other service industries) jobs during construction and approximately 16 full time jobs during operation;
- liaise and work with the community and all potentially affected stakeholders in the identification, mitigation and/or monitoring of any potential environmental effects;
- ensure quality, safety and environmental standards are maintained;
- recycle and reuse materials where practically and economically feasible;
- minimise all potential negative environmental effects and where practical, maximise all potential positive environmental effects; and
- deliver responsible innovation and service excellence.

Preliminary estimates indicate that the Project could produce about 1000 Gigawatt hours (GWh) of electricity per year. This equates to providing power to over 150,000 homes. The Project is expected to result in a reduction of approximately 770,000 tonnes of annual carbon dioxide emissions (CO_2).

1.3.2 Greenhouse Gas Emissions

Australia's per capita greenhouse gas emissions are the highest of any Organisation for Economic Cooperation and Development (OECD) country and are among the highest in the world. In 2012-2013, per capita emissions (including emissions from land use, land-use change and forestry) were 249 tonnes carbon dioxide equivalent (CO_2-e) per person. Australia's per capita emissions are nearly twice the OECD average and more than four times the world average (Garnaut, 2011). Victoria generates in the order of 100 million tonnes (Mt) of CO_2 emissions per year, and in Victoria, electricity from coal accounts for over 60 percent (%) of total emissions.

One of the largest sources of Australia's disproportionately high greenhouse gas emissions is the combustion of coal in the electricity sector. Therefore, increasing the proportion of electricity generation derived from renewable energy sources can provide considerable environmental benefits. In 2013, electricity generation accounted for approximately 181Mt CO2-e, around 31% of Australia's total greenhouse gas emissions (The Climate Institute, 2013).

1.3.3 Energy Demand

Australia is heavily dependent on fossil fuels for electricity generation. Over 90% of Australia's electricity is derived from fossil fuels, with coal (both black and brown coal) accounting for approximately 53% of Australia's electricity generation (ABS, 2012).

1.3.4 Wind Energy

Wind energy is the world's fastest growing source of renewable electricity around the globe. Wind energy can make a significant contribution to Australia's clean energy future as it is a mature, proven and cost-effective technology. Over the past six years, global wind power capacity has continued to grow at an average cumulative rate of 23% worldwide, which is the equivalent of almost double Australia's current residential electricity consumption.

Installed wind power capacity in Australia has grown from 1.8% at the end of 2009, to 3.2% at the end of 2013 (Windicator, 2014). By 2029-2030, wind energy projects are forecast to account for 12% of total Australian stationary energy generation (ABARE 2010).

Wind energy also provides the following additional benefits:

- wind farms are compatible with the continued use of land for agricultural purposes;
- when decommissioned, wind farm sites are readily able to be returned to their original state;
- the cost of electricity produced from wind farms costs only a few cents higher per kWh than the current average price in Australia's National Electricity Market (NEM), with wind energy being the most cost competitive renewable energy technology;
- it results in carbon emissions savings as energy produced replaces energy that is otherwise provided from non-renewable sources; and
- construction and development of the wind farm creates a diversified construction skill base.

1.3.5 Policy Context

Australian Renewable Energy Target

The National Renewable Energy Target (RET) is a commitment to ensure that 20% of Australia's electricity supply comes from renewable energy sources by 2020. The RET policy creates a competitive market for new renewable

energy projects as it places a legal obligation on electricity retailers to purchase Renewable Energy Certificates (RECs) from accredited renewable electricity generators.

The RET is divided into two parts; the Large-scale Renewable Energy Target (LRET), which supports investment in large-scale renewable energy projects, and the Small-scale Renewable Energy Scheme (SRES), which targets small-scale technologies, such as solar water heaters and rooftop photo-voltaic systems.

The current target for renewable electricity generation under the LRET increases annually up to 41,850GWh by 2020. It is estimated that the LRET will drive investment in an additional 7GWh of wind energy by 2020 (SKM & MMA, 2012) and generate $14.5 billion of investment in large-scale renewable energy projects by 2020 (Roam Consulting, 2014). In addition, more than 24,000 Australians were employed in the renewable energy sector in 2012 and the RET is expected to generate 18,400 jobs by 2020 if retained in its current form. This is estimated to result in 9,700 jobs in large-scale renewables like wind and bioenergy and 8,700 jobs in household renewable energy, such as solar power and solar hot water (Roam Consulting, 2014).

1.3.6 Carbon Pricing and Emissions Trading

On November 2011, the Australian Federal Government passed the Clean Energy Future legislative package to introduce a carbon price from July 2012. A carbon pricing mechanism commenced in July 2012. Key polluters were required to buy and surrender to the Government a pollution permit for every tonne of pollution they produce. The cost was fixed at $23 per tonne.

In July 2014, the Government repealed the carbon tax with the intent of shifting to an emissions trading scheme that will allow the market to set the cost. This change will bring the Australian carbon price into line with the carbon price prevailing under the European Union Emission Trading System (EU ETS), which is currently anticipated to be around $6 per tonne of emissions in 2014-15.

1.3.7 Projected Electricity Generation for the Project

The expected electricity generation for the Project has been calculated by modelling the interaction between the wind distribution available within the wind farm site, and the capacity factor of the WTGs. The effectiveness of the conversion of wind into electricity at any site is measured by its capacity factor, which is the average output level over time and which varies site by site. The projected electricity generation for the Project is summarised in *Table 1-1*.

Table 1-1 Projected Electricity Generation for the Project

Project attribute	Figure
Total number of wind turbines	Maximum number 104
Rated capacity of each turbine	Approximately 3MW
Total installed capacity	Approximately 312MW
Capacity factor incorporated in the Environmental Benefits	38%
Annual Electricity Output	Approximately 1000GWh
Equivalent household consumption (Victorian homes)	150,000
Carbon dioxide displaced per annum	770,000 tonnes

1.4 Structure of the EES

This EES has been prepared to ensure that the Project is described adequately, the potential environmental impacts are assessed and proposed mitigation measures are identified. The EES also includes the information required to support the planning permit applications required under the P&E Act. To present this information, the EES consists of four volumes, with the main environmental assessment contained at Volume 1 as outlined in *Table 1-2*. The supporting specialist technical assessments and other documentation are contained in Volume 2, the Certificates of Title relevant to the Project are contained in Volume 3 and the letters of consent from the owners of dwellings within 2km of a WTG and letters of support from property owners where terms have been agreed with Trustpower are included at Volume 4.

Table 1-2 EES Structure

Chapter No.	Chapter Title	Chapter Summary
1	Introduction	Describes the Project and the proponent (Trustpower) and the objectives of the Project.
2	Project Description	Outlines the proposed development and its components for both construction and operation.
3	Site Analysis	Identifies the existing conditions of the Project area and surrounding area.
4	Legislation and Approvals Framework	Describes the approvals framework and the relevant legislation and policies to the Project.
5	Project Alternatives	Describes the alternatives considered for the Project including site selection processes and infrastructure layouts and configurations.
6	Environmental Impact Assessment Approach	Describes the methodology used to prepare this EES including the impact assessment approach undertaken for the Project.
7	Community and Stakeholder Engagement	Describes the key stakeholders in the Project, the consultation undertaken by the proponent in relation to the Project, and the management of key issues raised during the consultation.
8	Geomorphology and Soils	Chapters 8-22 describe the physical, biological, cultural, social and economic environments that the Project would operate within, the potential risks and impacts of the Project upon the existing environment, the mitigation and management measures that would be undertaken to minimise these risks and impacts, and the residual environmental effects of the Project.
9	Hydrogeology	
10	Surface Water	
11	Cultural Heritage	
12	Flora and Fauna	
13	Brolga	
14	Noise and Vibration	
15	Shadow Flicker and Blade Glint	
16	Electromagnetic Interference	
17	Landscape and Visual	
18	Planning and Land Use	
19	Traffic and Transport	
20	Socio-Economic	
21	Aviation	
22	Fire Management	
23	Cumulative Impacts	Describes the potential cumulative impacts of the Project in combination with existing and other publicly proposed wind farms in the region.

Chapter No.	Chapter Title	Chapter Summary
24	Matters of National Environmental Significance	Summarises the assessment of matters of national environmental significance that are required to be assessed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.
25	Environmental Management Framework	Outlines the environmental management process and describes the environmental management plan that would be used in the construction, operation, decommissioning and rehabilitation of the Project.
26	Conclusions	Presents the conclusions of the EES.
27	References	

Volume 2 contains 26 annexures as follows:

Annex A EES Scoping Requirements.

Annex B Environment Protection and Biodiversity Conservation Act 1999 (Schedule 4) –matters to be addressed by Draft Public Environment Report and Environmental Impact Statement.

Annex C Dundonnell Wind Farm EES Consultation Plan, 2015.

Annex D Consultation Material.

Annex E Proposed Dundonnell Wind Farm Geoscience Features Significance and Sensitivity Assessment, 2014.

Annex F Hydrogeological Study, Dundonnell Wind Farm, 2015.

Annex G Dundonnell Wind Farm, Surface Water Assessment, 2014.

Annex H Dundonnell Wind Farm, Draft Cultural Heritage Management Plan, Wind Farm Site, 2015.

Annex I Dundonnell Wind Farm, Draft Cultural Heritage Management Plan, Transmission Line, 2015.

Annex J Dundonnell Wind Farm, Historic Heritage Assessment, Wind Farm Site, 2014.

Annex K Dundonnell Wind Farm, Historic Heritage Assessment, Transmission Line, 2014.

Annex L Dundonnell Wind Farm, Flora and Fauna Assessment, 2015.

Annex M Dundonnell Wind Farm, Brolga Assessment, 2014.

Annex N Dundonnell Wind Farm, Brolga Assessment Peer Review, 2014.

Annex O Dundonnell Wind Farm, Noise Impact Assessment, 2014.

Annex P Shadow Flicker and Blade Glint Assessment for the Proposed Dundonnell Wind Farm, 2014.

Annex Q Assessment of Electromagnetic Interference Issues for the Dundonnell Wind Farm, 2014.

Annex R Dundonnell Wind Farm, Landscape and Visual Assessment, 2014.

Annex S Dundonnell Wind Farm, Landscape and Visual Assessment Peer Review, 2014.

Annex T	Dundonnell Wind Farm, Planning and Land Use Assessment, 2015.
Annex U	Dundonnell Wind Farm, Traffic Impact Assessment, 2014.
Annex V	Dundonnell Wind Farm Project, Socio-Economic Impact Assessment, 2014.
Annex W	Dundonnell Wind Farm, Economic Impact Assessment, 2014.
Annex X	Aeronautical Impact and Night Lighting Assessment, Dundonnell Wind Farm, 2014.
Annex Y	Draft Quarry Work Plan, 2015.
Annex Z	Report on Desk Study Geotechnical Assessment, 2011.

Volume 3 contains four annexures as follows:

Annex A	Summary of the Certificates of Title relevant to the Project.
Annex B	Certificates of Title, Wind Farm Site.
Annex C	Certificates of Title, Transmission Line.
Annex D	Certificates of Title, Off-site Substation.

Volume 4 contains two annexures as follows:

Annex A	Letters of consent from owners of dwellings within 2km of a WTG.
Annex B	Letters of support from property owners where terms have been agreed with Trustpower.

1.5 EES Requirements

On 21 January 2013, the Victorian Minister for Planning determined that the Project had the potential for significant environmental effects and that an EES was required under Section 8B (3) (a) of the EE Act. The EES assessment process is described in *Chapter 4.*

This EES has been prepared in accordance with the requirements specified in:

- The *Scoping Requirements - Dundonnell Wind Farm Project Environment Effects Statement* (DTPLI, 2013) (EES Scoping Requirements);
- *Policy and planning guidelines for development of wind energy facilities in Victoria* (DELWP, 2015)(the Wind Energy Guidelines); and
- Clause 52.32 'Wind Energy Facility' of the Moyne Planning Scheme.

The EES Scoping Requirements provide guidance on the specific matters to be investigated and documented in the EES, in the context of the *Ministerial Guidelines for the Assessment of Environmental Effects* under the EE Act. As part of the bilateral agreement between the Commonwealth and Victoria, the scoping requirements also included matters required to be addressed under the EPBC Act.

The EES is also required to address the matters identified in Schedule 4 of the *Environment Protection and Biodiversity Conservation Regulations* (2000). These have been compiled in a table and included at Volume 1: *Annex B*.

1.5.1 EES Draft Evaluation Objectives

This EES has been prepared to address the EES Draft Evaluation Objectives outlined in the EES Scoping Requirements and each technical chapter highlights the relevant objectives being considered. The legislation, guidelines and policies relevant to the Draft Evaluation Objectives are also presented within each chapter.

The EES Draft Evaluation Objectives are presented in *Table 1-3,* together with corresponding references for where the objectives are addressed within the EES chapters.

Table 1-3 EES Draft Evaluation Objectives

EES Draft Evaluation Objectives	Relevant EES Chapter
Biodiversity – To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, including those listed under the FFG Act or EPBC Act, and address opportunities for offsetting potential losses consistent with relevant policy.	Chapter 12 – Flora and Fauna Chapter 13 – Brolga Chapter 24 – Matters of National Environmental Significance
Landscape and Geoscience Values – *To avoid or minimise adverse effects on the landscape and geoscience values of the region.*	Chapter 8 – Geomorphology and Soils Chapter 17 – Landscape and Visual
Land use and Socio-economic – *To avoid or minimise disruption and other adverse effects on local infrastructure (including roads), land use (including agricultural and residential) and to neighbouring landowners and road users during construction and operation of the Project.*	Chapter 18 – Planning and Land Use Chapter 19 – Traffic and Transport Chapter 20 – Socio-Economic
Amenity – *To avoid or minimise adverse noise, visual and other amenity effects on nearby residents and local communities, to the extent practicable*.	Chapter 14 – Noise and Vibration Chapter 15 – Shadow Flicker and Blade Glint Chapter 16 – Electromagnetic Effects Chapter 17 – Landscape and Visual Chapter 20 – Socio-Economic Impacts
Cultural Heritage – *To avoid or minimise adverse effects on Aboriginal and historic cultural heritage and associated values.*	Chapter 11 – Cultural Heritage
Catchment Values – *To maintain the functions and values of aquatic environments, surface water and groundwater, including avoiding effects on hydrology and protected beneficial uses.*	Chapter 9 – Hydrogeology Chapter 10 – Surface Water
Environmental Management Framework – *To provide a transparent framework with clear accountabilities for managing environmental effects and hazards associated with construction, operation, decommissioning and rehabilitation phases of the Project, in order to achieve acceptable environmental outcomes.*	Chapter 25 – Environmental Management Framework
Sustainable Development – *Overall, to ensure that the Dundonnell Wind Farm Project achieves a balance of economic, environmental and social outcomes that contributes to sustainable development and provides a net community benefit over the short and longer-term.*	Whole EES Chapter 26 – Conclusion

This page is intentionally blank

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 2 - PROJECT DESCRIPTION

This page is intentionally blank

Contents

Figures

Tables

Photographs

This page is intentionally blank

2 PROJECT DESCRIPTION

2.1 Introduction

This Chapter describes the main components of the Project, including details of the wind farm site layout, the WTGs and their dimensions, associated infrastructure, the construction timing and generation capacity.

2.2 Project Overview

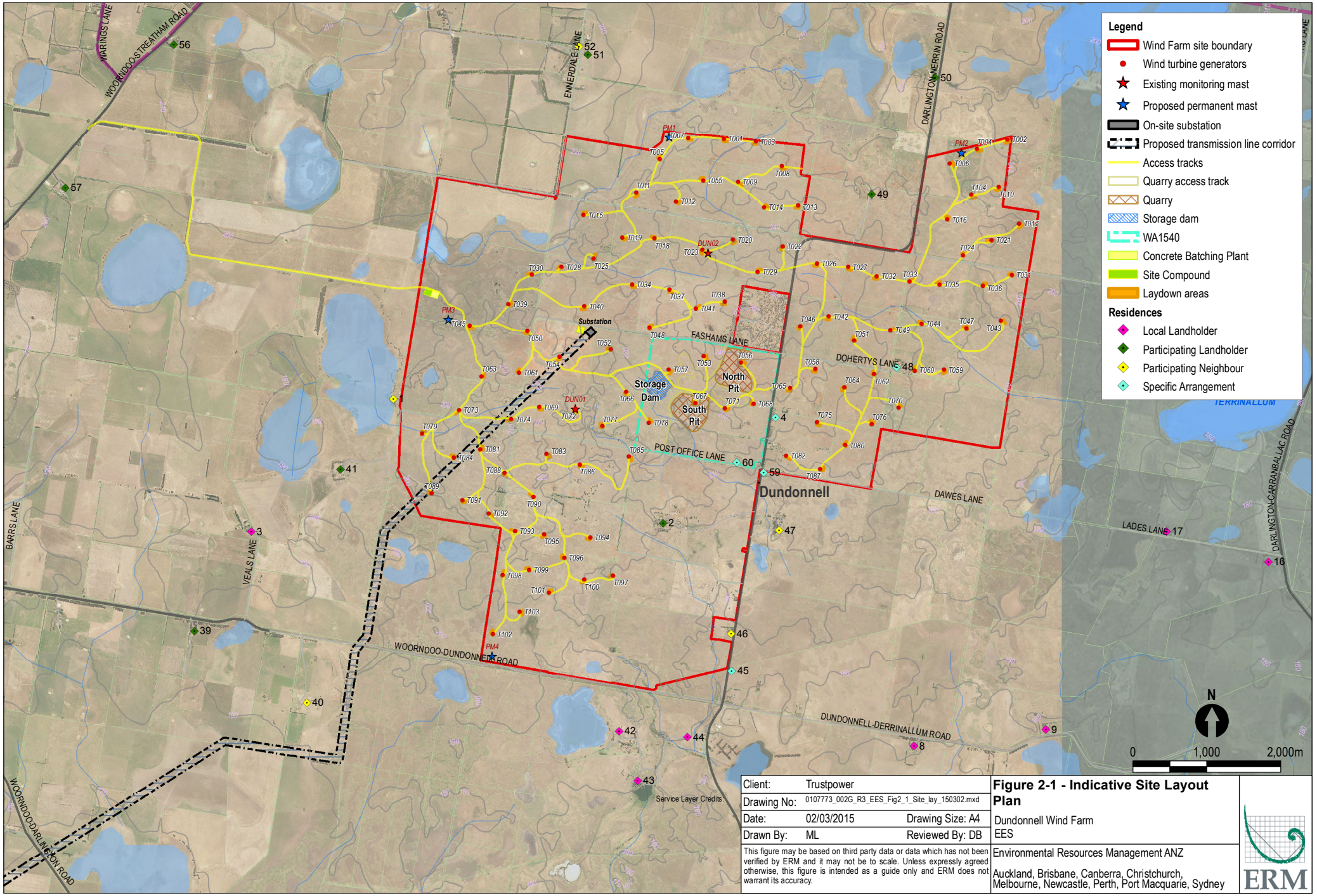
The Project will consist of the following components:

- up to 104 WTGs with a maximum height of 165m AGL (to the blade tip) and adjacent hardstands for the generation of electricity within the wind farm site;
- up to 104 transformer kiosks externally housed adjacent to each WTG. Alternatively transformers may be located inside the WTGs;
- up to four permanent wind monitoring masts within the wind farm site with a height of approximately 110m AGL (hub height of the WTGs);
- a permanent operations and maintenance building;
- a central electrical 220/33kV substation/switchyard building, including a control room, transformers, switchgear, insulators and other ancillary equipment;
- an off-site electrical 500/220kV substation, to be located on land to the east of MOPS;
- a single or double circuit, 220kV above ground transmission line connecting the on-site electrical substation/switchyard building to the off-site substation. The transmission line would be established within a corridor approximately 50m wide and generally on monopoles (with double pole structures being utilised only where absolutely necessary) up to a maximum height of 35m AGL. A 500kV transmission line (up to 1km in length) will connect the off-site substation to MOPS;
- underground 33kV electrical reticulation and fibre optic cabling connecting the WTGs to the on-site substation/switchyard building; and
- an internal private access road network (approximately 75km in length) connecting the WTGs and the wind farm site to the public road network.

The following elements will also be required during construction of the Project:

- earthworks for access tracks, WTG platforms and foundations;
- on-site quarry;
- concrete batching plant(s);
- water supply for concrete batching and construction activities (potentially groundwater extraction from bores subject to an appropriate water resource being available on-site and obtaining the necessary approvals to do so);
- cleared hardstand areas for construction equipment and storage (construction laydown areas);
- temporary buildings; and
- the use and storage of hazardous substances.

The key project components are discussed in further detail below. The proposed layout of the wind farm site including the WTGs, access track network and connection to the transmission line corridor is identified in *Figure 2-1.*



Client:	Trustpower		
Drawing No:	0107773_002G_R3_EES_Fig2_1_Site_lay_150302.mxd		
Date:	02/03/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 2-1 - Indicative Site Layout Plan

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

2.3 Project Components

2.3.1 WTG Description

The Project will involve the construction and operation of up to 104 WTGs within the wind farm site boundary.

Each WTG will consist of a tower, nacelle, hub and rotor. These elements will all be painted a similar colour, within a white to light grey colour palette. The painted surface will be non-reflective.

The WTGs will have a maximum height AGL of 165m to the blade tip and will be supported by either a mass gravity concrete foundation or deep piled foundation.

The nacelle is the housing that sits on the top of the turbine tower and accommodates the generator, control systems, pitch and yaw drives. The nacelle may also include the transformer and gearbox (if used) and is typically constructed of fibreglass. Given the nature of the components housed within the nacelle, oil containment and sound insulation will be provided for within each WTG. Access into the nacelle will be provided through an opening in the floor which leads to the tower.

The rotor, which includes the blades, is the portion of the WTG that captures the energy from the wind. The energy captured by the rotating blades is transferred to a generator housed within the nacelle. Blades are generally made of fibreglass reinforced with epoxy and carbon fibre. The rotor is controlled by a central wind turbine control unit (microprocessor). The microprocessor controls the rotational speed of the rotor and the pitch of the blades, thus enabling the rotor to maximise energy production from the wind resource and ensure the safe and reliable operation of the WTG. When wind speeds get too high the microprocessor controls the pitch of the blades to stop the WTG rotating. This minimises wear on the components from operating at too high wind speeds.

For each WTG, a transformer will be required to 'step-up' to the on-site distribution voltage of 33kV. Depending on the type of WTG selected, this transformer may be located within an external kiosk mounted on a pad adjacent to each WTG, or contained within the WTG in the tower base or nacelle. Each WTG will be connected to the on-site substation via a network of underground power and communication cables.

2.3.2 Wind Monitoring Masts

In addition to the 104 WTGs, up to four wind monitoring masts will be established within the wind farm site. All masts will be permanent structures, supported by a small concrete foundation and guy wires.

The height of each wind monitoring mast will be approximately 110m AGL but will likely be constructed to a height equivalent to the hub-height of the installed WTGs. The locations of the wind monitoring masts are shown on *Figure 2-1*.

2.3.3 On-Site Quarry

Established sources of construction materials in the region are very limited and it is preferable to source construction materials on-site where possible. Therefore, an on-site quarry is proposed to reduce reliance on external quarries and minimise impacts on local roads and the community. The on-site quarry (proposed Work Authority 1540) is intended to provide the materials required for construction of the hardstands and the internal access roads. A *Draft Quarry Work Plan* has been prepared by CK Prowse and Associates and is contained at Volume 2. The location of the proposed quarry is identified on the site layout plan at *Figure 2-1*.

The quarry will comprise a northern and southern pit located to the north of Post Office Lane and the west of Darlington-Nerrin Road within the wind farm site. Work Authority 1540 covers an area of 272.54ha, while the

extraction area will be confined to the two pits with an area of 19.2ha and 17.8ha for the north and south pits respectively.

Basalt materials will be extracted and processed into crushed rock products. The proposal accounts for development over an anticipated 2-3 year period at assumed production of 300,000 tonnes per annum (tpa). Extraction will be undertaken from the two pits in stages, as detailed in Section 7.4 of the *Draft Quarry Work Plan*. The estimated deposit volume of total basalt for the northern pit is 3.9Mt and 3.7Mt for the southern pit. The basalt is to be extracted by traditional drill and blast method. Broken rock will then be removed by excavator and trucked to the crushing plant. It is proposed that a mobile crushing and screening plant will be used for processing. A temporary amenities and workshop building will be located within the perimeter of the processing area.

During site establishment, access to the quarry site will be from the existing entrances off Fashams or Post Office Lane. The product sourced from the quarry will be transported within the wind farm site boundary, thereby avoiding and reducing pressure for the local road network.

The quarry location benefits from its isolation and undulating topography, thereby minimising amenity impacts such as dust and noise. The closest two dwellings (at construction and operational stage) comprise a participating landholder approximately 1.3km south of the southern pit, and a participating neighbour, approximately 1.7km south-east of the southern pit. Nonetheless, to mitigate any impacts, the design includes a minimum 20m buffer zone to all external boundaries where no excavation can occur. In addition, a 60m buffer zone will be maintained on the development of the northern limit of the northern pit (Stage 4) until operational experience is obtained on rock quality and strength parameters, to ensure the zone can be developed without compromising ground stability. These buffer zones, in conjunction with the screening provided by the natural topography and earthen bund walls, will mitigate any direct line of sight and transient noise. Moreover, it is envisaged that normal quarry operations will be undertaken during daytime hours, between 7am-6pm Monday to Friday and 7am-1pm Saturday.

Drainage from disturbed areas will be captured internally within the works authority area and directed along quarry drainage lines for redirection to a retention pond. Transient dust is unlikely to be an issue at the site due to the isolated position of the quarry pits and the processing area. Dust creation may occur during stripping operations on hot windy days or during the transport of soil and overburden for rehabilitation works. A water truck will be used for dampening roads and plant/stockpile areas. Loads transported near any sensitive locations will be covered prior to leaving the site.

Rehabilitation of the quarry pits will occur progressively as extraction of material is completed. The primary objective of the rehabilitation plan is to leave the site in a safe and stable manner and provide productive rural land for the landowners at the completion of quarrying activities. The bunds will be removed to enable backfill as necessary to cover the final rehabilitation surfaces. The plant area will be cleared, contour ripped and top-dressed for regressing. Rehabilitation of the pits will achieve amphitheatre shapes and the landform will be self-draining. Local seed propagators and Council will be consulted during preparation phases for seed collection, sowing density and propagation.

The quarry will be subject to a detailed design process, with further information outlined in the *Draft Quarry Work Plan*.

2.4 Electrical Reticulation

2.4.1 On-Site Substation

A substation compound is proposed on-site with approximate dimensions of 200m x 150m. The transformers and radiators in the electrical substation will be located on pedestal foundations and will be surrounded by concrete bunds. These bunds will have sufficient capacity to retain all of the oil utilised in each transformer.

The primary purpose of the electrical substation/switchyard is the reception, transformation and distribution of electrical power and energy. The electrical substation will house up to two dual-rated transformers (approximately

160 mega-volt ampere (MA), switch gear, and ancillary equipment for the transformation and distribution of energy. In the event that the one transformer was out of service, a single transformer will be capable of handling the majority of the Project output (for a limited time).

The location of the substation is identified in the site layout plan at *Figure 2-1*. An image of a typical 220/33kV substation is provided at *Photograph 2-1.*

Photograph 2-1 Typical 220/33kV Substation

2.4.2 33kV Cable and Fibre Optic Network

Each of the 104 WTGs will be connected to each other and to the on-site substation via a network of 33kV underground electrical cables. The 33kV electrical cables will be placed in a trench approximately one metre deep that will be backfilled with suitable materials.

The underground 33kV electrical cable and fibre optic network will generally follow the alignment of the internal access roads and will have a total length of approximately 86km.

2.4.3 220kV Transmission Line

The proposed overhead transmission line will extend from the wind farm site to the proposed off-site substation on land to the east of the MOPS for a length of approximately 38km.

The transmission line route will consist of a 220kV (single or double circuit) transmission line (comprising 3 or 6 wires) located within a 50m corridor. The transmission line will be primarily constructed on monopoles up to a maximum height of 35m AGL, however some double pole structures may be required in select locations due to topography or other technical requirements. Each monopole will have a footprint of approximately 4m², including concrete footings with a diameter of approximately 2.5m, up to a depth of approximately 12m. The average span between each pole will be approximately 250m, although this may vary between poles due to topography, vegetation or landholder requirements.

A 500kV transmission line (up to 1km in length) will connect the off-site substation and MOPS. This portion of the transmission line will be constructed of light and heavy strain suspension towers, requiring approximately 3-4 towers over the 1km route, with a footprint varying between approximately 55-97m² for each tower.

The proposed transmission line corridor and grid connection system designed for the Project is indicated in *Figure 2-1*. An indicative image of a typical transmission line within the landscape is provided at *Photograph 2-2*.

Photograph 2-2 Typical Transmission Line

2.4.4 Off-Site Substation

An off-site substation will be developed on the land immediately to the east of the MOPS (EPA Licence 8750) on land that forms part of the transmission line corridor. A 500kV transmission line (up to 1km in length) will connect the off-site substation to the Heywood-Moorabool 500kV network. Trustpower will enter into a commercial agreement with this landholder.

This substation will contain similar infrastructure to the on-site substation. The location of the substation is identified in the site layout plan at *Figure 2-1.* The substation compound will have approximate dimensions of 300m x 250m. An indicative image of a typical 500/220 kV substation is provided at *Photograph 2-3.*

Photograph 2-3 Typical 500/220kV Substation

2.5 Site Layout

2.5.1 Introduction

The site layout and number of WTGs has been decided, among other things, through analysis of the outcomes of the technical assessments that are summarised in the later sections of this Report. The site layout is shown in *Figure 2-1.*

2.5.2 Access

Public Roads

Subject to obtaining relevant approvals and permits from VicRoads, WTG components will be imported to the Port of Portland, and transported via Woorndoo by road to the wind farm site. Transformers for the Project will be delivered to the Port of Geelong, transported to Mortlake and then to the wind farm site and off-site substation.

Internal Access Roads

A main access track, with a length of approximately 6.5km and width up to 12m, is proposed to be established from Woorndoo-Streatham Road to access the site's western boundary. The construction and maintenance of the Project will also require the construction of approximately 75km of private access tracks within the wind farm site. The tracks will also provide ongoing access for farm management practices for land owners continuing to utilise the site. Where possible, the internal road network will be aligned on the route of existing farm or other tracks. During construction the internal access tracks will be up to 10m wide (with approximately 1m shoulders on either side), with localised widening where required to support transportation and construction activities.

Construction of the access roads will require land clearing and the removal of topsoil to a suitable founding layer. Where tracks cross water bodies, suitable crossings will be installed. The roads will maintain a vertical alignment in order to minimise the interception of storm water. However, any storm water runoff collected from the internal access road network and hardstand areas will be conveyed by channel and/or pipe systems to designated disposal locations (e.g. soak pits or discharges into the existing drainage channels on-site). Energy dissipation measures (e.g. rock lining and culvert wing walls) may be required in some locations to reduce the potential for erosion during storm events.

During construction, dust suppression will be applied to the internal access roads on an as required basis using water carts and other applicable measures. The access road network is identified as part of *Figure 2-1.*

With regards to the transmission line, approximately 10km of the route will adjoin the existing road reserve and thus, new access tracks will not be required for this portion of the transmission line. In areas not adjoining the road reserve, access tracks with a width of approximately 4-5m will be required during construction.

2.5.3 Construction Laydown Areas

A crane pad or hardstand will be required adjacent to the base of the WTGs to enable the assembly and erection of the tower, nacelle and blade components. Although the final design will depend on the topography of the surrounding land, each crane pad will consist of crushed rock hardstand of approximately 50m x 30m.

Whilst it is anticipated that the majority of crane pads will remain in situ to allow for future maintenance or removal of the WTGs, there may be the opportunity to apply a top soil layer to the laydown portions to allow grazing activities to resume.

Additional construction laydown areas may be required at select locations within the wind farm site to support the delivery of equipment and WTG components during construction. It is anticipated these laydown areas will be approximately 75m x 75 m.

2.5.4 Permanent Operations and Maintenance Building

A permanent site operations and maintenance facility including offices, sheds, car/truck parking, and laydown areas will be constructed within the wind farm site. This will provide for all operations and maintenance activities associated with the substation and wind farm. The area of land occupied by area will be approximately 100m x 75m.

During operations approximately 10 permanent staff will occupy these premises. Whilst most activity is anticipated to occur during business hours, Monday to Friday, access to the site will be required on a 24 hour basis, seven days a week.

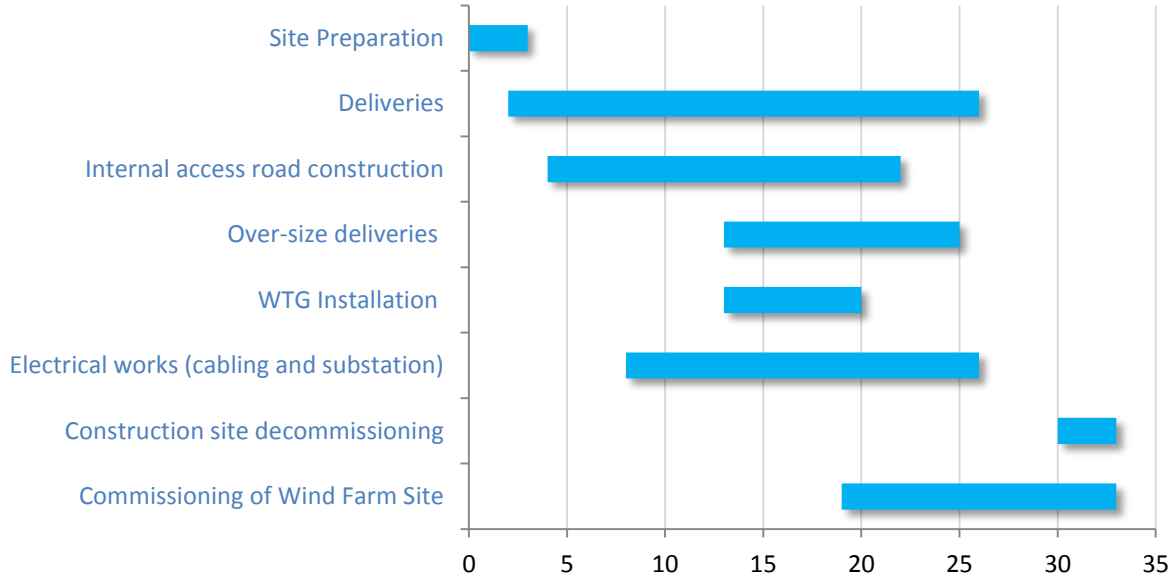
The wind farm will be subject to round-the-clock remote monitoring by specialist technicians. This remote monitoring will enable rapid response to maintenance issues, and if necessary will include the ability to shut down any and all WTGs on-site.

2.6 Wind Farm Construction

2.6.1 Project Construction Schedule

The Project is anticipated to have a construction timeframe of approximately 24-36 months. An indicative construction schedule for the Project is presented in *Table 2-1*.

Table 2-1 Indicative Construction Schedule (Months)



2.6.2 Transport

WTG Transport

The main components of a WTG are the nacelle and drive train assembly (gearbox and main shaft), hub, blades and tower sections. Over dimensional (OD) transport trucks will be used to transport the WTG components. OD vehicles to transport transformers for the substation will exceed VicRoads maximum Gross Combination Mass Limits for heavy vehicles and therefore will require permits and the preparation of a specific traffic management plan.

Construction Materials

Materials for the construction of the foundations of the WTGs are proposed to be primarily sourced from the on-site quarry. The on-site quarry is discussed in *Section 2.3.3*.

WTG Installation

Excavation for the WTG foundations will be carried out with mechanical equipment. Initial geotechnical assessment has indicated that in some cases, primary fragmentation by hydraulic fracturing or drilling and blasting may be required.

The design of the WTG foundations will depend on localised geotechnical conditions and utilise either a mass gravity concrete foundation or deep piled foundation. Topsoil and spoil from excavation will be stockpiled for reuse to backfill over the foundation and for vegetation rehabilitation of the wind farm site. Excess materials will be utilised at other parts of the wind farm site.

The towers, nacelles and blades will be lifted off delivery trucks using mobile cranes. Cranes will then assist in the assembly of the rotor and the installation of the towers, nacelles and rotors.

Following delivery of main components, the crane operations associated with WTG erection will take two or three days to complete for each WTG, depending on weather conditions.

2.6.3 Concrete Batching Plants

Two temporary concrete batching plants are proposed at the wind farm site, one near the western boundary and another located centrally within the wind farm site. The batching plants will include a slump stand, water tanks and stockpiles of gravel and sand. They will primarily be used for the construction of the WTG foundations but may also provide materials for building foundations, bunding, culverts etc.

Whilst the exact details of the facilities will be determined during the detailed design phase, typically the area required for the plant and storage of materials for each facility will be approximately 100m x 100m with a height of approximately 10m. The batching plants will be bunded to contain runoff and potential contaminants.

Materials for the plants will be primarily sourced from the on-site quarry. The cement will be stored in a silo adjacent to the batching process machinery. Concrete agitators will transfer the concrete from the batching plant to the WTG foundation locations.

The concrete batching plants will be removed following the completion of construction. The location of the plants will be rehabilitated and returned to agricultural use.

An image of a typical temporary concrete batching plant is included in *Photograph 2-4*.

Photograph 2-4 Typical Temporary Concrete Batching Plant

2.6.4 Water Supply

Water supply for the concrete batching plant, dust suppression and other construction activities will be required on-site. It is anticipated that water for the concrete batching plant will be supplied from groundwater sourced within the wind farm site, subject to an appropriate resource being available and appropriate approvals being obtained. If, in the unlikely event that groundwater volume is not sufficient, water will be obtained from local sources, subject to approval.

2.7 Decommissioning and Rehabilitation

The proponents of the Project have entered long-term lease agreements with the landholders for the construction and operation of the Project. The WTGs have an expected 25 year operating life, at the end of which there are three main options for consideration:

- continue the use of the site as a wind farm using the existing WTGs;
- replace the WTGs with technology current at that time and continue the use of the site as a wind farm for a further term; or
- decommission the Project and remove the WTGs and associated infrastructure in accordance with a Decommissioning and Rehabilitation Plan.

A Decommissioning and Rehabilitation Plan will be prepared as per the requirements outlined within Appendix B of the Wind Energy Guidelines and will provide for the rehabilitation and decommissioning of all components of the wind farm.

The decommissioning work will be undertaken in consultation with the landholders to ensure that the land can be returned to agricultural use. Hardstand crane pads constructed for the Project will be reused during the decommissioning stage of the Project. It is anticipated that some access tracks may be retained, should landholders desire to use them for agricultural activities. In most areas, the wind farm site will be returned to rural pasture, with native vegetation planted where necessary.

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 3 - SITE ANALYSIS

This page is intentionally blank

Contents

Figures

Tables

This page is intentionally blank

3 SITE ANALYSIS

3.1 Introduction

This Section identifies the existing conditions of the Project area and the surrounding area. It describes details of the location, land use, physical conditions (topography and geology), drainage and waterways, flora and fauna, landscape, heritage, infrastructure, transportation and access and the wind resource. The environmental constraints within the wind farm site and the transmission line corridor are broadly identified in *Figure 3-1 to Figure 3-6* and are discussed in *Sections 3.5* to *3.9*.

3.2 Location

The wind farm site is located at Dundonnell, Victoria, approximately 225km west of Melbourne and entirely within the Moyne Shire Council LGA. The proximity of the wind farm site to nearby towns and communities is detailed in *Table 3-1*.

Table 3-1 Proximity to Nearby Townships

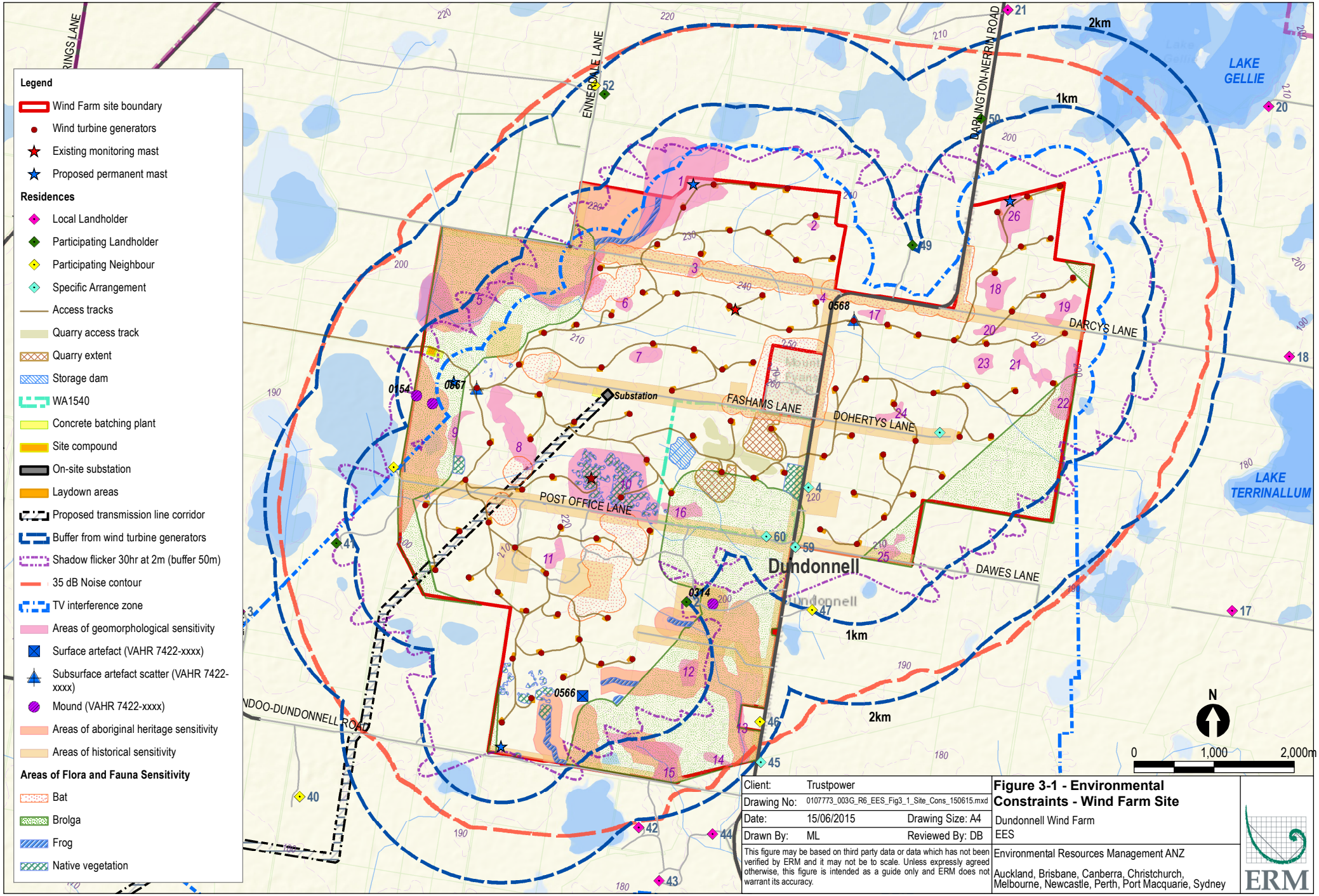
Township	Approximate distance and direction from wind farm site
Mortlake	23km south-west
Woorndoo	12km west
Darlington	12km south-east
Pura Pura	6km north-east
Derrinallum	21km east

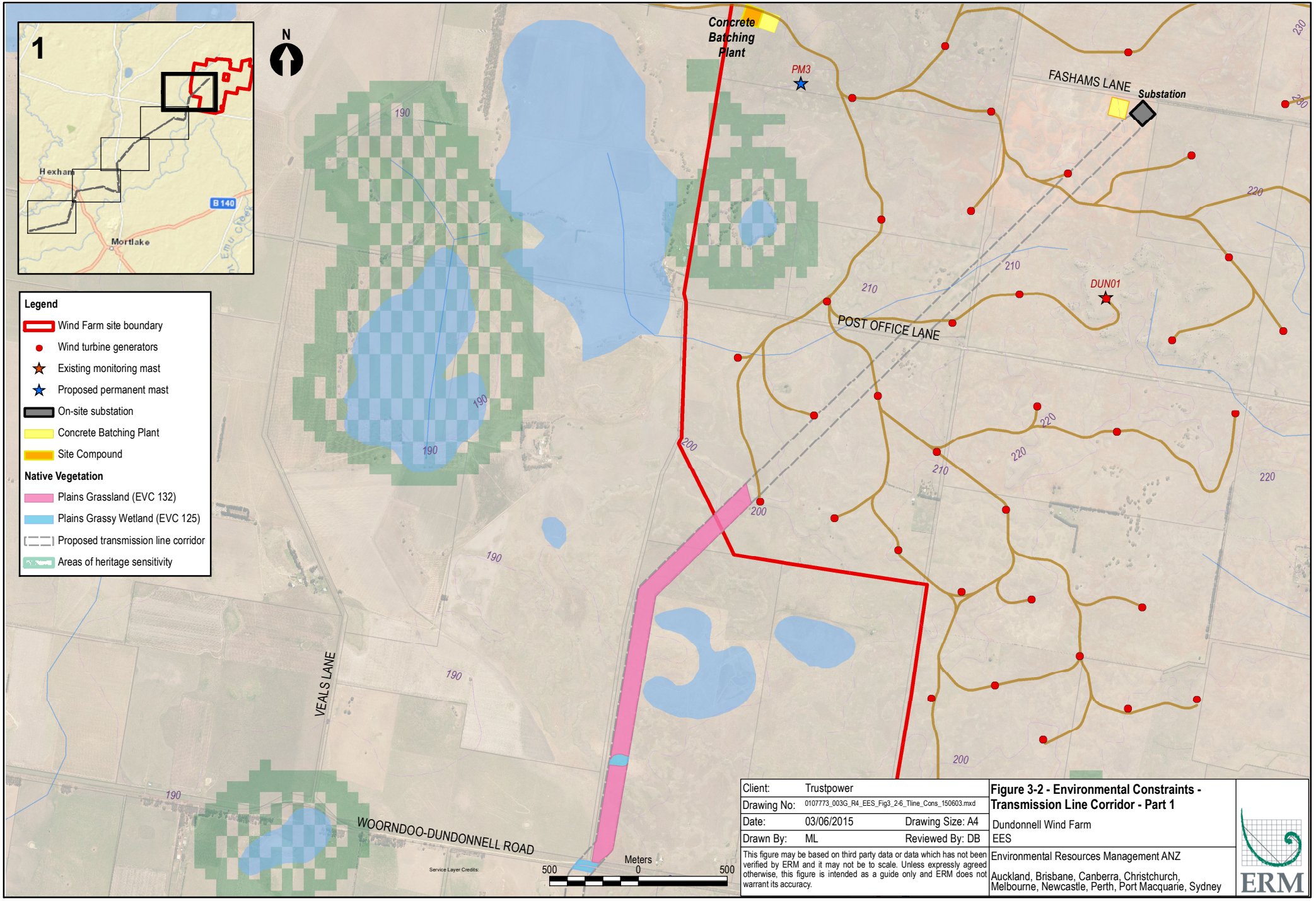
The associated transmission line corridor is proposed to run approximately 38km from the south-western boundary of the wind farm site and terminate at the proposed off-site substation east of MOPS.

3.3 Site Details

The wind farm site is irregular in shape and bounded by farmland to the north, Darlington-Nerrin Road to the east, Woorndoo-Dundonnell Road to south and farmland to the west. The site comprises approximately 4,200ha of agricultural land with isolated homesteads. Wind farm infrastructure including WTGs and roads will cover an area of approximately 220ha, which constitutes approximately 2% of the wind farm site. Trustpower has entered into commercial agreements with 11 landholders to host the wind farm. In addition, Trustpower has entered into commercial agreements with 15 landholders to host the transmission line easement. The transmission line connects with the proposed off-site substation on the land to the east of the MOPS (EPA Licence 8750). A commercial agreement will be put in place with this landholder.

A summary of the Certificates of Title relevant to the Project is provided at Volume 3 together with copies of the titles. Some of the Certificates of Title identify encumbrances on the land including caveats and powerline easements.


Legend
Wind Farm site boundary
Wind turbine generators
Existing monitoring mast
Proposed permanent mast
Residences
Local Landholder
Participating Landholder
Participating Neighbour
Specific Arrangement
Access tracks
Quarry access track
Quarry extent
Storage dam
WA1540
Concrete batching plant
Site compound
On-site substation
Laydown areas
Proposed transmission line corridor
Buffer from wind turbine generators
Shadow flicker 30hr at 2m (buffer 50m)
35 dB Noise contour
TV interference zone
Areas of geomorphological sensitivity
Surface artefact (VAHR 7422-xxxx)
Subsurface artefact scatter (VAHR 7422-xxxx)
Mound (VAHR 7422-xxxx)
Areas of aboriginal heritage sensitivity
Areas of historical sensitivity
Areas of Flora and Fauna Sensitivity
Bat
Brolga
Frog
Native vegetation
2km
1km
1km
2km
ENNERDALE LANE
DARLINGTON-NERRIM ROAD
DARCYS LANE
FASHAMS LANE
DOHERTYS LANE
POST OFFICE LANE
DAWES LANE
NDOO-DUNDONNELL ROAD
Substation
0154
0567
0568
0314
0566
Dundonnell
LAKE GELLIE
LAKE TERRINALLUM
N
0
1,000
2,000m
Client: Trustpower
Drawing No: 0107773_003G_R6_EES_Fig3_1_Site_Cons_150615.mxd
Date: 15/06/2015 Drawing Size: A4
Drawn By: ML Reviewed By: DB
This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.
Figure 3-1 - Environmental Constraints - Wind Farm Site
Dundonnell Wind Farm
EES
Environmental Resources Management ANZ
Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney
ERM



Client:	Trustpower		
Drawing No:	0107773_003G_R4_EES_Fig3_2-6_Tline_Cons_150603.mxd		
Date:	03/06/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

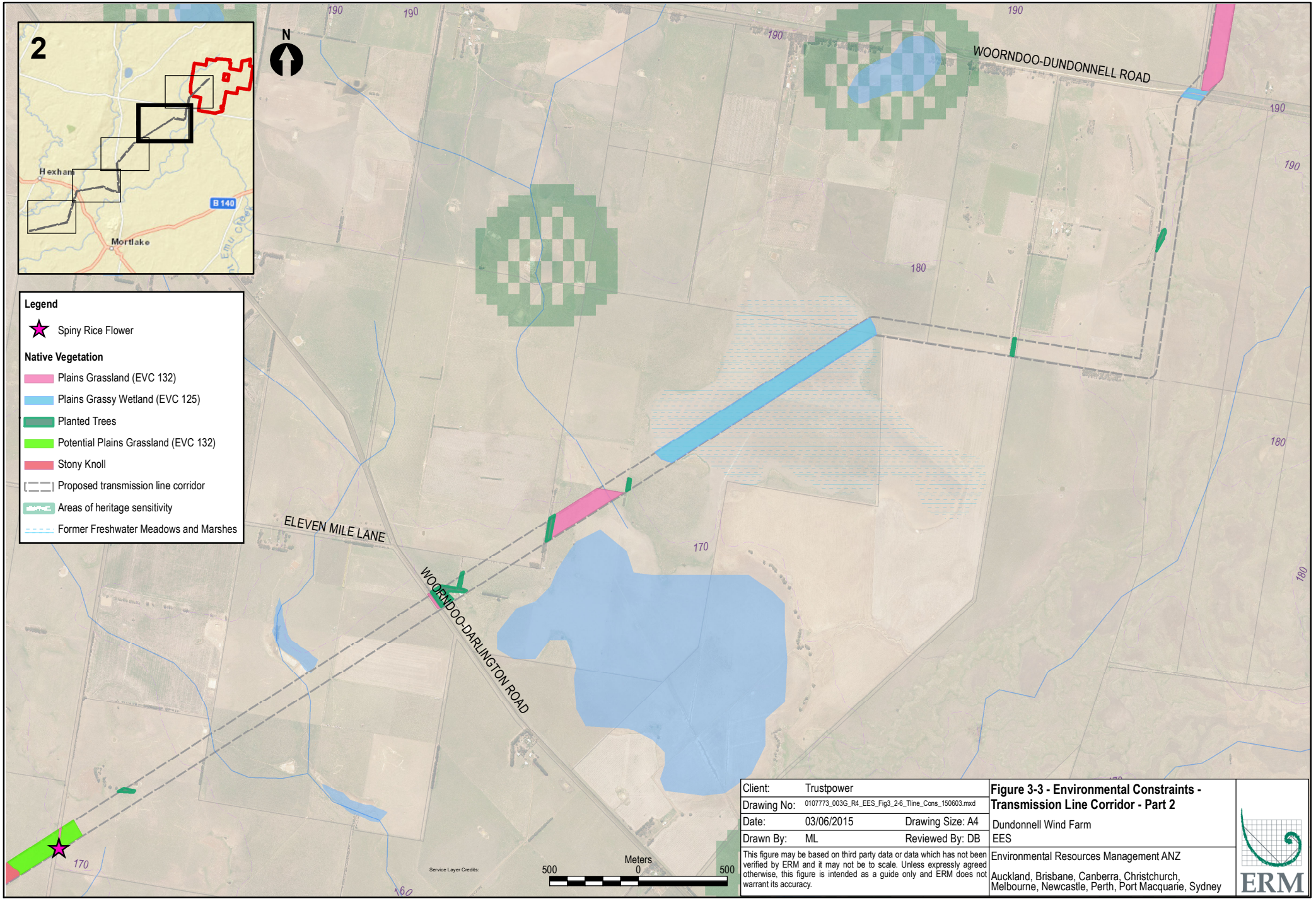
Figure 3-2 - Environmental Constraints - Transmission Line Corridor - Part 1

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Trustpower		
Drawing No:	0107773_003G_R4_EES_Fig3_2-6_Tline_Cons_150603.mxd		
Date:	03/06/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 3-3 - Environmental Constraints - Transmission Line Corridor - Part 2

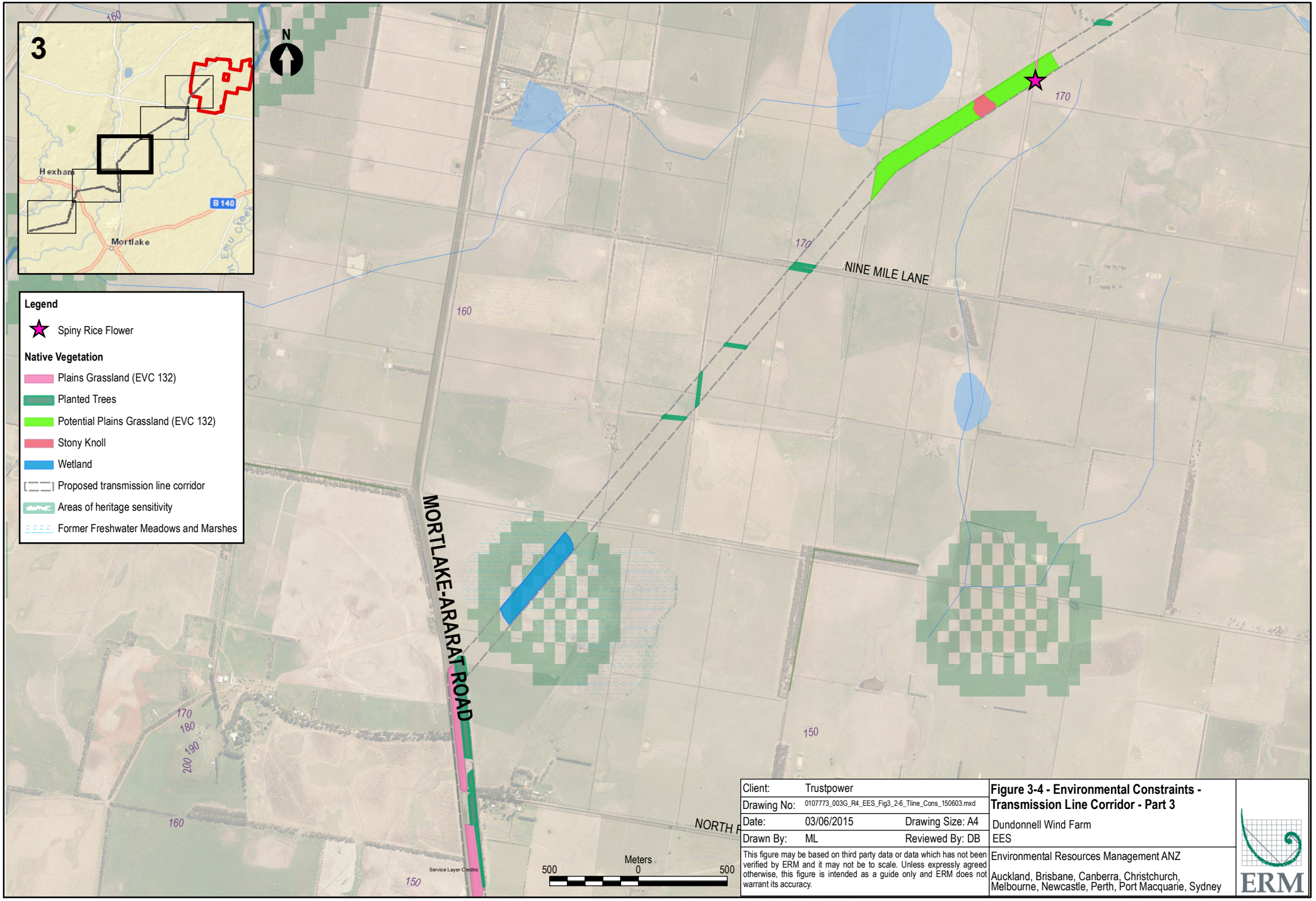
Dundonnell Wind Farm

EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Trustpower		
Drawing No:	0107773_003G_R4_EES_Fig3_2-6_Tline_Cons_150603.mxd		
Date:	03/06/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

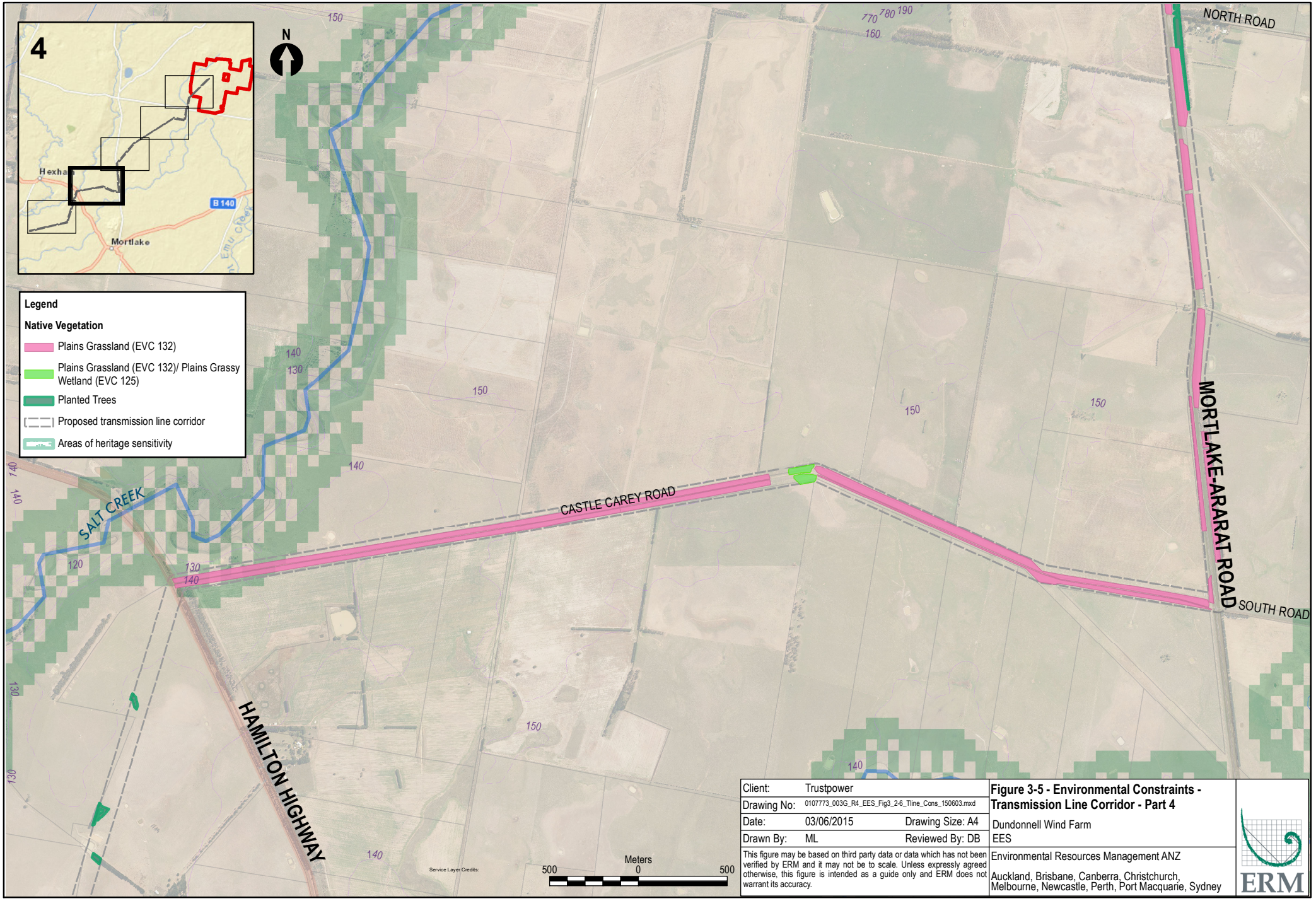
Figure 3-4 - Environmental Constraints - Transmission Line Corridor - Part 3

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Trustpower		
Drawing No:	0107773_003G_R4_EES_Fig3_2-6_Tline_Cons_150603.mxd		
Date:	03/06/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 3-5 - Environmental Constraints - Transmission Line Corridor - Part 4

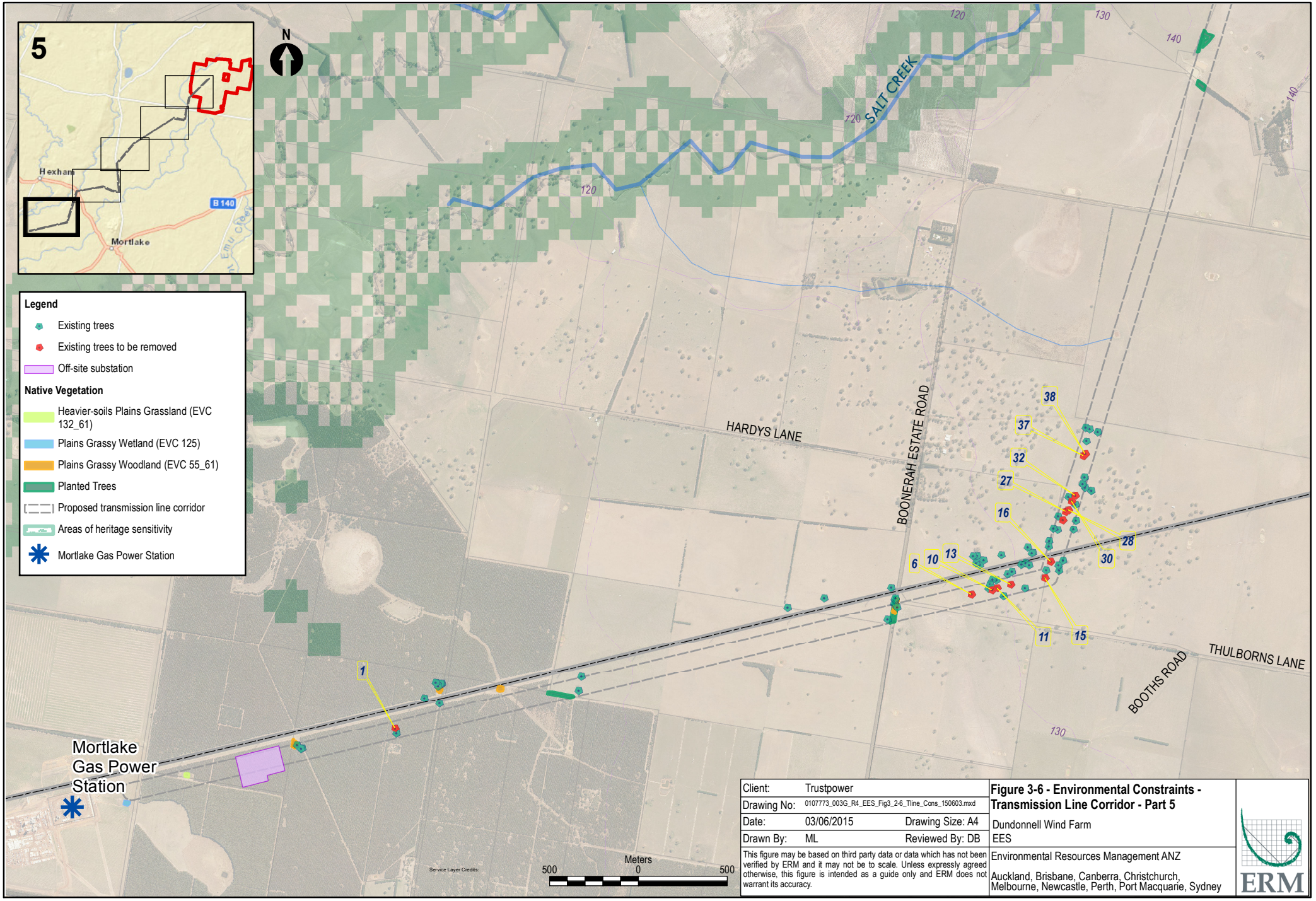
Dundonnell Wind Farm

EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Trustpower		**Figure 3-6 - Environmental Constraints - Transmission Line Corridor - Part 5**
Drawing No:	0107773_003G_R4_EES_Fig3_2-6_Tline_Cons_150603.mxd		Dundonnell Wind Farm
Date:	03/06/2015	Drawing Size: A4	EES
Drawn By:	ML	Reviewed By: DB	Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

3.4 Current Land Use

The wind farm site and adjoining areas are primarily unimproved pasture used for grazing. The land has been partly cleared for improved pasture, and land use surrounding the Project includes cropping. Remnant native vegetation generally occurs in patches within shrubland identified on basalt stony rises and along some roadsides and within the Mt Fyans Wildlife Reserve. The reserve is located in the central part of the site and is surrounded by the wind farm site, but is not included within the boundary.

There are currently three dwellings within the boundary of the wind farm site that are within 1km of a proposed WTG (H4, H48, and H60). These dwellings, together with H45 and H59, which are located just outside the boundary, have not been considered in the various specialist technical assessments. The owners of these dwellings have given their consent for these WTGs to be included in the proposed wind farm layout. The owners have also each entered into legal agreements with Trustpower on mutually acceptable terms, such that if the wind farm proceeds to construction, these dwellings will either be acquired by Trustpower, removed, or modified and uninhabited for the duration of the wind farm's operation. These five dwellings are defined as "specific agreement" dwellings.

There are a further nine dwellings within 2km of a proposed WTG, five participating landholders (H2, H41, H49, H50and H51) and four participating neighbours (H1, H46, H47 and H52). The owners of these dwellings have given their consent for these WTGs to be included in the proposed wind farm layout.

The location of the houses associated with the 'participating landholders' and 'participating neighbours', as well as the five houses that have not been included in the supporting technical assessments are identified in *Figure 3-1*. The terms agreed between Trustpower and the property owners involved with the Project are set out in letters of the support for the Project included at Volume 4.

The nearest non-participating house is H42, which is located just over 2km from the nearest WTG. Non-participating houses more than 2km from a WTG have been identified in *Figure 3-1* as 'local landholders'.

The remainder of land not within private ownership consists of local and State declared roads and a number of Crown land parcels.

There are several operational, approved or proposed wind farms in the vicinity of the wind farm site as outlined in *Table 3-2*.

Table 3-2 Operational, Approved and Proposed Wind Farms in Proximity to the Project

Wind Farm	Approximate distance and direction from wind farm site	Status
Stockyard Hill	45km north-east	Approved
Morton's Lane	45km west	Operational
Berrybank	50km south-east	Under construction*
Salt Creek	15km south-west	Under construction*
Darlington 1	6km south	Referral in preparation
Mortlake South	35km south	Under construction*
Macarthur	70km south-west	Operational
Oaklands Hill	37km north-west	Operational
Penshurst	65km west	Preparing EES
Challicum Hills	55km north	Operational
Waubra	75km north-east	Operational

Wind Farm	Approximate distance and direction from wind farm site	Status
Chepstowe	55km north-east	Approved
Hawkesdale	60km south-west	Under construction*
Ryans Corner	80km south-west	Under construction*
Tarrone	80km south-west	Planning approval stage
Woolsthorpe	60km south-west	Under construction*
* It is understood that substantial construction has not yet commenced at these projects, i.e. WTG suppliers have not been selected and full construction contracts have not been awarded or offtake agreements been reached.		

3.5 Physical Conditions

The wind farm site lies on the western Victorian volcanic plains and is of flat to gently undulating terrain. The area generally comprises lower lying grassland with limited remnant native vegetation occurrence on basalt stony rises and along roadways.

Key topographic features in the area include Mt Hamilton (approximately 6.5km north of the wind farm site with an elevation of 317m) and Mt Fyans (in the centre of the wind farm site, but excluded from it, with an elevation of 275m).

Palaeozoic bedrock (Cambrian sedimentary and metamorphic rocks and Devonian granites) underlies the wind farm site but does not crop out across the area. Apart from a very small area of Eastern View Formation (non-marine sand, gravel and clay) located 4km west of Mt Fyans, the geology and landforms of the wind farm site are dominated by flows of basalt lava and characterised by a series of variably weathered stony rise lava flows from Mt Fyans.

The sub-surface profile of the wind farm site is expected to comprise thin reddish brown soil across the stony rises, and black stony loam within deeper depressions and the spring outflow sites.

Further details regarding geomorphology and soils are provided at *Chapter 8*.

3.6 Drainage and Waterways

The wind farm site is located at the high point of the catchment and water drains from here in all directions, but mainly from north to south. The complex terrain formed by lava flows have blocked and diverted numerous streams which have formed a series of wetlands and ponds, including an active groundwater discharge zone in the south eastern portion of the wind farm site. Local advice indicates that the springs are perennial with potable water during drought periods.

The local catchment is not within a designated water supply protection area and does not drain to a designated water supply catchment. Lake Bolac (approximately 13km north-west) is the largest water body in proximity to the wind farm site.

The wind farm site is adjacent to Mt Emu Creek, approximately 5km to the east at its nearest point, and Salt Creek which is 10km to the west. The southern end of the proposed transmission line corridor is approximately 100m from Salt Creek, and approximately 650m from the intersection of Salt Creek and the Hopkins River. The proposed transmission line corridor intersects 14 designated waterways, however these are intermittently flowing and are not considered to be significant waterways.

Five registered boreholes have been identified within the wind farm site boundary. Of these, two are registered as observation wells, and three are registered for stock watering use, with one also registered for domestic use.

The main aquifer on the wind farm site occurs in the basalt, which typically has a dual porosity, with groundwater flow occurring primarily through fractures and blocky zones. Groundwater storage occurs predominantly in the more weathered and vesicular zones of the basalt, as well as in fractures.

Groundwater investigations undertaken for the Project indicated that the slope of the water table was very flat, with the general groundwater flow direction considered to be to the south, consistent with topography. Results obtained from drilling investigations undertaken in February 2015, indicate that the water table at this time was around 22m below the proposed floor level of the north quarry pit, and approximately 3.6m below the potential south quarry pit second floor level of 204m AHD.

Further details regarding hydrogeological conditions and surface water are provided at *Chapters 9* and *10* respectively.

3.7 Flora and Fauna

The Dundonnell Wind Farm is determined to be a 'controlled action' and therefore, an assessment and approval is required under the Commonwealth *Environment Protection and Biodiversity Act 1999* (EPBC Act). A summary of the existing flora and fauna within the wind farm site and transmission line corridor is provided below.

3.7.1 Flora

Wind Farm Site and Major Access Track

The majority of the wind farm site is dominated by improved pasture (comprising introduced grass species) and common introduced agricultural and environmental weeds. Remnant native vegetation is limited to scattered patches of shallow grassy wetland, areas of escarpment shrubland, scattered patches of plains grassland and scattered River Red Gum trees. A total of 187 remnant vegetation patches belonging to six different ecological vegetation classes (EVCs) were identified. The EVCs present on the wind farm site are Plains Grassy Woodland (EVC 55), Plains Grassy Wetland (EVC 125), Plains Grassland (EVC 132), Plains Sedgy Wetland (EVC 647), Stony Knoll Shrubland (EVC 649) and Aquatic Herbland (EVC 653).

Two critically endangered ecological communities listed under the EPBC Act occur in the wind farm site; Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (SHWTLP) and Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP). One threatened ecological community listed under the *Flora and Fauna Guarantee Act, 1988* (FFG Act); Western (Basalt) Plains Grassland Community (WPGC) was identified.

Targeted surveys for listed flora species were undertaken on the wind farm site in areas of native vegetation with the potential to be impacted by Project infrastructure and no EPBC or FFG Act listed flora species were found.

Transmission Line and Off-site Substation

The transmission line route contains a mixture of indigenous and exotic vegetation. The EVCs present within the corridor were Plains Grassland (EVC 132), Plains Grassy Wetland (EVC 125), and Stony Knoll Shrubland (EVC 649), located mostly within the roadside reserves along the route. In addition, a total of 83 scattered trees were recorded within the transmission line corridor.

Two critically endangered ecological communities listed under the EPBC Act are highly likely to occur in areas of remnant vegetation within the proposed transmission line route; Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP), and Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains. One ecological community listed as threatened under the FFG Act has potential to occur within the transmission line route; Western (Basalt) Plains Grassland Community. Once the detailed design of the transmission line is known, targeted surveys will be undertaken to determine the locations of vegetation meeting the criteria for these communities.

Fourteen EPBC Act and/or FFG Act listed flora species were determined to have potential to occur in remnant vegetation within the transmission line route. One species, the Spiny Rice-flower (EPBC Act critically endangered, FFG Act threatened) was incidentally recorded during the overview vegetation assessment but is not located in an area to be impacted by Project infrastructure.

Targeted surveys will be undertaken prior to construction, once pole and access track locations are determined, to assess the impact of the transmission line. These will inform detailed mitigation measures which will be adopted, such as the micro-siting of poles and access tracks as well as use of existing farm tracks where available, to minimise any impacts to threatened species or communities.

3.7.2 Fauna

Wind Farm Site and Major Access Track

The majority of the wind farm site is of low quality habitat for fauna as the extensive modification of the site for agriculture has resulted in the removal of most suitable habitat elements. Scattered trees, small patches of grassland, shrublands, woodlands, wetlands and creek lines on the site could provide moderate to high quality habitat for fauna species. A total of 21 threatened species, including 15 birds, two mammals, two reptiles, one frog and one invertebrate, were considered to have potential to occur within the wind farm site.

Potentially suitable habitat was detected for the Corangamite Water Skink and Growling Grass Frog in the south-eastern and north-western part of the wind farm site comprising areas in and around ephemeral and permanent wetlands and drainage lines. The majority of these areas are located within a WTG-free buffer zone, which was introduced during design development to minimise impacts on Brolgas. The remaining areas of potential habitat that lie outside the Brolga buffer will be buffered from works with a 55m WTG-free buffer zone implemented.

There is potential for the presence of the Striped Legless Lizard to occur within suitable habitat consisting of remnant native grassland and shrubland, however none were detected during targeted surveys of the wind farm site.

Suitable habitat for the Golden Sun Moth occurs in a paddock west of Darlington-Nerrin Road in the eastern part of the wind farm site. This area will be avoided and no habitat loss for this species is anticipated as a result of the Project.

Fauna surveys identified one species listed under the EPBC Act; the Southern Bent-wing Bat, however due to the low number of calls confirmed from this species, the Project is not considered to have a significant impact. In addition, two bird species listed under the EPBC Act Migratory Species list were recorded on-site: Latham's Snipe, and the Common Greenshank. These species were recorded in wetlands along the western boundary of the wind farm site and Latham's Snipe also occurred in freshwater creeks in the south-eastern corner of the site. No wind farm infrastructure will be built in these areas.

Five fauna species listed under the FFG Act were detected: Baillon's Crake, Brolga, White-bellied Sea-Eagle (flying over the site), Yellow-bellied Sheathtail Bat and the Southern Bent-wing Bat. None of the above fauna species are considered likely to occur regularly on the wind farm site due to a lack of quality wetland habitat.

One fauna species from the DEPI (now DELWP) Threatened Species Advisory List, the Fat-tailed Dunnart, was recorded at the wind farm site in very low numbers. Mitigation measures have been identified and will be implemented in the event that suitable habitat for this species will be removed.

Transmission Line and Off-site Substation

A total of 15 EPBC Act listed species are considered to have potential to occur within the transmission line corridor, including ten bird species, one mammal, two reptiles, one frog and one invertebrate species.

The majority of threatened birds that have been recorded, or are likely to occur along the transmission line corridor, are waterbirds. Waterbird species have the potential to occur in aquatic habitats in and near the wind farm site, but it is considered unlikely they would occur in significant numbers on a regular basis on the wind farm site along the transmission line as individual habitats are limited in extent, many are ephemeral and they vary in quality.

Potential impacts on ground-dwelling mammals, lizards and frogs are considered to be negligible due to the small size of the development footprint. The transmission line corridor does not represent key habitat for EPBC Act or FFG Act species, but impacts may occur due to habitat removal for the EPBC Act listed Striped Legless Lizard, Corangamite Water Skink and Golden Sun Moth (GSM). Once the design of the transmission line is determined, targeted pre-construction surveys will be undertaken to determine the potential impacts upon these two threatened reptile species.

The GSM was identified as likely to occur in the 10km radius from the transmission line corridor due to the presence of suitable habitat (Plains Grassland). Targeted surveys will be undertaken once pole locations and access tracks are determined to confirm whether GSM are present within the transmission line. This will inform potential management and mitigation measures if necessary.

3.7.3 Brolga

The population and distribution of the Brolga has declined in Victoria since European settlement, through drainage of wetlands, conversion of habitat for agricultural use and predation by introduced species such as the fox. The Brolga is now listed under the FFG Act as a threatened species and specific guidelines (*Interim Guidelines for the Assessment, Avoidance, Mitigation and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population 2011*, *February 2012 Revision*, DSE 2012) exist for the assessment of impact to Brolgas from wind farm proposals. The *Brolga Assessment* undertaken by Brett Lane and Associates (BL&A, 2014) in accordance with these Guidelines has been peer reviewed by Biosis Pty Ltd.

Darlington is known as a consistent flocking and breeding area for the Brolga in south-west Victoria. The investigation undertaken by BL&A in 2014 identified four historical breeding sites within 3km of the wind farm site boundary. No nests have historically been recorded within the proposed wind farm site.

Within a 10km radius of the wind farm site and transmission line corridor, there were 42 breeding sites known to occur together with 13 traditional flocking sites and an additional 16 sites where one-off flocking has been recorded. The closest breeding site to the wind farm boundary is located approximately 3km to the south-west of the nearest WTG, whilst the closest traditional flocking site to the wind farm boundary is located approximately 2km to the north-east.

Further details of the flora and fauna within and surrounding the Project area are provided at *Chapters 12, 13* and *24.*

3.8 Landscape

The areas surrounding the Project are predominantly cleared, and comprise existing infrastructure including roads, rail, transmission lines, towers, power lines, communication towers and fences.

The viewshed for the Project includes the Moyne, Pyrenees, Corangamite and Ararat LGAs. The landscape units of the Project area can be defined in relation to topography, geology, vegetation and land use within the viewshed. Three landscape units have been identified within the wind farm viewshed:

- Farmland Landscape Unit, land used primarily for agricultural purposes, including two sub-units which are:
  - the plains – flatter areas within the farmland unit with no obvious undulations. The plains are characterised by gentle slopes and are derived from basaltic flows, alluvial or sedimentary origins; and
  - stony rises – the undulating and broken landscape associated with remnant basalt flows, which generally have a height variation of 10-15m between the swales and the high points of the 'rises';

- Rural Communities and Townships Landscape Unit, where significant clusters of houses are concentrated. The townships of Lake Bolac, Woorndoo and Darlington and localities of Dundonnell, Pura Pura and Nerrin Nerrin are present within the viewshed; and
- Volcanic Cones Landscape Unit, volcanic cones rise above the surrounding plains and provide easily recognised points within the region. Mt Hamilton, Mt Elephant and Mt Shadwell are three volcanic cones that occur within or near the viewshed.

Further details of the landscape and visual features are provided at *Chapter 17*.

3.9 Heritage

Aboriginal Cultural Heritage

The desktop assessment undertaken as part of the wind farm and transmission line Draft Cultural Heritage Management Plans (CHMPs) in the early stages of the Project identified three registered Aboriginal places defined as earth mounds, within the wind farm site. The ground survey undertaken by Archaeology At Tardis Pty Ltd (2015a) for the wind farm site did not identify any evidence of these heritage places. During field investigations for the complex assessment (which included subsurface investigation) three additional Aboriginal cultural heritage places were identified within the wind farm site. Two of these place types are defined as artefact scatters, with one comprising a surface artefact.

In addition to the registered places, there are areas of cultural heritage sensitivity within and surrounding the wind farm site, including elevated land adjacent to waterways, the slopes of Mt Fyans and boundary of the Mt Fyans lava flow and Ennerdale plain.

There are no registered Aboriginal cultural heritage places within the transmission line corridor and the ground survey undertaken as part of the standard assessment did not identify any additional Aboriginal cultural heritage places within the corridor. The transmission line corridor however, will cross some areas of moderate potential for Aboriginal cultural heritage sensitivity, being land within 50m of the margins of former large freshwater meadows and marshes.

Areas of archaeological potential that may be impacted by Project infrastructure have been identified and will be subject to management measures consisting of ground surface survey of a percentage of access tracks during construction.

Historic Heritage

A review of heritage databases did not identify any statutory registered historic places inside or within a 10km radius of the wind farm site and transmission line corridor. The ground survey undertaken by Archaeology at Tardis as part of the *Historic Heritage Assessment* dated 2014, identified 10 places of historic cultural heritage value. Of these, it was considered that five historic places could meet the threshold for listing on the Victorian Heritage Inventory, and site cards for these places were subsequently submitted to Heritage Victoria for consideration. These places are the Mt Violet Homestead Complex, Shepherds/Boundary Rider Hut and Stockyards, McColl House Complex, Fasham House Complex and O'Donnell House Complex. These sites were included on the Heritage Inventory in August 2014.

Further details of the Aboriginal cultural heritage and historic heritage values are provided at *Chapter 11*.

3.10 Infrastructure

Existing infrastructure at the wind farm site is predominantly agricultural in nature and includes sheds, dams, access tracks and fencing. The site also contains water mains, electricity and telephone cables.

Two wind monitoring masts are currently located within the wind farm site. The existing masts are 75m and 83m AGL.

There is no significant infrastructure within the transmission line corridor or within the land proposed for the off-site substation.

3.11 Transportation and Access

Major roads in proximity to the wind farm site include the Glenelg Highway, approximately 17km to the north, and the Hamilton Highway, approximately 12km to the south.

Woorndoo-Streatham Road runs north from Woorndoo-Dundonnell Road to the intersection of the Glenelg Highway. An access road to the western boundary of the wind farm site is proposed from this road. The site is bisected or bounded by several local roads which will be used for construction and maintenance of the Project.

Further details regarding the transport and traffic characteristics are provided at *Chapter 19*.

3.12 Wind Resource

The Victorian Wind Atlas identifies that the proposed wind farm site is located within an area that receives an average wind speed of 7m/second at a height of 65m AGL.

The Project will use higher towers than were used by Sustainable Energy Authority Victoria (SEAV) in the development of the wind atlas. The increase in height will result in an increase in the average wind speed, as there will be a reduction in turbulence due to surface roughness resulting in a significantly improved energy yield.

Commencing in 2009, Trustpower has undertaken extensive wind monitoring at the site in accordance with best industry practice utilising two meteorological monitoring masts. This wind monitoring and associated modelling at the wind farm site has confirmed high and consistent wind speeds that are ideal for the generation of electricity.

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 4 - LEGISLATION AND APPROVALS FRAMEWORK

This page is intentionally blank

Contents

Figures

This page is intentionally blank

4 LEGISLATION AND APPROVALS FRAMEWORK

4.1 Introduction

This Chapter outlines the relevant legislation and approvals process for the Project.

As discussed previously in *Chapter 1*, the Project requires assessment under the EE Act. In addition to this assessment, the Project also requires approval under the EPBC Act, the P&E Act and the preparation of a CHMP under the *Aboriginal Heritage Act 2006* (AH Act).

The approvals process pursuant to the relevant legislation is outlined in *Figure 4-1*.

4.2 Commonwealth Approval Requirements

4.2.1 Environmental Protection and Biodiversity Conservation Act 1999

The Commonwealth Department of the Environment (DoE), through the implementation of the EPBC Act, is the responsible authority for determining whether development activities are likely to have a significant impact on matters of national environmental significance.

The Project was referred to the Commonwealth Government under the EPBC Act on 25 September 2012. DoE, on behalf of the Minister for the Environment, determined the Project to be a 'controlled action' on 3 December 2012. The relevant controlling provisions of the EPBC Act are as follows:

- Listed threatened species and communities (Sections 18 and 18A); and
- Listed migratory species (Sections 20 and 20A).

DoE (then DSEWPAC) determined that the proposed action is likely to have a significant impact based on the following:

- '*The proposed action is likely to result in direct mortality of the critically endangered Southern Bent-wing Bat (Miniopterus schreibersii bassanii), which migrates and/or forages within the wind farm site and adjacent areas;*
- *the proposed action may result in the removal of habitat or populations of a number of other threatened fauna species including the critically endangered Golden Sun Moth (Synemon plana), endangered Corangamite Water Skink (Eulamprus tympanum marnieae), vulnerable Striped Legless Lizard (Delma impar) and the vulnerable Growling Grass Frog (Litoria raniformis);*
- *the proposed action may result in the fragmentation or removal of populations of a number of threatened flora species including the critically endangered Spiny Rice-flower (Pimelea spinescens subsp. Spinescens), endangered Basalt Greenhood (Pterostylis basaltica), endangered Button Wrinklewort (Rutidosis leptorhynchoides), endangered Small Golden Moths Orchid (Diuris basaltica) and the vulnerable Clover Glycine (Glycine latrobeana);*
- *the proposed action may result in the fragmentation or removal of three listed threatened ecological communities including the critically endangered Natural Temperate Grassland of the Victorian Volcanic Plain, critically endangered Grassy Eucalypt Woodland of the Victorian Volcanic Plain and the critically endangered Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains; and*
- *the proposed action may result in direct mortality or modify an area of important habitat for listed migratory shorebird species, including but not limited to Latham's Snipe (Gallinago hardwickii).'*

Pursuant to Section 45 of the EPBC Act, the proposed action is covered by a bilateral agreement that allows the Commonwealth Minister to make a decision whether to approve the Project based on the Victorian EES assessment process.

4.3 Victorian Approval Requirements

4.3.1 Environment Effects Act 1978

The EE Act provides for the assessment of projects that are capable of having a significant effect on the environment. The EE Act enables the Victorian Minister for Planning to decide whether an EES should be prepared for a project.

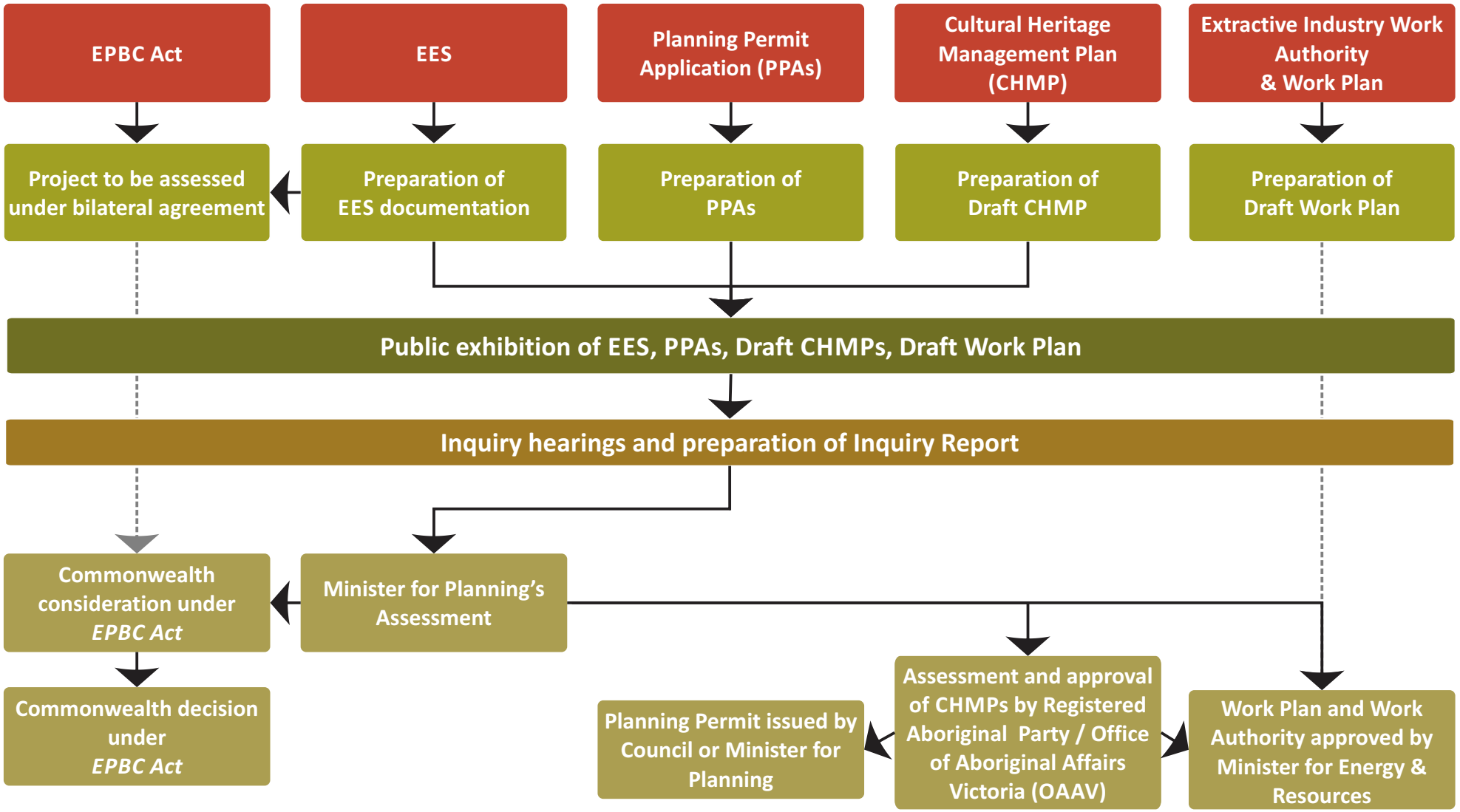
The *Ministerial Guidelines for Assessment of Environmental Effects* (DSE, 2006) specify criteria under which a project must be referred to the Minister for Planning, for a decision on the need for an EES.

As the Project met several of these referral criteria, a referral was submitted to the Minister for Planning on 10 October 2012. The Minister determined on 21 January 2013 that an EES was required for the Project for the following reasons:

- '*The project could have significant effects on biodiversity values, in particular threatened fauna such as the Brolga and protected migratory bird species. Further, the potential for significant impacts on the little known Yellow-bellied Sheath-tail Bat is highly uncertain.*
- *The project could have significant effects on the scientific and landscape values associated with volcanic features on the site if appropriate avoidance and mitigation responses are not applied.*
- *The project has the potential for cumulative adverse effects on biodiversity, landscape and geoscientific values in the context of nearby existing, approved and publicly known wind energy projects.*
- *An EES would enable an integrated assessment of development scenarios for the site and required off-site infrastructure and works, in the context of avoidance and mitigation measure commensurate with environmental values and risk'.*

The assessment of the Project under the EE Act does not constitute a statutory approval in its own right, however it will inform decisions as to whether the potential environmental impacts are acceptable.

While Trustpower is responsible for preparing the EES, DELWP provides guidance on the EES process. The EES process for the Project is outlined in *Figure 4-2.*

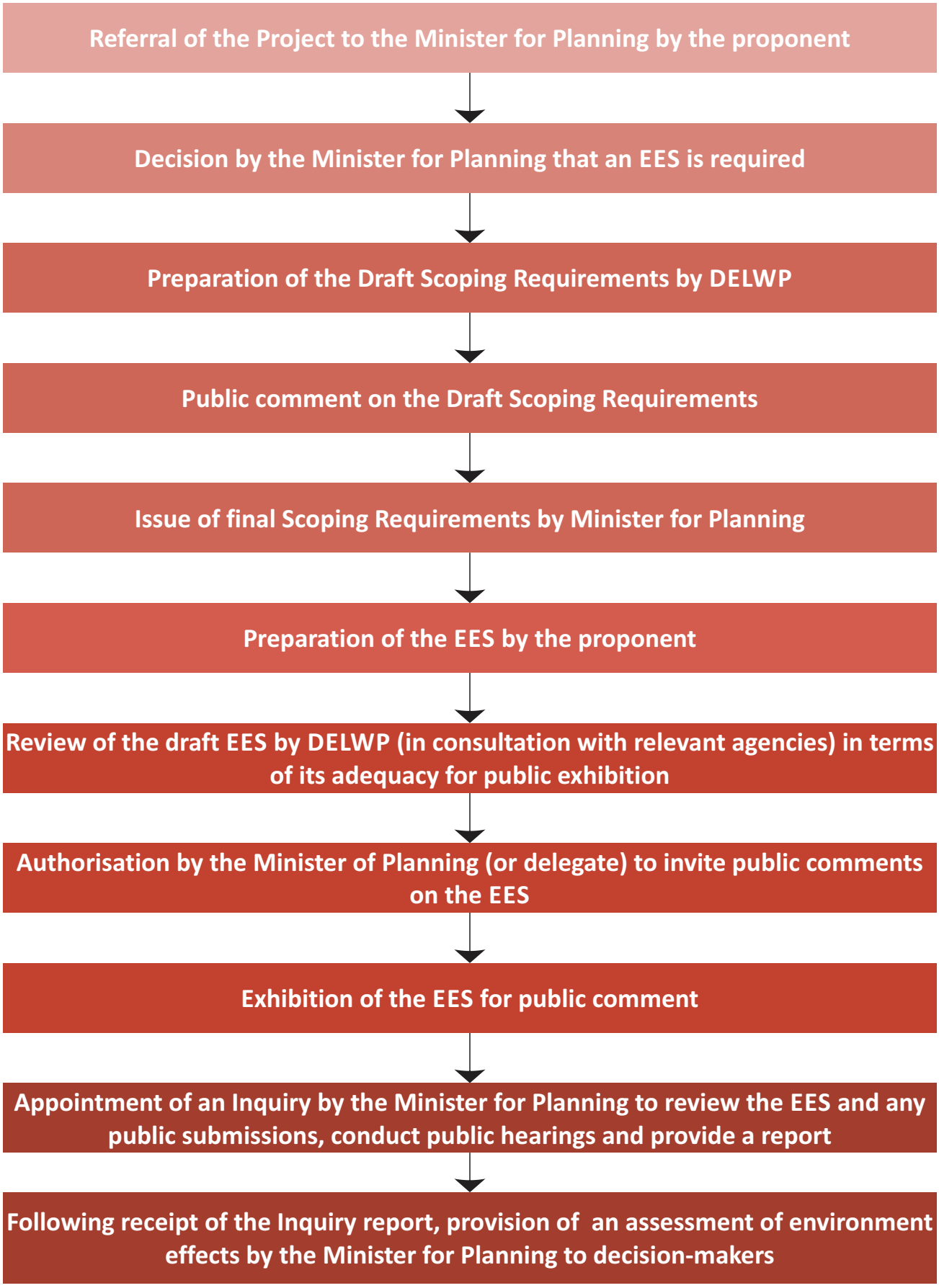


Client:	Trust Power		**Figure 4-1 - Approvals Process**
Drawing No:	0107773m_004c_R3_EES.cdr		
Date:	10/04/2015	Drawing size: A4	Dundonnell Wind Farm EES
Drawn by:	ML	Reviewed by: RS	Environmental Resources Management ANZ

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Trustpower		**Figure 4-2 - EES Process**
Drawing No:	0107773_004C_R4_EES_Fig4_2.cdr		
Date:	03/06/2015	Drawing size: A4	Dundonnell Wind Farm EES
Drawn by:	ML	Reviewed by: RS	
This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.			Environmental Resources Management ANZ Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

EES Scoping Requirements

The EES Scoping Requirements provide guidance on the specific matters to be investigated and documented in the EES, in the context of the Ministerial Guidelines. A study program to inform the scope of specialist studies was agreed between Trustpower and representatives of DTPLI (now DELWP) and the Department of Environment and Primary Industries (DEPI now part of DELWP) in 2013. This information was considered in conjunction with advice from relevant agencies and authorities in preparing the draft scoping requirements for the Project. As part of the bilateral agreement between the Commonwealth and Victoria, the scoping requirements also included matters required to be addressed under the EPBC Act.

The draft EES Scoping requirements were placed on public exhibition from 29 July to 16 August 2013. The final EES Scoping Requirements for the Project were issued on 16 September 2013.

EES Draft Evaluation Objectives

The EES Scoping Requirements include Draft EES Evaluation Objectives to guide the assessment of the potential effects of the Project. The evaluation objectives reflect the key matters to be investigated by the EES and may be refined throughout the EES assessment process.

Technical Reference Group

A Technical Reference Group (TRG) was established for the Project. The objective of the TRG was to enable relevant State government departments and agencies as well as Moyne Shire Council to provide input and guidance to the EES process including:

- applicable policies, strategies and statutory provisions that apply to the Project;
- the EES Scoping Requirements;
- the design and adequacy of technical assessments for the EES;
- the proponent's public information and stakeholder consultation program for the EES;
- the technical adequacy of draft EES documentation; and
- coordination of applicable statutory processes.

The TRG was made up of representatives from the following government departments, agencies and local Council:

- Moyne Shire Council;
- DTPLI (now DELWP);
- DEPI (now DELWP);
- Glenelg Hopkins Catchment Management Authority (GHCMA);
- VicRoads;
- Department of State Development Business and Innovation (DSDBI now Department of Economic Development, Jobs, Transport and Resources (DEDJTR)) ;
- Southern Rural Water (SRW);
- Heritage Victoria (HV); and
- Aboriginal Affairs Victoria (AAV now Office of Aboriginal Affairs Victoria (OAAV)).

4.3.2 Planning and Environment Act 1987

The purpose of the P&E Act is to establish and maintain a framework for the use and development of land in Victoria.

The P&E Act provides for planning controls through the implementation of planning schemes. A planning scheme is a statutory document which sets out objectives, policies and provisions relating to the use, development, protection and conservation of land in the area to which it applies. The Moyne Planning Scheme is relevant to the Project and is administered by Moyne Shire Council.

The Project will require three separate planning permits, pursuant to the provisions of the Moyne Planning Scheme and the P&E Act; one for the wind farm, one for the transmission line and one for the off-site substation As an EES is required, the planning permit applications are expected to be exhibited concurrently with the EES. The Minister for Planning will first make an assessment under the EE Act and subject to the approval of the CHMPs, the responsible authority will then determine whether to issue or refuse the planning permits. As a result of recent Amendment VC124 gazetted 2 April 2015, the Minister for Planning is now the responsible authority for the approval of all wind farms in Victoria. Moyne Shire Council however, remains the responsible authority associated infrastructure, including the transmission line and off-site substation components of the Project.

Whilst Moyne Shire Council is the responsible authority the transmission line and off-site substation applications, the Minister for Planning has the power to 'call-in' a planning permit application under Section 97B of the P&E Act.

The following planning permits are required for the Project:

1. Use and development of a wind energy facility, comprising up to 104 wind turbines, main site access track, internal access tracks, on-site substation, electrical reticulation, up to four wind monitoring masts, permanent operations/maintenance facility, temporary concrete batching plant and site office buildings; removal of native vegetation; business identification signage; and alterations to roads located in a Road Zone Category 1;
2. Use and development of a utility installation associated with the transmission line and removal of native vegetation; and
3. Use and development of a utility installation associated with the off-site substation.

As noted above, due to the recent gazettal of Amendment VC124, the Minister for Planning is now the responsible authority for the approval of the wind farm application. Thus, of the three planning permit applications listed above, the wind farm application will be lodged with DELWP, whilst the transmission line and off-site substation applications will be lodged with the Shire of Moyne.

The planning permits and relevant sections of the Moyne Planning Scheme are detailed in *Chapter 18*.

4.3.3 Aboriginal Heritage Act 2006

The Aboriginal Heritage Act 2006 (AH Act) allows for the protection of Aboriginal cultural heritage and increased Aboriginal community involvement in the decision making process for development permits. The AH Act also sets out the criteria for the requirement of a CHMP for activities which are defined as High Impact Activities (i.e. activities which cause significant ground disturbance) and are within an Area of Cultural Heritage Sensitivity.

Under Section 49 of the AH Act, a CHMP must be prepared prior to commencing works for any project for which an EES has been required. A planning permit cannot be granted for an activity that is inconsistent with an approved CHMP.

Under the AH Act, Registered Aboriginal Parties (RAPs) are the cultural heritage decision-makers for a designated area and are determined by the Aboriginal Heritage Council. There are currently no RAPs for the wind farm component of the Project and therefore OAAV will assess the CHMP instead of a RAP.

In the case of the transmission line corridor, Martang Pty Ltd is the RAP for a portion (16%) of the corridor. There are no RAPs for the remainder of the corridor, however Kuuyang Maar Aboriginal Corporation (KMAC) and the Eastern Maar Aboriginal Corporation (EMAC) are the relevant Aboriginal Groups. OAAV and Martang Pty Ltd will therefore jointly assess the CHMP.

The *Environmental Effects Advisory Note: Aboriginal cultural heritage and the environment effects process* (DPCD, 2007) outlines two possible pathways within the broader EES process for the timing of preparation and approval of a CHMP.

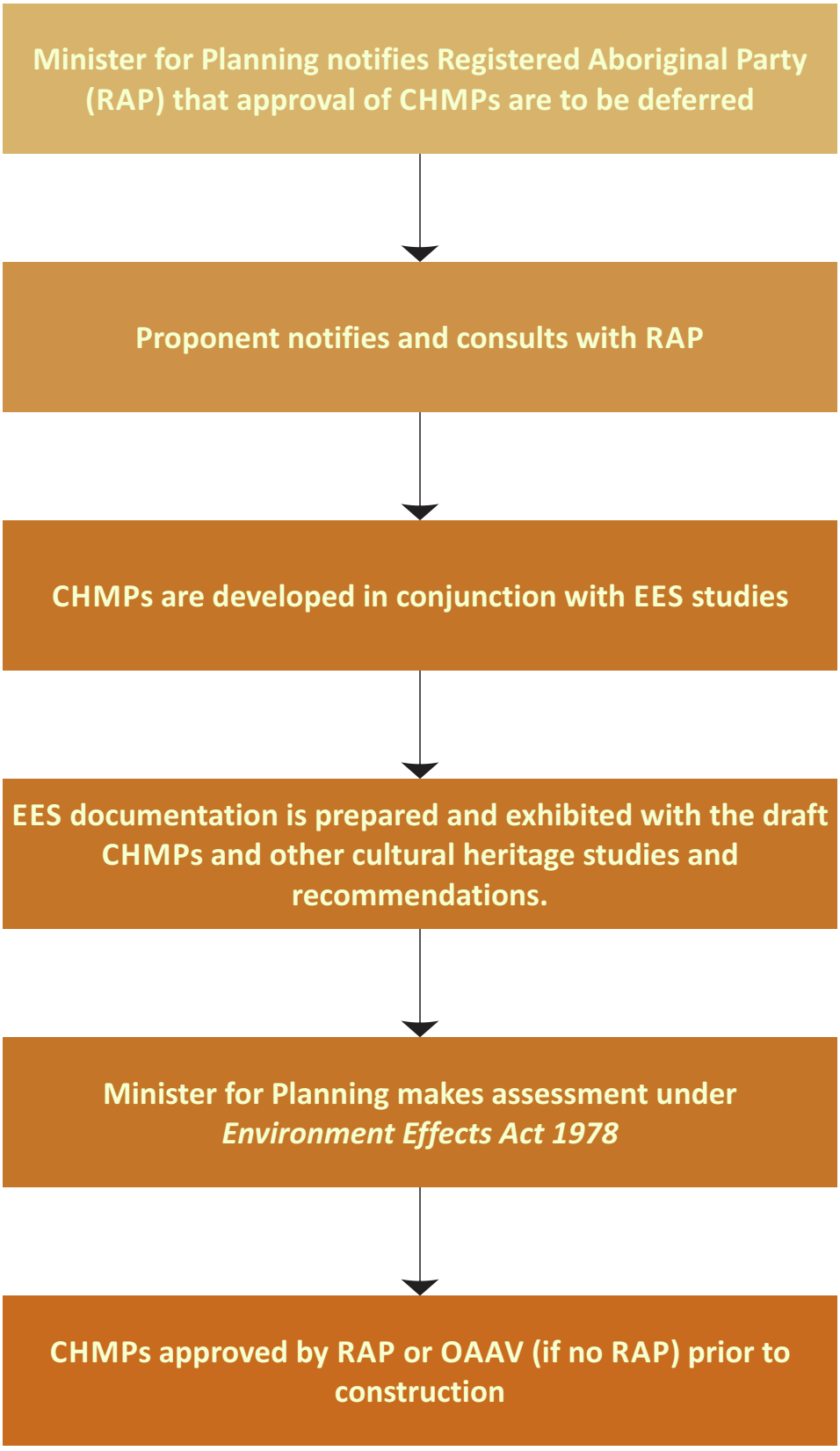
Under Pathway 1, the CHMP is finalised and approved by the RAP/OAAV prior to the preparation and exhibition of the EES, and the Minister for Planning considers an approved CHMP in the assessment of environmental effects of the project. Pathway 1 is commonly used for those projects where values and assets are known to exist, and are straightforward to assess and take account of in project planning.

Under Pathway 2, the CHMP is developed within the context of other environmental, social and economic issues and the draft CHMP is exhibited in conjunction with the EES. The approval of the CHMP by the RAP/OAAV is deferred until after the Minister for Planning has made an assessment of the project. Pathway 2 is for projects with a degree of uncertainty or complexity, or where a range of project options are being considered. Pathway 2 is considered appropriate for the Project and therefore the draft CHMPs will exhibited with the EES.

The standard (land survey) and complex (sub surface investigation) assessments for the wind farm site and the standard assessment for the transmission line, as required by the Aboriginal Heritage Regulations, have been included at Volume 2.

Further details on the cultural heritage values within the wind farm site and transmission line corridor are provided at *Chapter 11.*

The Pathway 2 CHMP process is outlined in *Figure 4-3*.



Client:	Trustpower	
Drawing No:	0107773_004C_R3_EES_Fig4_3.cdr	
Date:	10/04/2014	Drawing size: A4
Drawn by:	ML	Reviewed by: RS

Figure 4-3 - Cultural Heritage Management Plan Process

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

4.3.4 Extractive Industry Approvals

The Mineral Resources (Sustainable Development) Act (MRSD Act) encourages extractive industries which *'make the best use of, and extract the value from, resources in a way that is compatible with the economic, social and environmental objectives of the State.'*

A work authority to carry out extractive industry (quarry) is required pursuant to Section 77I of the MRSD Act and the responsible authority for the work authority is the Minister for Energy and Resources. As previously noted, an application for Work Authority 1540 applies to the proposed quarry at Dundonnell.

A work plan for extractive industry is also required pursuant to Section 77G of the MRSD Act to document extraction and rehabilitation proposals for Work Authority 1540 and must be obtained from DEDJTR. A *Draft Quarry Work Plan* has been prepared by CK Prowse Associates Pty Ltd (2015) which will be exhibited concurrently with the EES and is included at Volume 2.

The Minister for Planning will first make an assessment under the EE Act and subject to the approval of the CHMPs, the responsible authorities will then determine whether to grant the work plan and work authority.

4.3.5 Other Project Approval Requirements

There are other approvals which may be required for the Project, however these approvals would not be considered until after the Minister for Planning makes an assessment of the EES. These additional approvals may include:

- A license to remove listed threatened species or communities and protected flora from public land (e.g. road reserves) pursuant to Section 48 of the FFG Act. The licence must be obtained from DELWP;
- A licence or authorisation for the removal, relocation or destruction of native fauna species pursuant to Sections 22, 28A and 28G of the *Wildlife Act 1975*. The licence or authorisation must be obtained from DELWP;
- A licence to take or use water from a waterway or groundwater from any bores pursuant to Section 51 of the *Water Act 1989* (Water Act). The licence must be obtained from Southern Rural Water;
- A licence to construct works across any waterways or to construct a bore as part of the Project pursuant to Section 67 of the Water Act. The licence must be obtained from Southern Rural Water;
- Consent for the construction of works in, on or under roads pursuant to Section 63 of the *Road Management Act 2007*. Depending on the type of road to be affected, the coordinating road authority will be either VicRoads or Moyne Shire Council; and
- Consents to disturb historical archaeological sites and/or permits to carry out works to a heritage place pursuant to the *Heritage Act 1995*.

This page is intentionally blank

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 5 - PROJECT ALTERNATIVES

This page is intentionally blank

Contents

Figures

This page is intentionally blank

5 PROJECT ALTERNATIVES

5.1 Introduction

This Chapter discusses the alternatives considered for the Project, including:

- site selection processes for the wind farm site;
- alternative infrastructure layouts;
- WTG models and configurations (including height, blade length and generator models); and
- the transmission line route selection process and investigations into the potentially suitable technologies, including but not limited to, undergrounding.

5.2 Site Selection Process

Suitable sites for wind farms are generally located where:

- there are consistent high wind speeds;
- there are nearby transmission lines with available capacity;
- road access is available to site;
- land tenure can be obtained;
- cover from native vegetation is sparse and local ecology is likely to be minimally impacted; and
- the impact on local amenity can be minimised.

In 2008, NewEn (the former proponent for the Project) commenced exploring options for the development of a wind farm in the Dundonnell area. The Project was initially conceived after a group of local landholders at the subject site formed a company with the intent of selecting a developer for a wind farm and contacted NewEn to investigate the potential in the area. In 2009 NewEn erected one wind monitoring mast within the proposed wind farm site to accurately quantify the nature of the available wind resource. Data from this mast was correlated with long-term monitoring data from the Salt Creek Wind Farm site, approximately 15km to the west, where wind monitoring has taken place since April 2004. A second wind monitoring mast was installed on-site in the early stages of 2013.

A number of other preliminary investigations were undertaken including preliminary flora and fauna assessments and review of landholder data.

The Dundonnell site was chosen due to its following attributes:

- proven and consistent wind resource with excellent wind energy potential;
- appropriate elevations and suitable topography;
- large surrounding landholdings and landholder interest in participating in the Project;
- proximity to the electricity network; and
- relative isolation from nearby towns and scarcity of nearby dwellings and adequate road access.

5.3 Project Component Alternatives

5.3.1 Overview

At the conceptual design stage, a range of variations for the Project layout and associated grid connection were developed, and considered in the context of technical, environmental, social, and commercial constraints. Alternatives for the following aspects of the Project were considered and assessed:

- wind farm site area;
- site layout including different WTG models;
- location and route of the proposed transmission line; and
- transport routes on public roads leading to the site.

5.3.2 Project Area

In the planning stages, various options for the wind farm site boundary were considered. The objective was to identify the optimum size of a project that was commercially viable and could deliver significant electricity generation, whilst being socially and environmentally acceptable.

During the preliminary planning and consultation stages, NewEn explored the feasibility of incorporating an area to the north and south-east of the current wind farm site into the Project, being approximately 12,000ha. Investigations undertaken between 2009-2010 and government policy changes including the introduction of the Wind Energy Guidelines meant that it was not viable to proceed with the enlarged area.

The parcels of land included in the wind farm site and considered in this EES were broadly identified by 2011. Since that time the boundary has shifted east on recommendations of the ecology consultants and has been refined further to accommodate ecological constraints, changes in the numbers of involved landholders and WTG layout. Through various discussions with specialist consultants and landholders alterations to the wind farm site boundary have been achieved to optimise the wind farm area, and minimise environmental impacts.

5.3.3 Site Layout

Several alternative site layouts were considered throughout the planning stage and the Project has been designed to respond to advice from the ecology, cultural heritage and geomorphological consultants and site conditions. Setback distances between WTGs and surrounding dwellings were defined at an early stage to ensure compliance with required standards concerning landholder agreements, noise, shadow flicker and blade glint, and to reduce associated impacts on properties neighbouring the wind farm site. The decision to develop an on-site quarry and source the majority of water on-site was made early in the process in order to reduce traffic impacts on the surrounding road network.

An indicative site layout, for a proposal containing 89 WTGs was submitted with the EPBC Referral in September 2012. The September 2012 layout was informed by the following preliminary assessments and activities:

- flora and fauna assessment;
- preliminary cultural heritage assessment;
- geoscience features significance and sensitivity assessment;
- transmission line planning constraints assessment;
- transmission line heritage constraints assessment;
- desk top geotechnical assessment; and
- stakeholder engagement.

The results of the preliminary assessments influenced the layout in the following ways:

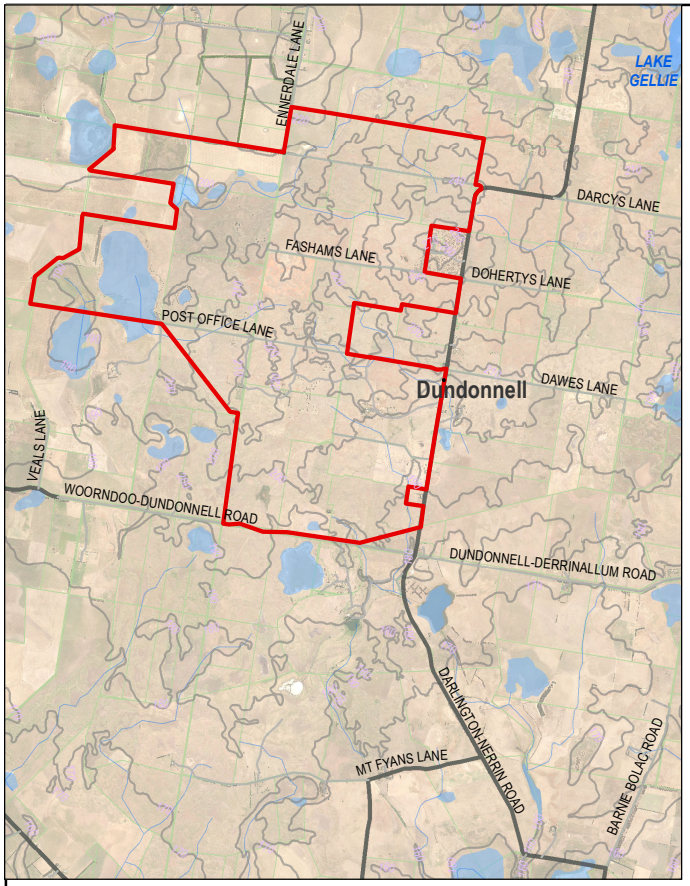
- WTG free buffers established around Brolga flocking sites in accordance with the *Brolga Guidelines*;
- removal of WTGs in the southern part of the site, to avoid impacts to geomorphological values;
- WTG locations selected to avoid or reduce the removal of native vegetation;
- minimum 300m buffer provided between WTGs and vegetated wetland and waterway habitat on the site;
- 450m buffer provided around wetland area in the north-east of the wind farm site;
- 30m buffer provided between all wind farm infrastructure and any aquatic habitat including wetlands, creeks and drainage lines;
- rocky outcrops avoided where appropriate so as to reduce impacts to fauna;
- WTGs removed or moved to avoid impacts on identified sensitive heritage values/areas within the site; and
- site access road located to avoid areas of high geomorphological value adjacent to the southern boundary of the site.

Since this time, the Project layout has been adjusted to accommodate an expanded wind farm site area and additional WTGs, while at the same time adhering to the advice of the experts as described above. The increase in WTG numbers reflects the opportunity to capitalise on the quality of the available wind resource and the existing grid capacity. A project of increased size also has economy of scale benefits, in that the fixed costs associated with the construction of the wind farm (the most significant of these being the cost of grid integration) is amortised across a larger number of WTGs.

An indicative WTG layout has been developed based on the constraint areas identified, with a maximum of 104 WTGs at a maximum height of 165m. This WTG layout was used as a basis for the assessment and consideration of the effects of the Project. This approach ensures that the most suitable and cost effective technology can be deployed on the site at the time the Project moves to construction.

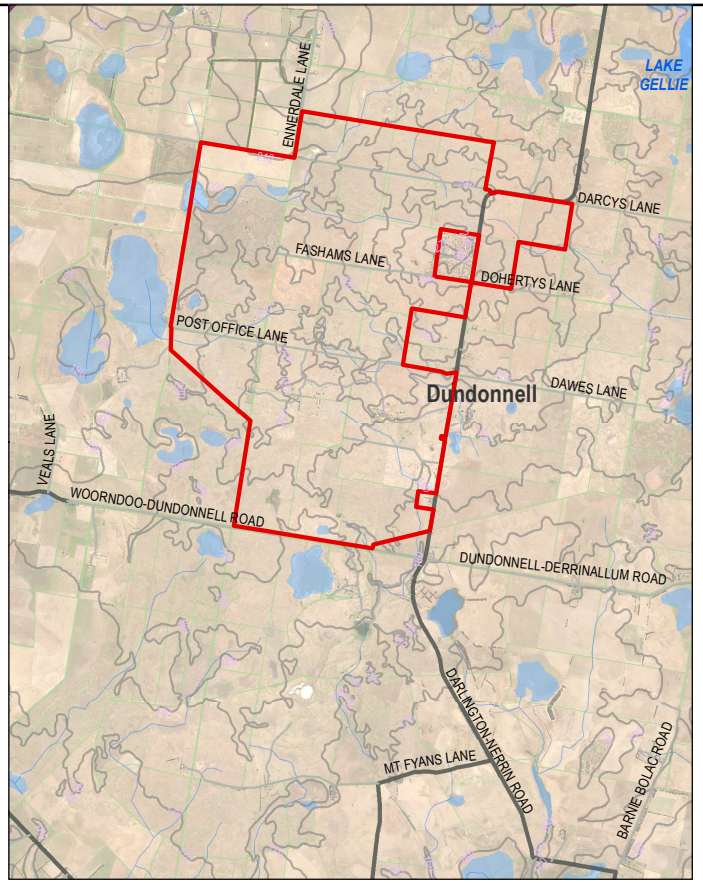
The current layout reflects the most appropriate arrangement of WTGs based on the environmental assessments undertaken to date. Project infrastructure occupies approximately 2% of the site area. This provides flexibility for siting of WTGs and other infrastructure, should this become necessary as a result of the EES process and negotiations with agencies.

The general changes to the overall site area from preliminary planning stages to the current proposal are illustrated at *Figure 5-1*. This shows how the site area was altered to avoid environmental constraints to the west, in particular the significant waterways, and then expanded to the north-east where the land is less constrained.



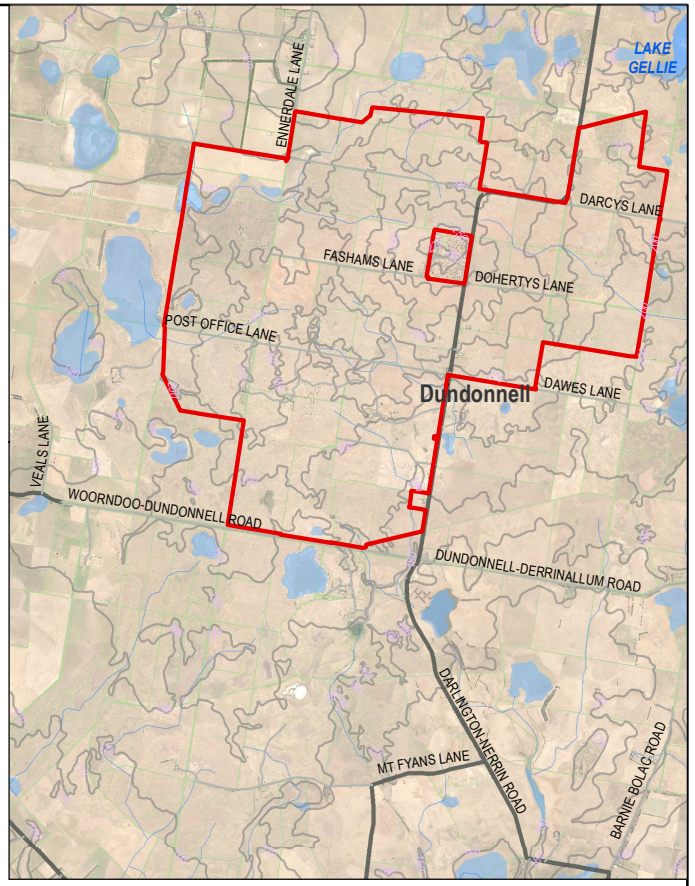
Legend

Indicative site boundary pre-Notification (Nov 2011)



Legend

Indicative site boundary Notification (Aug 2012)



Legend

Wind Farm site boundary (EES)

N

0 1 2 3 4

Kilometers

Client:	Trustpower	
Drawing No:	0107773_002G_R0_EES_Fig5_1_Site_lay_150605.mxd	
Date:	05/06/2015	Drawing Size: A4
Drawn By:	ML	Reviewed By: DB

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 5-1 - Indicative Wind Farm Site - Change to extent in response to constraints and opportunities

Dundonnell Wind Farm

EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

5.3.4 WTG Selection

At this stage of the Project planning, the exact make and model of WTG has not yet been finalised. Due to the technological progression in the design and engineering of WTGs, it is difficult to predict the exact specifications of an appropriate WTG that will be selected for use in future.

Only proven and commercially available WTGs of the multi-megawatt class will be considered. These WTGs will all be of an up-wind, three bladed design mounted on cylindrical towers. For the purposes of this EES, assumptions have been made in regard to the WTG model that will be used, and these assumptions have been stated in the respective technical assessments.

5.3.5 Quarry Sites

Initial guidance for the site selection for the quarry was based on the potential availability of suitable rock in areas that would not directly affect sites of geoscience significance. Following a preliminary assessment of quarry locations, two quarry sites (the northern pit and southern pit) were identified for suitability for providing crushed rock for the wind farm. These pits are located to the south of Fashams Lane with areas of 19.2ha and 17.8ha respectively.

5.3.6 Transmission Line Route and Infrastructure

Electricity generated by the Project will be exported to the Victorian electricity grid for distribution to meet demand from consumers through the NEM. Trustpower has worked to identify the best option for the network connection to meet network, siting and environmental requirements.

The proposed transmission line route requires the development of an easement and installation of approximately 38km of 220kV overhead transmission line between the wind farm site and a substation to be constructed to the east of the MOPS. Consideration was given to alternative design solutions, including an underground transmission line, however this was not considered to be a viable option. A 500kV transmission line (up to 1km in length) will connect the off-site substation to the Heywood-Moorabool 500kV network at MOPS. The route that is proposed for the transmission line corridor was developed in discussions with the Australian Energy Market Operator (AEMO) and was agreed upon with landowners early on in the Project development, with only minor realignments required as a result of the inability to obtain landowner agreement in two locations.

A desktop planning constraints assessment and a heritage constraints assessment of the proposed transmission line corridor were undertaken in August 2012. This assessment concluded that the proposed transmission line corridor was not subject to significant planning constraints, however permits would be required depending on the type of powerline required and the extent of vegetation to be removed. A subsequent review of certificates of titles within the corridor confirmed that there were no covenants on title that would restrict the development and use of powerlines.

The heritage constraints assessment did not identify any items of cultural or historic heritage that necessitated immediate changes to the route of the proposed corridor. However, the corridor is located in proximity to areas of cultural heritage sensitivity, being land within 50m of former large freshwater meadows and marshes. A CHMP has been prepared to support the planning permit for the transmission line and the EES process and is provided at Volume 2.

In earlier studies, an alternative transmission line to a potential 'Lismore' substation along the 500kV line was identified and investigated. Whilst the length of this transmission line is similar to the one proposed to MOPS, after further investigations the proponent determined that the nature of these connection works were not technically or commercially feasible.

Connection to a high voltage transmission line represents a significant cost, largely due to the expensive infrastructure required to transform wind farm internal voltage to the HV transmission voltage. The number of

WTGs proposed under this Project and electrical output makes the connection economically viable. The proposed transmission line route represents a cost-effective connection for the Project and the optimal route to a point in the network, which has capacity to accommodate the electrical output of the Project.

5.3.7 Transport Routes

In consultation with VicRoads and Moyne Shire Council, previously approved OD vehicle haulage routes from Portland, the Port of Geelong and the Port of Melbourne to the Mortlake/Woorndoo area were considered for the Project. Given their proven feasibility, the OD vehicle route from Portland to Woorndoo (associated with the Salt Creek Wind Farm) and the approved transformer OD vehicle route from Geelong to Mortlake (associated with the MOPS) are proposed for the Project. These routes are proposed subject to obtaining relevant approvals and permits from VicRoads.

From Woorndoo, two options for OD vehicles from Portland to the wind farm site were identified, as follows:

- Route 1 – East from Woorndoo via the Mortlake-Ararat Road, then Woorndoo-Streatham Road ending at a site access point through private land, south of Warings Lane; and
- Route 2 – East from Woorndoo via the Mortlake-Ararat Road, then Woorndoo–Dundonnell Road to a site access road on the southern wind farm site boundary.

Route 1 was identified as the preferred OD access route to the wind farm site due to the degraded surface condition of the eastern section of Woorndoo–Dundonnell Road, and more significantly, the rocky outcrops and ridges within the wind farm site on the southern boundary. This rocky terrain would limit the ability of OD vehicles to move from the road into the wind farm site along this frontage, and had the potential to impact on geomorphological values in this area. Route 1 also has the advantage of having a lesser impact from site development traffic on identified school bus routes; and lesser amenity impacts on dwellings within proximity to the road reserve on Woorndoo-Dundonnell Road.

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 6 - EIA APPROACH

This page is intentionally blank

Contents

Figures

Tables

This page is intentionally blank

6 ENVIRONMENTAL IMPACT ASSESSMENT APPROACH

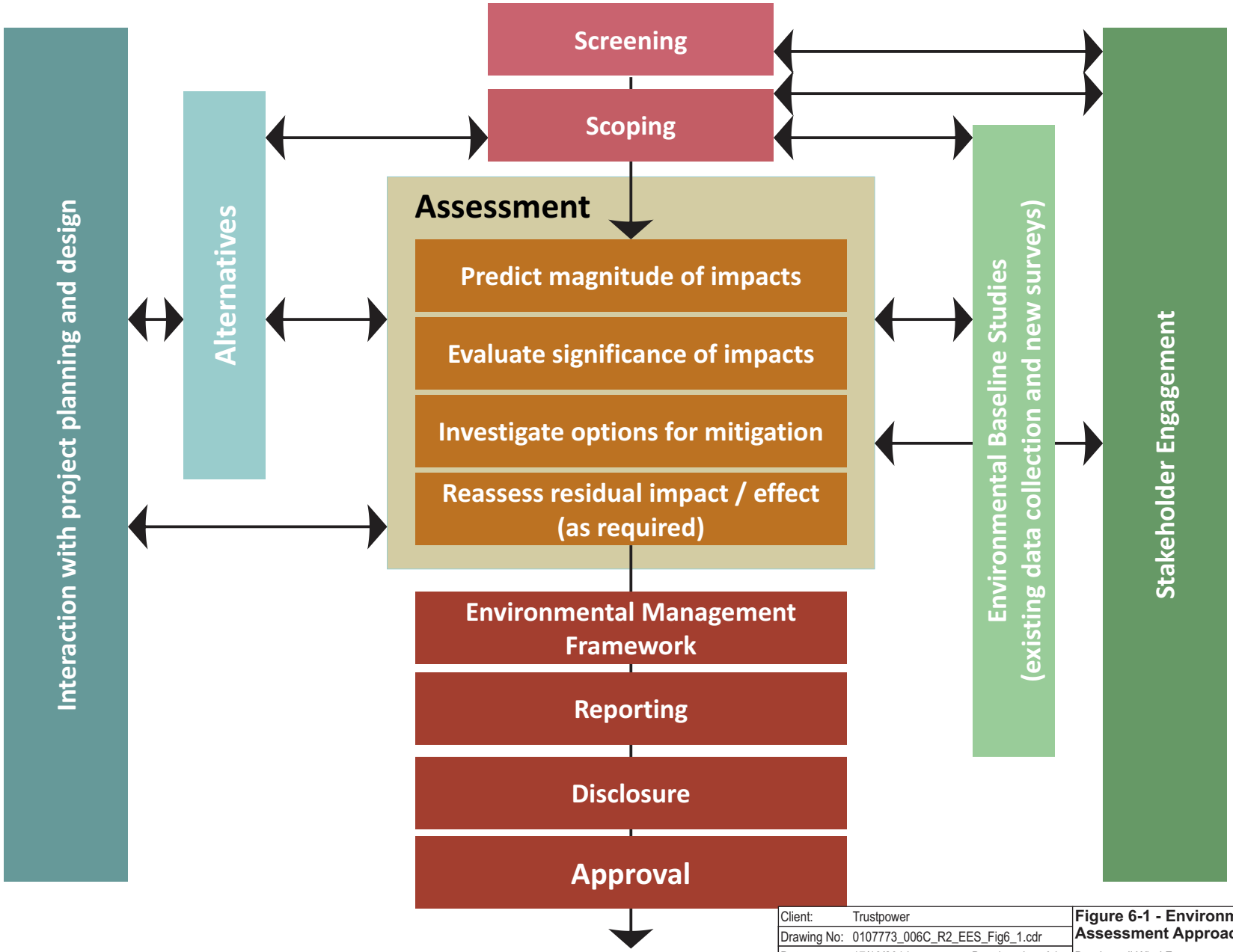
6.1 Overview

The objective of this Chapter is to describe the impact assessment approach and process undertaken for the Project and demonstrate that the impact assessment meets the EES Scoping Requirements.

The EES for the Project has been prepared using a systematic process that screened, scoped, predicted and evaluated the Project's anticipated impacts on physical/biological, social, cultural, economic and built components of the environment. The EES presents measures that Trustpower will employ to maximise the benefits of the Project and to avoid, minimise, reduce, remedy, or offset adverse impacts.

6.2 Project Approach to Environmental Impacts

The development of the Project design and the scope of the environmental investigations for the Project has been an iterative process. The process comprises the stages illustrated in *Figure 6-1* and the main steps as described following.



Client:	Trustpower		
Drawing No:	0107773_006C_R2_EES_Fig6_1.cdr		
Date:	17/10/2014	Drawing size: A4	
Drawn by:	ML	Reviewed by: RS	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 6-1 - Environmental Impact Assessment Approach

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

6.2.1 Screening

Screening is the process by which key physical/biological, social, cultural, economic and built environment aspects and impacts are considered at the commencement of the Project. The Project commenced with a landholder group approaching the NewEn (the Project proponent at the time) to investigate the suitability of the wind farm site for a wind energy facility.

Screening included wind monitoring at the wind farm site commencing in January 2010. Results of this monitoring were correlated with long-term data collected at the Salt Creek Wind Farm site (approximately 15km to the west) from April 2004–present. Salt Creek Wind Farm is another project of Trustpower.

A second monitoring mast was installed at the wind farm site in the early stages of 2013. The monitoring work was crucial to determine the available wind resource and appropriateness of the proposed site.

Having established the potential for a viable wind farm at the site, baseline data collection to identify the key environmental, social and socio-economic conditions in areas potentially affected by the Project also commenced at this stage. Preliminary ecological, cultural heritage and geomorphic environmental investigations were undertaken to broadly identify and avoid areas of high biodiversity value and environmental sensitivity. The screening process informed initial Project design and siting of infrastructure and informed the referral of the Project to the Commonwealth and State Governments pursuant to the EPBC Act and the EE Act respectively.

6.2.2 Scoping

Scoping is undertaken to identify Project activities that could lead to impacts on the environmental, social or economic values of a Project area. Scoping was a co-operative exercise undertaken between Trustpower, government departments and environmental specialists and followed the preliminary screening process to ensure that all potentially significant issues and impacts were identified early on to enable further assessment.

The scoping exercise was guided by the requirements of the Wind Energy Guidelines and Clause 52.32 'Wind Energy Facility' of the Moyne Planning Scheme. Scoping outlined the context, study objectives, legislative guidelines, assumptions and data gaps associated with each environmental category and enabled cross disciplinary discussions between the technical specialists engaged for the Project. The results of the scoping process are summarised in *Table 6-1*.

Table 6-1 Scoping of Environmental Assessment

Environmental Category	Potential impacts associated with the Project	Proposed scope of work for the EES	Reference
Geomorphology	The wind farm site is situated in Volcanic Province basalt lava flows from Mount Fyans and includes features of high Regional Geoscience Significance. The Project has the potential to result in disturbance to or removal of geoscience sites and have adverse impacts on geomorphological values in the Project area.	Assessment of the geoscience values in the Project area in the local, regional, state and national context; including desktop assessment and field visit, assessment of potential impacts during construction and operation. Recommendations to inform Project layout and avoid/ reduce potential impacts on the geoscience values.	Chapter 8
Soils	Construction of temporary and permanent access roadways and temporary lay-down areas at the turbine sites for equipment and crane platforms can modify the existing surface drainage flows (natural or man-made) and negatively impact on the prevailing sedimentation and erosion processes which lead to land degradation.	Desktop assessment of existing soil conditions within the wind farm site.	Chapter 8
Hydrogeology	Environmental impact on groundwater during construction and operation of the wind farm (including with regard to chemical and fuel storage, waste management, works compounds and lay-down areas, and concrete batching plants).	A hydrogeology assessment to be prepared characterising the groundwater environment, and identifying and assessing the potential effects of the Project on groundwater water environments and beneficial uses, including on groundwater flow and quality.	Chapter 9
Surface Water	Impact of wind farm infrastructure (WTGs, access roads and hardstand) on existing surface drainage flows (natural or man-made), and on prevailing sedimentation and erosion processes.	A surface water assessment prepared to accompany the EES. This will include a desktop assessment of existing hydrological conditions within and in the vicinity of the wind farm site.	Chapter 10
Aboriginal Cultural Heritage **Wind Farm Site**	Potential impacts on tangible and intangible Aboriginal cultural heritage values – wind farm site.	A complex CHMP (including ground investigation) to be prepared for the wind farm site.	Chapter 11
Transmission Line	Potential impacts on tangible and intangible Aboriginal cultural heritage values – transmission line corridor.	Standard CHMP to be prepared for the transmission line corridor.	Chapter 11
Historic Cultural Heritage **Wind Farm Site**	Potential impacts on all known historic cultural heritage and areas of potential historic cultural heritage sensitivity.	Desktop historic heritage assessment to be prepared to identify all known historic cultural heritage likely to be impacted by the wind farm and areas of potential historic cultural heritage sensitivity.	Chapter 11

Environmental Category	Potential impacts associated with the Project	Proposed scope of work for the EES	Reference
		A ground surface survey of the construction zone to be undertaken to identify all known and unknown historic places. This survey will target areas identified in the desktop assessment likely to contain historic places and which are also likely to be impacted by the development.	
Transmission Line	Potential impacts on all known historic cultural heritage and areas of potential historic cultural heritage sensitivity - transmission line corridor.	Desktop historic heritage assessment to identify all known historic cultural heritage likely to be impacted by the proposed transmission line corridor. A ground surface survey of the construction zone to be undertaken to identify all known and unknown historic places. This survey will target areas identified in the desktop assessment likely to contain historic places and which are also likely to be impacted by the transmission line corridor, including power poles, access tracks and temporary construction compounds.	Chapter 11
Flora and Fauna **EPBC Act Listed Ecological Communities**	Removal of part of a listed community during construction; indirect disturbance of a listed community during and after construction.	Assessment of the extent and quality of the EPBC Act listed communities that have the potential to occur within the wind farm site and transmission line corridor, including targeted field surveys of the wind farm site. Recommendation of mitigation measures, including the micro-siting of Project infrastructure to avoid and minimise impacts to listed communities and measures in areas that cannot be avoided by adjustments to the wind farm layout.	Chapter 12
Listed Flora Species	Removal or disturbance through construction of WTGs and other Project infrastructure.	Targeted flora surveys of the Project footprint during the flowering season of each species to be undertaken.	Chapter 12
Brolga (listed as Threatened under the FFG Act and classified as Vulnerable on the Advisory List of Threatened Vertebrate).	Collision of breeding, migrating and/or flocking Brolgas with operational WTGs; disturbance to breeding, migration and/or flocking Brolgas from WTG operations.	Assessment of the impact of the Project on the Victorian Brolga population, including documenting patterns of Brolga occurrence on and around the wind farm site, compilation of historical and landholder information on the occurrence of the Brolga in this area. Recommendation of mitigation measures, including WTG free buffers around breeding and traditional flocking sites within three and five kilometres of WTGs.	Chapter 13
Southern Bent-wing Bat	Collision with or barotrauma from turbine blades to numbers of	Assessment including literature review, targeted surveys and	Chapter 12

Environmental Category	Potential impacts associated with the Project	Proposed scope of work for the EES	Reference
(SBWB) (listed as critically endangered under the EPBC Act 1999).	SBWB on the wind farm site, disturbance from earthworks to any on-site roosting caves of SBWB, removal of SBWB habitat or indirect detrimental impacts from construction and operation.	consultation to determine the level of SBWB activity on the wind farm site in comparison to Victoria and across Australia. Impact assessment, recommendation of mitigation measures, including appropriate turbine separation distances from potential habitats, if relevant.	
Noise and Vibration	Construction noise associated with traffic, operation of the concrete batching plants, quarry and the establishment of the infrastructure for the Project may generate noise impacts to nearby sensitive receivers. Noise generated by WTGs may impact nearby sensitive receivers.	Identification of all relevant noise sensitive receptor locations, including existing and consented land uses as defined in New Zealand Standard (NZS) 6808:2010; Undertake background noise monitoring in accordance with NZS6808:2010; Determine applicable noise limits in accordance with NZS6808:2010 and giving consideration to EPA Guidelines *Noise from Industry in Regional Victoria*; Determine applicable of noise limits for host landholders using *European Working Group* on *Noise from Wind Turbines* (ETSU-R-97) as a guide; undertake noise predictions in accordance with NZS6808:2010 using the methodology provided in ISO9613-2:1996; identify the location and nature of key noise generating activities associated with construction and operation of the wind farm. Recommend mitigation measures to be included in the construction management plan to address noise and vibration effects associated with construction and operation of the wind farm, including reference to working times and procedures, and relevant criteria to be adhered to.	Chapter 14
Shadow Flicker and Blade Glint	Amenity impact on nearby dwellings and on the surrounding area.	An assessment of the potential for shadow flicker and blade glint impacts on nearby dwellings; including an estimation of the annual hours of shadow flicker received at dwellings; identification of any dwellings where there is potential for the shadow flicker duration to exceed limits specified in planning guidelines; identification of the specific WTGs contributing high levels of shadow flicker for each dwelling; and recommendation of appropriate mitigation measures, if required.	Chapter 15

Environmental Category	Potential impacts associated with the Project	Proposed scope of work for the EES	Reference
Electromagnetic Interference	WTGs have the potential to cause EMI by blocking, scattering or reflecting waves between transmitters and receivers. This may include television, radar and radio transmissions.	An assessment of the potential for the project to result in EMI to surrounding telecommunications transmitting or receiving stations. Suggested adjustments to the wind farm layout to avoid impacts and recommendation of appropriate mitigation measures, if required.	Chapter 16
Landscape and Visual	Unreasonable visual impacts from WTGs to neighbouring dwellings and the public realm; Cumulative visual and landscape impacts; and Unreasonable visual impacts from grid connection infrastructure to neighbouring dwellings and the public realm.	A Landscape and Visual Impact assessment including montages to be prepared to determine the impact of the Project on the surrounding visual environment. The assessment to focus on the view scape from residences and publicly accessible areas.	Chapter 17
Planning and Land Use	Disruption of existing land uses (e.g. agricultural land activities), impact on the ability to use and develop surrounding properties for residential dwellings.	An assessment of the Project against the relevant controls and provisions of the Moyne Planning Scheme; identification of existing land uses including dwellings surrounding the site and assessment of uses; assessment of the potential for future dwellings on surrounding landholdings; identification of appropriate mitigation measures, if required.	Chapter 18
Traffic and Transport	Increase in traffic, particularly heavy vehicles, during construction. Impact on local road network including safety, performance and road pavement deterioration.	A transport and traffic assessment of the Project including identification of a preferred construction transport route, identification of existing traffic conditions, a haulage route analysis, preliminary bridge review, and preliminary traffic assessment. Identification of appropriate mitigation measures.	Chapter 19
Socio Economic	Potential socio-economic impacts include: associated land use constraints, affects from Project related procurement on local businesses communities and the supply chain, increased pressure on physical infrastructure (e.g. roads, power and water).	A high level Socio-Economic Impact (SIA) including a summary of the baseline conditions in the area, and an assessment of the direct and indirect socio-economic impacts of the Project. The preparation of an updated stakeholder engagement strategy to accompany the EES.	Chapter 20

Environmental Category	Potential impacts associated with the Project	Proposed scope of work for the EES	Reference
Aviation	WTGs and other Project infrastructure present a hazard for aviation activities undertaken in the vicinity of the Project.	An aviation impact assessment in accordance with Airservices Australia requirements, and taking into consideration the results of stakeholder consultation. Assessment of the need for obstacle lighting of the proposed wind farm undertaken in accordance with regulatory requirements, and assessment of impacts on aerial firefighting capability.	Chapter 21
Fire Management	Impacts to/from the Project on bushfire risk. Impacts of the Project on bushfire management capabilities.	A desk top bushfire risk assessment to be undertaken including an assessment of existing bushfire risk to the Project, the surrounding area and on bushfire management capabilities. Recommendation of mitigation measures to help provide protection from fire risks to and arising from the Project.	Chapter 22

The scoping process enabled the preparation of a draft study program for the Project which was submitted to DTPLI (now DELWP) by Trustpower. The final EES Scoping Requirements issued by the Minister set out the specific environmental matters to be investigated and documented in the EES and reflected the outcome of the impact assessment process to target key areas of impacts. The EES Scoping Requirements also included draft evaluation objectives for each environmental category. The draft evaluation objectives identify desired outcomes in the context of potential Project effects.

Scoping has continued throughout the preparation of the EES as further information has emerged during studies, site visits and stakeholder consultations and as a result of refinement of the Project design.

6.3 Impact Assessment

6.3.1 Purpose

The purpose of the impact assessment is to establish the likely impacts of the Project and to identify measures available to mitigate likely impacts.

6.3.2 Existing Conditions

The existing conditions or environmental baseline identifies the key environmental, socio- economic and cultural conditions in the Project area. Investigations for each environmental category considered in the EES were undertaken in accordance with the EES Scoping Requirements and guided by the draft study program. The existing conditions can be considered to represent conditions under the 'no Project' scenario and informs an understanding of how these matters may be affected during the construction, operation and decommissioning of the Project. An overview of the existing conditions in the Project area is summarised in *Chapter 3* and in each technical chapter of the EES.

The prediction of impacts is essentially an objective exercise to determine what could happen as a result of the Project's interaction with the environmental, socio-economic and cultural environment. The prediction of impacts considers the baseline conditions in the Project and any controls embedded in the Project design.

6.3.3 Magnitude of Impacts

Methods for predicting the degree or magnitude of impacts include quantitative, for those categories capable of being measured, and qualitative, for those that require a subjective description. This EES uses both quantitative and qualitative methods to describe Project impacts. Where quantification of potential impacts was possible, impact magnitude is based on numerical values, representing regulatory limits, project standards or guidelines (e.g. noise and shadow flicker). The prediction of impacts assumes that Project environmental controls planned and described in the project description, detailed in *Chapter 2*, are in place. Environmental categories such as visual impact, geomorphology, biodiversity and all social and cultural impacts required a more qualitative approach for determining magnitude.

6.3.4 Sensitivity of Receptor/ Resource

The sensitivity of a receptor/ resource is affected by physical, biological, cultural or human factors, e.g. the sensitivity of a waterway to impacts is influenced by physical factors such as the sensitivity of vegetated areas, and whether it constitutes habitat for threatened species. The sensitivity of a community is influenced by human factors such as levels of employment, or the presence of vulnerable groups within that community. As with the magnitude of impacts, designations for the sensitivity or vulnerability of a resource/receptor are universal, but the definitions for these designations vary on a resource/receptor basis. Baseline data collected for this EES throughout the screening

and scoping stages established the context of existing conditions and informed the determination of the sensitivity of receptors and resources.

6.3.5 Significance of Impacts

The significance of impacts is a function of the magnitude of the impact combined with the sensitivity/vulnerability of the receptor affected. The matrix used in this process is illustrated in *Table 6-2*.

Table 6-2 Classification of Impact Significance

	Sensitivity/ Vulnerability of Resource/ Receptor			
Magnitude of Impacts[1]		Low	Medium	High
	Negligible	Negligible	Negligible	Negligible
	Small	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	Large	Moderate	Major	Major

Source: The ERM Impact Assessment Standard V1.1

[1] Magnitude of impacts encompasses extent, duration, scale, frequency and the likelihood of an impact occurring.

The consequences of impact significance are broadly described in *Table 6-3*. More specific consequence descriptions for the subject areas assessed in this EES and provided in *Table 6-4*. These consequence descriptions are based on the judgement of specialist environmental practitioners, with reference to existing conditions, legal standards, government policy and the relevant draft evaluation objectives for the EES. The consequence descriptors have been specifically developed for the Dundonnell Wind Farm and are not intended as prescriptive standards to be applied to other projects.

In relation to Aboriginal cultural heritage, and following the recommendation of OAAV, the environmental impacts to Aboriginal cultural heritage have been based on 'impact', 'potential impact' or 'no impact' to Aboriginal cultural heritage values. This is because it is not considered meaningful to distinguish between negligible, minor, moderate and major impacts, when the key concern is whether harm will occur to values and if so, whether any impact is appropriately managed. Residual impact ratings for this aspect have therefore been defined as 'harm avoided', 'harm minimised' and 'harm appropriately managed' as outlined in *Table 6-5*.

In addition, for noise and shadow flicker impacts, impact assessment is based on compliance or non-compliance with criteria, as the key concern is the compliance or otherwise of the Project with relevant criteria. Therefore, in this EES, the noise and vibration, and shadow flicker impacts of the Project have been described as either compliant or non-compliant. A 'compliant' rating encompasses the impact ratings of negligible or minor, and 'non-compliant' includes moderate and major impacts. Noise impacts are described at *Table 6-6* and shadow flicker impacts at *Table 6-7*.

Similarly the socio-economic impacts assessment only considers positive and negative impacts, not the scale of impact. Socio-economic impacts are described at *Table 6-8*.

Table 6-3 Consequences of Impact Significance

Level of impact	Definition
Negligible	An impact of negligible significance is one where a resource/ receptor will essentially not be affected in any way by a particular activity, or the predicted effect is deemed to be 'imperceptible' or indistinguishable from natural background variation.
Minor	An impact of minor significance is one where a resource/ receptor will experience a noticeable effect, but the impact magnitude is sufficiently small (for impacts that can be quantified, well within applicable standards) or the resource/ receptor is of low vulnerability/ importance.
Moderate	An impact of moderate significance has an impact magnitude within applicable standards but are close to threshold. Not all moderate impacts are able to be reduced to minor impacts but mitigation measures are to be employed so that their impact is reduced to a level that is as low as reasonably practicable (ALARP).
Major	An impact of major significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/ sensitive resource/ receptors. Impact mitigation measures must be found to reduce impacts. Monitoring is required to ensure mitigation of negative impacts works properly and that the impact is not worse than predicted.
Source: The ERM Impact Assessment Standard V1.1	

Table 6-4 Environmental Categories and Impact Significance

Environmental Category	Aspect	Negligible	Minor	Moderate	Major
Geomorphology	Impacts on geomorphological values.	No discernible impacts on geoscience sites.	Minor impact to geoscience site/s of low significance.	Minor impact to geoscience site/s of regional significance. Major impacts to geosciences site/s of low significance.	Major impact to geoscience site/s of regional significance.
Soils	Erosion/ sediment generation.	Negligible potential.	Potential for erosion and sediment mobilisation in small isolated locations.	Potential for erosion and sediment mobilisation in multiple locations on wind farm site.	Potential for significant erosion and sediment mobilisation along the majority of the wind farm site.
	Land contamination.	Insignificant risk of encountering historic land contamination during construction, or contaminating land through construction or operation.	Potential for minor land contamination, but minimal risk to sensitive receivers.	Potential for moderate land contamination, some risk to sensitive receivers.	Potential for gross land contamination, confined to a localised area. Significant risk to sensitive receivers and health.
Hydrogeology	Construction and operation impacts on groundwater.	Negligible change to groundwater regime, quality or availability.	Temporary changes to groundwater regime, quality or availability but no significant implications.	Changes to groundwater regime, quality or availability with minor groundwater implications for a localised area.	Groundwater regime, quality or availability significantly compromised.

Environmental Category	Aspect	Negligible	Minor	Moderate	Major
Surface Water	Construction and operation impacts on surface water quality and existing surface drainage flows result in increased stormwater runoff, sediment and contaminant loading to waterways, wetlands and degradation of water quality.	Minor increases to stormwater runoff, sediment and or contaminant loading to the waterway, negligible impacts to existing surface drainage flows.	Significant increases to stormwater runoff, sediment and or contaminant loading to a minor waterway. Minor impacts to existing surface drainage flows.	Significant increases to stormwater runoff, sediment and or contaminant loading to a significant waterway. Moderate impacts to existing surface drainage flows.	Significant increases to stormwater runoff, sediment and or contaminant loading to a major waterway. Major impacts to existing surface drainage flows.
	Construction or operation activities are disturbed by flood events.	No flooding impacts to Project infrastructure.	100 year ARI event results in localised flooding on wind farm site or the transmission line corridor however 4wd access is maintained and no damage to infrastructure results.	100 year ARI event temporarily prevents access to wind farm site or the transmission line corridor and results in damage to Project infrastructure in <5 locations.	100 year ARI event prevents access to wind farm site or the transmission line corridor for a period greater than one week and results in infrastructure damage at >5 locations.
Historic Heritage	Historic cultural heritage.	No impact to extant cultural heritage place or sites. Places or sites remain unaffected.	Disturbance to a locally significant extant heritage place or site (Heritage Overlay listing) and/or historical heritage inventory site (HI) which is reparable.	Harm to an extant heritage site or place of State or National significance (Victorian Heritage Register (VHR)) which is not fully repairable and/or complete removal of historical heritage inventory site (HI).	Complete removal of an extant heritage site or place of State or National significance (VHR).

Environmental Category	Aspect	Negligible	Minor	Moderate	Major
Flora and Fauna	Listed Threatened Fauna.	No impacts to Listed Threatened Fauna.	Minor disturbance to Listed Threatened Fauna species.	Moderate disturbance to Listed Threatened Fauna species.	Major disturbance to Listed Threatened Fauna species.
	Listed Flora Species.	No impacts to Listed Flora Species.	Removal of a small number of listed Flora individuals during construction; indirect disturbance of a habitat for listed flora species during and after construction.	Removal of a moderate amount of listed Flora individuals during construction; indirect disturbance of a habitat for listed flora species during and after construction.	Removal of significant amount of listed Flora individuals during construction; indirect disturbance of a habitat for listed flora species during and after construction.
	Removal or disturbance of Ecological Vegetation Class/es.	No impacts to Ecological Vegetation Class/es.	Removal of part of Ecological Vegetation Class/es during construction; indirect disturbance of Ecological Vegetation Class/es during and after construction.	Removal of a moderate amount of Ecological Vegetation Class/es during construction; indirect disturbance of Ecological Vegetation Class/es during and after construction.	Removal of significant amount of Ecological Vegetation Class/es during construction; indirect disturbance of Ecological Vegetation Class/es during and after construction.
	Removal or disturbance of EPBC Listed Ecological Communities.	No impacts to EPBC Listed Ecological Communities.	Removal of part of an EPBC Listed Ecological Community during construction; indirect disturbance of a listed community during and after construction.	Removal of moderate amount of an EPBC Listed Ecological Community during construction; indirect disturbance of a listed community during and after construction.	Removal of significant amount of an EPBC Listed Ecological Community during construction; indirect disturbance of a listed community during and after construction.
	Disturbance to breeding, migration and/or flocking Brolgas from WTG construction/operation.	No disturbance to breeding/migration and or flocking behaviours.	Minor displacement of Brolga breeding/ flocking migration behaviours.	Moderate disturbance to Brolga breeding/ flocking migration behaviours.	Major disturbance to Brolga breeding/ flocking migration behaviours.

Environmental Category	Aspect	Negligible	Minor	Moderate	Major
	Collision of breeding, migrating and/or flocking Brolgas with operational WTGs.	No collision of Brolga with operational WTGs.	Minor incidence of collision of Brolgas with operational WTGs.	Moderate incidence of collision of Brolgas with operational WTGs.	Major incidence of collision of Brolgas with operational WTGs.
EMI	Disturbance to radiocommunications transmitting or receiving stations.	No discernible impacts on radiocommunications transmitting or receiving stations.	Limited impacts on radiocommunications transmitting or receiving stations.	Limited impacts on radiocommunications transmitting or receiving stations.	Major impacts on radiocommunications transmitting or receiving stations.
Landscape and Visual	Visual Impact upon public and private landscape values.	Minute level of effect that is barely discernible over ordinary day to day effects.	Adverse effects that are noticeable however will not cause any significant adverse impacts. This level of impact can be derived if the rating of any one of three factors, that is distance, viewer numbers and landscape sensitivity, is assessed as low.	Significant effects. This level of impact can be derived if distance, viewer numbers and landscape sensitivity are assessed as higher than low.	Extensive adverse effects. A major impact from a publicly accessible viewpoint usually requires distance, viewer numbers and landscape sensitivity to be assessed as high. For example, a highly sensitive landscape, viewed by many people, with the development in close proximity would lead to an assessment of an unacceptable adverse effect.
	Cumulative visual impact; whereby sequential and /or simultaneous views to WTGs from viewing locations lead to a change in a perception of the locality.	Minute level of effect that is barely discernible over ordinary day to day effects.	Adverse effects that are noticeable however will not cause any significant adverse impacts. This level of impact can be derived if the rating of any one of three factors, that is distance, viewer numbers and landscape sensitivity, is	Significant effects. This level of impact can be derived if distance, viewer numbers and landscape sensitivity are assessed as higher than low.	Extensive adverse effects. A major impact from a usually requires distance, viewer numbers and landscape sensitivity to be assessed as high.

Environmental Category	Aspect	Negligible	Minor	Moderate	Major
			assessed as low.		
Planning and Land Use	Inconsistency with planning policies and provisions, including the Moyne Planning Scheme.	Land use changes that would not result in inconsistency with planning policies.	Land use changes that would result in minor inconsistency with local planning policies.	Land use changes that would result in significant inconsistency with local planning policies.	Land use changes that would result in extensive conflict with planning policies.
Traffic and Transport	Traffic and transport operations (during construction and operation.	Negligible impact and delay to existing (or non-wind farm) traffic on identified wind farm access routes on one occasion.	Minor impact and delay to existing (or non-wind farm) traffic on identified wind farm access routes on one occasion.	Acceptable impact and delay to existing (or non-wind farm) traffic on identified wind farm access routes on one or more occasions.	Unacceptable impact and delay to existing (or non-wind farm) traffic on identified wind farm access routes on multiple occasion/s.
Aviation	Operational impacts on aviation activities- designated air routes, radar, communication systems and navigational aids.	No adverse impact on aviation activities.	Project results in minor disruption to aviation activities.	Results in moderate disruption to aviation activities.	Results in significant disruption to aviation activities.
	Operational impacts on aerial agricultural applications and aerial fire-fighting capability.	Negligible adverse impact on aerial agricultural applications and aerial fire-fighting capability.	Project necessitates minor modifications to existing aerial agricultural applications and aerial fire-fighting capability.	Project necessitates major modifications to existing aerial agricultural applications and aerial fire-fighting capability.	Project presents significant impediment to aerial agricultural applications and aerial fire-fighting capability.
	Aircraft collision with wind farm infrastructure.	Negligible damage to property. No injuries to people.	Minor damage to property. Injuries to people.	Moderate damage to property. Serious injuries to people.	Major damage to property. Severe injuries/ death to people.

Environmental Category	Aspect	Negligible	Minor	Moderate	Major
Fire Management	Risk of bushfire damaging Project infrastructure.	Negligible risk of bushfire damaging Project infrastructure.	Minor risk of bushfire damaging Project infrastructure.	Moderate risk of bushfire damaging Project infrastructure.	Significant risk of bushfire damaging Project infrastructure.
	Risk of the Project starting or influencing the spread of fire. Impacts of the Project on fire-fighting capabilities.	Project has negligible impact on starting or influencing the spread of fire. Project has negligible adverse impact on fire-fighting capability.	Project has minor adverse impact on starting or influencing the spread of fire. Project has minor adverse impact on fire-fighting capability.	Project has moderate adverse impact on starting or influencing the spread of fire. Project has moderate adverse impact on fire-fighting capability.	Significant impact of the Project on starting or influencing the spread of fire. Project has significant adverse impact on fire-fighting capability.

Table 6-5 Cultural Heritage Impact Assessment

Environmental Category	Aspect	No Impact/Harm Avoided	Impact and/or Potential Impact/Harm Managed Appropriately	Impact/Place Harmed
Cultural Heritage	Cultural Heritage	No harm to an Aboriginal place has occurred.	A portion, or all, of the Aboriginal place is harmed. Any loss to scientific or cultural value and/or landscape context has been minimised and appropriately managed in accordance with the approved CHMP.	A portion, or all, of the Aboriginal place is harmed. Harm has resulted in a significant loss of scientific or cultural value and/or the landscape context has altered significantly so that cultural values are lost.

Table 6-6 Noise Impact Assessment

Environmental Category	Aspect	Compliant	Non-Compliant
Noise and Vibration	Construction	Applicable standards met at all sensitive receptors at all times.	Exceedance of applicable standards at sensitive receptors.
	Operation	Applicable standards met at all sensitive receptors at all times.	Exceedance of applicable standards at sensitive receptors.

Table 6-7 Shadow Flicker Impact Assessment

Environmental Category	Aspect	Compliant	Non-Compliant
Shadow Flicker	Hours of exposure to shadow flicker	Applicable standards met at all sensitive receptors (dwellings <1.5km from a WTG) at all times.	Exceedance of applicable standard (modelled shadow flicker > 30 hours per year) at sensitive receptors (dwellings <1.5km from a WTG).
	Blade glint	Use of non-reflective finish to blades	Use of reflective finish to blades

Table 6-8 Socio-Economic Impact Assessment

Environmental Category	Aspect	Impact
Socio Economic	Function of place (land use, change in population composition/ distribution)	**Negative** Loss of productive agricultural land (net reduction in agricultural land of approximately 2% in the long-term). **Positive** Wind farms diversify land use and provide a positive offset to the overall trend of declining agricultural land uses in rural areas. The wind farm site will be rehabilitated to a landform capable of supporting rural activities. Road upgrades required for construction and delivery vehicles will provide long-term beneficial outcomes for local residents and workers, and improved access to the site for farming and emergency services. Construction workforce likely to increase the overall short-term and long-term local and regional residential populations during the construction phase.

Environmental Category	Aspect	Impact
	Access to employment opportunities	**Positive** Increased direct and indirect employment opportunities at the State, regional and local level during the construction and operational phases. Demand for services/positions within existing local businesses creates short term job opportunities and provision of a broader knowledge base and range of experiences.
	Capacity of support function in the region	**Positive** Materials sourced from within the region provide a range of direct and indirect benefits to the economy. Increased size of the construction workforce offers incentives to local residents to remain in the local area and support local membership to volunteer groups. The Project sponsors a number of local community organisations and programs to promote long-term benefit. Project infrastructure provides improved road access for emergency services. Carbon emissions reduction where wind energy replaces coal or gas generated electricity.
	Certainty and peace of mind (communication, property values, potential amenity impacts)	**Negative** Potential to create adverse impacts on human health and amenity generally a result of operational noise, shadow flicker or electromagnetic radiation. Perceived reduction in property values as result of wind farms. **Positive** No long term detrimental impact on overall property values. The Project will avoid adverse amenity impacts on nearby residents and local communities by complying with the relevant assessment criteria applicable to operational wind farm noise, shadow flicker and electromagnetic radiation.

6.3.6 Mitigation

The priority in mitigation is to apply mitigation measures to the source of the impacts (i.e. avoid or reduce the magnitude of the impacts from the associated Project activity), and then to address the resultant effect to the resource/ receptor via abatement or mitigation.

Impacts assessed as negligible or minor require no additional management or mitigation measures on the basis that the magnitude of the impact is sufficiently small, or that the receptor is of low sensitivity and/or that adequate controls are already included in the Project design.

Impacts evaluated as moderate or major require the implementation of further management or mitigation measures. Major and moderate impacts are therefore deemed significant. Where significant impacts were identified, a hierarchy of mitigation was utilised to identify the preferred approach:

- **Avoid at source** –alter Project, e.g. remove WTG so that impact is designed out;
- **Abate at source** – modify the basic design to abate the impact;
- **Attenuate** - reduce the impact between the source and the receptor;
- **Abate at the receptor** – reduce the impact at the receptor;
- **Remedy** – repair damage after it has occurred; or
- **Offset** – replace in kind or with a different resource of equal value.

Major and moderate impacts require further management or mitigation measures to minimise or reduce the impact to as low as reasonably practicable (ALARP). ALARP is the point at which impacts are considered able to be managed by routine management procedures.

Environmental objectives and indicators to guide the environmental performance of the Project have also been developed. The objectives have been identified having consideration for the EES Scoping Requirements and the potential environmental impacts that have been identified for the Project. The indicators have been developed to measure the effectiveness of the proposed environmental management and mitigation measures. The environmental objectives and indicators and the proposed mitigation and management measures have been used to inform the Environmental Management Framework for the Project, as described in *Chapter 25* of the EES.

6.3.7 Residual Impacts

Once feasible mitigation measures were identified, significant impacts were reassessed and re-rated with the recommended mitigation measures integrated into design and operation of the Project. This second rating is known as the 'residual impact rating.'

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 7- COMMUNITY AND STAKEHOLDER ENGAGEMENT

This page is intentionally blank

Contents

Tables

This page is intentionally blank

7 STAKEHOLDER ENGAGEMENT

This Chapter describes the consultation undertaken in relation to the Project to date and future community engagement commitments.

A *Dundonnell Wind Farm EES Consultation Plan* has been prepared to develop and implement a consultation process in relation to the Project. The Plan has ensured that stakeholders (including the community) have been informed consistently and through a variety of different methods and that feedback has been captured and actioned appropriately.

7.1 EES Objectives

This Chapter is based on the *Dundonnell Wind Farm EES Consultation Plan* undertaken by Wordwiz, dated March 2015. The Consultation Plan is contained in Volume 2: Supplementary Reports. This Chapter and Consultation Plan address the EES Scoping Requirements by documenting the process and results of the consultation undertaken during the preparation of the EES, including:

- issues raised and suggestions made by stakeholders or members of the public and the following responses made by the proponent in the context of the EES studies or associated consideration of mitigation measures; and
- outlining the program for community engagement, stakeholder engagement and communications during the construction and operation of the Project, including opportunities for local stakeholders to engage with the proponent to seek responses to issues that might arise when the Project is undertaken.

7.2 Consultation Approach

Trustpower is dedicated to developing and implementing a consistent and comprehensive consultation approach tailored specifically to the Project area. The range of consultation and feedback methods, varied types of engagement and the availability of project experts has been designed to cater for the direct and broader community potentially impacted by the Project.

The consultation strategy for the Project has been based on the Clean Energy Council's *Community Engagement Guidelines for the Australian Wind Industry*, feedback from Moyne Shire Council and Trustpower's previous domestic and international project experience.

7.2.1 Consultation Plan

Trustpower is committed to effective and genuine engagement with the local community. Trustpower's environmental management system (EMS) sets out principles to ensure that all consultation undertaken by Trustpower and/or their consultants is:

- inclusive, Trustpower will empower the appropriate parties looking to partake in consultation and provide sufficient time for these parties to submit on their issues;
- open, all relevant information released by Trustpower shall be accurate and clearly articulated;
- flexible, comments made by the appropriate parties will be considered 'without prejudice' or predetermination; and
- ongoing and responsive throughout the course of the Project.

The main aims of the EES Consultation Plan developed for the Project are to:

- identify the relevant stakeholder groups;

- characterise the stakeholder groups in terms of their interests, concerns and consultation needs and potential to provide local knowledge;
- create a framework to seek and encourage input from stakeholders throughout the EES process;
- keep stakeholders informed about the EES process and preparation;
- describe the consultation methods to be used and outline a schedule of consultation activities;
- outline how inputs from stakeholders will be recorded, considered and/or addressed in the preparation of the EES; and
- identify opportunities for future community collaboration and engagement when the Project proceeds to construction and operation.

The EES Consultation Plan has been designed to be an adaptive and responsive document. It will undergo regular updates to ensure the content and direction remains relevant, addresses any feedback received and meets changing stakeholder needs.

7.2.2 Summary of Consultation and Engagement Activities

In 2010, NewEn (former proponent of the Project) commenced a program of community engagement, which included the following activities:

- direct engagement and face-to-face meetings with landholders;
- direct engagement and face-to-face meetings with non-involved landholders in the vicinity of the Project, including seeking consent from landholders with proposed turbines within two kilometres;
- preparation of three newsletters distributed within an approximate 12km radius of the wind farm site;
- two website redevelopments which have allowed for provision of dedicated Project information and feedback mechanisms;
- two community information sessions;
- a 1800 free call project information hotline and dedicated project email address; and
- articles and letters in local newspapers.

Consultation material produced throughout the Project is included at Volume 2.

7.2.3 Direct engagement

Trustpower has directly engaged with stakeholders in a variety of ways, as outlined in *Table 7-1*.

Table 7-1 Direct Engagement

Date	Engagement
2011	• Direct door knock or phone call of approximately 73 landholders residing within 10km of the wind farm site boundary. • Follow up face-to-face meetings with more than 10 local landholders. • Identification and engagement of landholders within 2kms of potential WTGs. • Direct interaction with approximately 37 interested stakeholders at community information session.
2012	• Further engagement with direct neighbours with dwellings within 2km of the proposed wind farm site, involving face-to-face meetings, phone calls and emails. • Multiple phone calls, emails and face-to face-meetings with a range of landholders and key stakeholders involved in the Project throughout the course of the year.
2013	• On-going liaison in the form of phone calls emails and face-to-face meetings with a range of landholders and key stakeholders involved in the Project throughout the course of the year.
2014	• On-going liaison in the form of phone calls, emails and face-to-face meetings with a range of landholders and key stakeholders involved in the Project throughout the year to date. • Direct interaction with a minimum of 40 interested stakeholders at community information day.

A recent Amendment to the Victorian Planning Scheme (VC124) made a number of changes to the planning controls affecting wind energy facilities. These changes include the Minister for Planning becoming the responsible authority only for the wind farm as well as a modification to the consent requirements such that written consent is now only required from landholders within 1km of the proposed wind turbines.

Prior to Amendment VC124 being gazetted, evidence of the written consent was required of any owner of an existing dwelling located within two kilometres of a proposed turbine forming part of a wind energy facility, instead of one kilometre as now applies.

The owners of all 14 dwellings, that are within 2km of the proposed wind turbines have given their consent for the WTGs to be included in the proposed wind farm layout, notwithstanding the fact that as a result of Amendment VC124 consent is now only required from those dwellings within 1km.

7.2.4 Government and Agency Consultation

Trustpower has actively engaged with a variety of government agencies, as outlined in *Table 7-2*.

Table 7-2 Government and Agency Consultation

Date	Agency and Activity
2010 2011	• Multiple meetings and correspondence with Moyne Shire Council (Councillors and Council staff) to introduce the Project and provide information on the concept, and provide updates; • meetings and correspondence with the DSE (now DELWP); and • meetings and correspondence with the DPCD (now DELWP).
2012	• Further meetings and correspondence with Moyne Shire Council (Councillors and appropriate staff) to provide updates on the Project; • meetings and correspondence with DSE (now DELWP); and • meetings and correspondence with DPCD (now DELWP).
2013	• Further meetings and correspondence with Moyne Shire Council (including Councillors and relevant staff) to provide updates on the Project; • meetings and correspondence with DSE (now DELWP); • meetings and correspondence with DPCD (now DELWP); • onsite meetings with DEPI (now DELWP) and DTPLI (now DELWP) specifically on the proposed quarry as well as the broader wind farm project; • meetings and/or correspondence with all TRG agencies, including DTPLI (now DELWP), VicRoads, DEPI (now DELWP), Department of Premier and Cabinet (DPC), DSDBI (now DEDJTR), EPA, Glenelg Hopkins Catchment Management Authority (GHCMA) and also local government agencies; • meetings and correspondence with the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (DSEWPAC) (now the Department of Environment [DoE]); • meetings, phone discussions and emails between Trustpower and Traditional Aboriginal owner groups: Kuuyang Maar Aboriginal Corporation, Eastern Maar Aboriginal Corporation (KMAC and EMAC); • meetings with KMAC and EMAC to introduce the Project concept, conduct site visits, confirm survey methodology and discuss the results of cultural heritage surveys; and • meetings and correspondence between Trustpower and Martang (the RAP for a portion of land within the transmission line corridor).
2014	• Further meetings and correspondence with Moyne Shire Council (both Councillors and relevant staff) to provide updates on the Project; • meetings and correspondence with DoE; • formal TRG meetings held March 2013, November 2013 and July 2014; • meetings between Trustpower and all agencies involved in the TRG, including DTPLI (now DELWP), DEPI (now DELWP), DSDBI (now DEDJTR), VicRoads, DPC, GHCMA, Heritage Victoria (HV), Aboriginal Affairs Victoria (now Office of the Aboriginal Affairs Victoria [OAAV]), Moyne Shire Council; • environmental issue specific meetings (concerning acoustics and flora and fauna) between Trustpower and TRG representatives with specialist consultants in attendance; and • discussions between Trustpower and TRG in response to comments received on the EES specialist reports and chapters and reporting amended accordingly.

7.2.5 Newsletters

Three newsletters have been developed and distributed in an approximate 12km radius of the wind farm site boundary. The newsletters were distributed by one of the landholders, which proved an effective method in a relatively isolated community. Trustpower also distributes newsletters to parties who have registered their interest via the website, or who have made contact with Trustpower. The Project newsletters are also available on the Project website. Details of the three newsletters produced to date are provided in *Table 7-3.*

Table 7-3 Project Newsletters

Newsletter	Distribution	Contents
Edition 1: September 2011	Print run of 200. Newsletters distributed via letterbox drop to houses within an approximate 12km radius of the Project site; newsletter uploaded to website; remaining newsletters distributed as required to Councillors and other stakeholders on request.	• An introduction to the Project; • information about the Proponent (NewEn); • development process; • development timeline; • public meeting details; and • Wind energy facts.
Edition 2: December 2012	Print run of 200. Newsletters distributed via letterbox drop to houses within an approximate 12km radius of the wind farm site; newsletter uploaded to website; remaining newsletters distributed as required to Councillors and other stakeholders on request.	• Introduction to new Proponent (following acquisition of the Project by Trustpower); • Dundonnell Wind Farm snapshot; • the EPBC and EES referral process; and • Where To From Here: external road reserve assessments, noise assessments, rock and quarry assessments.
Edition 3: December 2013	Print run of 200. Newsletters distributed via letterbox drop to houses within an approximate 12km radius of the wind farm site; newsletter uploaded to website; remaining newsletters distributed as required to Councillors and other stakeholders on request.	• A message from Trustpower; • Trustpower overview and other projects; • Trustpower's community commitment; • Dundonnell Wind Farm snapshot; • new website overview; • progress update; • information day overview; and • Season's greetings.

7.2.6 Website

A Project website was created in September 2011 as part of the former Proponent's website. A dedicated dundonnellwindfarm.com.au URL was registered in December 2013 and can be accessed through the Trustpower website.

The website features detailed information about the Project, including:

- a project snapshot;
- project facts and figures;
- project overview;
- media section;
- newsletter signup; and
- previous newsletters available for download.

7.2.7 Community Information Sessions

There have been two community information sessions held regarding the Project, as detailed in *Table 7-4.*

Table 7-4 Community Information Sessions

Date	Overview	Attendance
Wednesday, October 12, 2011, 7pm	The meeting was advertised via letterbox drop within an approximate 12km radius of the wind farm site. The formal segment of the meeting finished at 8.30pm. Main issues of the evening focused on roads, impact on Brolga and the acquisition of the Project by Trustpower.	37 attendees, including two Moyne Shire Councillors.
Community Information Day Wednesday, March 26, 2014, 12pm-7pm	The Community Information Day was held at the Dundonnell Hall. The day was promoted through an advertisement in the Mortlake Dispatch and a letterbox drop within an approximate 12km radius of the wind farm site. The information display featured 17 A1 posters covering a range of associated topics. Representatives of Trustpower and consultants responsible for the EES preparation and involved with the EES technical studies were in attendance, including flora and fauna experts, acoustic technicians, traffic consultant, and landscape and the visual consultant.	Approximately 40 people, including two Moyne Shire Councillors.

7.2.8 Community Engagement Officer

In 2012, the Proponent appointed a dedicated community engagement officer responsible for identifying and establishing partnership and engagement opportunities within the local community. This role involves liaising with members of the local community and the broader stakeholder group, attending consultation events and responding to enquiries. It is anticipated that as the Project progresses the extent of activities undertaken by the community engagement officer will increase accordingly.

7.2.9 Project Information Line

The Project hotline (1800 122 823) is widely promoted as a freecall number to access information. The number is a personal call service, which forwards the message to Trustpower via email. In early 2014, a new system was established whereby calls to this number are now returned by the community engagement officer, which allows for a prompt response to enquiries.

There were 16 calls to the number in 2012, 17 in 2013, 12 in 2014 and three to date in 2015. The majority of the enquiries concerned generic Project information and registration for provision of services. There have also been several enquiries about employment opportunities and accommodation requirements during construction.

7.2.10 Project Email Address

A dedicated email address was established in 2013 (dundonnell@trustpower.com.au), which is used on all marketing material. Prior to 2013, individual email addresses were used as opposed to a generic address. There have been a small number of emails sent to this address and these were in relation to the 2014 Community Information Day.

7.2.11 Fact Sheets

Seventeen posters on a range of topics were presented at the 2014 Community Information Day. These posters have been compiled into a 20-page A4 booklet, which is suitable for email distribution or able to be printed. The posters were prepared with input from the expert consultants appropriate to that field.

Poster topics included: Project overview; Project benefits; Who is Trustpower? Approvals process and consultation; Aviation; Construction; Flora and fauna; Fire prevention and response; Geology and landforms; Health; Heritage assessment; Noise; Property values; Quarry; Traffic and transport; Transmission line; and Visual impact assessment.

7.2.12 Brochure

A brochure detailing the Project was developed by Trustpower in the first quarter of 2014. It showcased the facts and figures of the Project, providing information on Trustpower, the Project, Project benefits, Project objectives, clean energy, and the planning approval and consultation process. These brochures were available at the 2014 Community Information Day, are available online and can be posted or emailed to interested parties on request.

7.3 Media Interaction

The main media outlets Trustpower has previously used are The Mortlake Dispatch (part of the Western District newspapers family, which also includes the nearby Terang Express) and The Standard, a regional daily based in Warrnambool, the district's largest town. While Trustpower does issue media releases and letters to the editor when appropriate, it prefers to interact with stakeholders at a more personal level. Trustpower has issued two media releases regarding the Project, the first regarding the change of ownership and the second following the 2014 Community Information Day.

7.4 Management of Issues Raised in Consultation

Trustpower is committed to responding to stakeholders' queries and concerns in a timely and thorough manner. Trustpower has created a complaint management mechanism that creates a formal process to respond to legitimate concerns relating all aspects of the wind farm and quarry. The matters raised in consultation and responses to these issues are provided in *Table 7-5*.

Table 7-5 Specific Issues Raised in Consultation

Issue	Management / Project response	EES reference (chapter)
Potential impact on Brolga	A comprehensive Brolga assessment has been undertaken since 2009 and is ongoing. Surveys have included desktop assessments, wetland quality assessments, on-ground and aerial breeding surveys as well as flocking surveys at the wind farm site and within a 10km radius, together with the transmission line corridor. The Project has involved partnering with the community to monitor Brolga movements in the area. This has been a positive and inclusive process between Trustpower and the community. The reporting prepared by BL&A in relation to the Brolga has been independently peer reviewed in order to provide assurance that the conclusions relating to the impacts and implications of the Project on the surrounding Brolga population are justified.	Chapter 13 Brolga

Issue	Management / Project response	EES reference (chapter)
Transfer of the Project to another company	Extensive consultation with stakeholders was undertaken prior to, during, and after the Project's transfer from NewEn to Trustpower. This information was disseminated via one-on-one meetings, phone calls, emails and through newsletters. This matter is no longer raised as a concern.	Chapter 1 Introduction
Risk of ownership company becoming insolvent	Promotion of the Trustpower's domestic and international status, investments and community partnerships has been provided through the website, newsletters, phone calls, emails, face-to-face meetings, promotional material and the 2014 Community Information Day. This has provided stakeholders with an element of security in relation to the Trustpower's financial status.	N/A
Length of construction and disruption during this time	Following EES approval, an Environmental Management Plan (EMP) will be prepared for the Project that will include a process for receiving and responding to community complaints, including the management response. The EMP will outline the processes of monitoring compliance with conditions of Project approval and performance management associated with the Project. The EMP will ensure that the environmental impacts associated with the construction phase of the Project are managed in accordance with statutory obligations and approval conditions. This process has been communicated with stakeholders through fact sheets, the Community Information Day, phone calls, emails and meetings. In relation to the on-site quarry, in particular its operation will follow all legislative and statutory requirements. Signage will be erected during quarry operation times. This will enable the community to communicate noise, dust or traffic issues that may arise as a result of the on-site quarry. Necessary actions will be undertaken to address reasonable community concerns in consultation with Council and DEDJTR as far as practicable.	Chapter 25 Environmental Management Framework
Traffic impacts; damage to roads; vehicle movements, safety	Trustpower engaged Cardno to undertake a Traffic Impact Assessment, which considers the Project impacts on road surface integrity, numbers of vehicle movements, safety considerations and potential road widening works required. Trustpower are committed to ongoing consultation with stakeholders and the implementation of a detailed Traffic Management Plan prior to, and throughout construction.	Chapter 19 Traffic and Transport
Impact on land values	The findings of robust studies by independent organisations around the world (which have failed to find any link between the presence of wind turbines and declining property values) has been communicated to interested stakeholders via email, phone calls, face-to-face meetings and the 2014 Community Information Day. An economic impact assessment was commissioned for the Project, which considers the findings of this research.	Chapter 20 Socio-Economic
Impact on groundwater	A hydrogeological desk study was prepared by Environmental Resources Management Australia that outlines proposed activities/operations associated with the site construction and operating phases that are considered to have the potential to impact groundwater resources. Necessary licenses and approvals required by Trustpower will be obtained at the appropriate time following the approval of the Project.	Chapter 9 Hydrogeology
Cumulative impact of major projects in the region	Trustpower has considered the potential cumulative impacts of the Project in accordance with the EES Scoping Requirements and direction received by DTPLI (now DELWP) during the course of the preparation of the EES.	Chapter 23 Cumulative Impacts

7.5 Ongoing Commitment to Stakeholder Engagement

Trustpower is committed to continued ongoing and thorough community engagement with all stakeholders. The ongoing stakeholder engagement detailed following is proposed during the preparation of the EES, the public notification period, and post approval during construction and operation.

7.5.1 Public Exhibition of the EES

In accordance with the statutory requirements, the EES will be exhibited for 30 business days for public comment. This will be advertised on the DELWP website, a national newspaper, daily newspaper, and at least one local newspaper. Printed copies of the document and the EES summary document will be available for viewing at the Moyne Shire Council office and DELWP offices.

During the public exhibition period, there are further opportunities for the community to engage with the Proponent, and the expert consultants that undertook the technical analysis supporting the EES. An open public information session will coincide with the public exhibition period. This will provide the community with an opportunity to meet with the Proponent and independent experts to discuss the EES process; learn about the proposed Project and the approach taken by the Proponents to assess project benefits and impacts; and explore potential local investment and employment opportunities.

7.5.2 Community Newsletters

Trustpower is committed to distributing at least two newsletters per year throughout the EES process, with the expectation these will increase in regularity as the Project progresses beyond planning approvals and into the construction period. Newsletters will continue to be distributed to landholders within an approximate 12km radius of the wind farm site and emailed to other stakeholders including Council, government officials and others who have registered their interest. Interested groups, outside previously identified stakeholders, will be able to access archived newsletters and subscribe to email versions through the Trustpower website.

7.5.3 Personalised Letters

Personalised letters will be sent to all people who attend public meetings and leave their contact details on the attendance sheets. Trustpower intends to maintain personal contact with these interested parties at regular intervals throughout the process.

7.5.4 Website Updates

The Project website will be regularly updated throughout the EES process, the Project approvals process and during construction, to ensure all stakeholders are able to access up-to-date information at all times.

7.5.5 1800 Number, Emails and Website Feedback

Trustpower is committed to prompt replies to any queries coming through either of these communication channels. During construction, Trustpower envisages that the 1800 number will be staffed to respond to any complaints received or issues arising in a timely manner. Further details will be set out in the Environmental Management Plan for the Project.

7.5.6 Personal Visits

Personal visits with key stakeholders are a regular part of the Trustpower's engagement process and will continue throughout the EES process, the Project approval and during construction.

7.5.7 Council Communication

Trustpower is committed to regular Council updates and will communicate directly with Councillors and Council staff. Newsletters will be emailed directly to each Councillor and relevant Council staff. Trustpower staff will also be available to speak to Councillors in a workshop environment as frequently as required.

7.5.8 Community Liaison Group

Following project approval, and prior to the commencement of construction, a Community Liaison Group (CLG) will be established to provide a forum for open discussion between representatives of the Project, the community, the Council and other stakeholders.

The CLG will have the following objectives:

- to facilitate information flow between the Proponent's management team and the community;
- to provide a forum to raise, discuss and resolve any issues arising during Project construction;
- to provide an ongoing point of contact between the Proponent and the wider community; and
- to help to identify opportunities for the community to benefit from the Project.

7.5.9 Community Assistance Fund

A Community Assistance Fund will be created once the Project is operational and specific details as to how the fund would be structured and operated will be determined at that stage. The fund will be designed to return funds to the area where the Project is based. The fund will be community-driven and enhance the partnership between Trustpower and the community. Funds will be available to community projects, groups and initiatives, as determined by the fund committee, which will be made up of community members.

7.5.10 Community Programs

Trustpower is committed to creating programs within the host community, which will enhance the lives and opportunities of those who live there. These initiatives may include programs through the local school network, physical support for community groups (i.e. wind farm staff working bees) and support to drive community projects. Specific programs will be identified and prioritised through the CLG.

7.6 Conclusion

Trustpower is an experienced energy provider with 38 hydro-generating stations and two wind farms in New Zealand, together with a variety of wind energy projects in Australia. Trustpower is experienced in community engagement and facilitating open and honest communication with stakeholders.

The variety of community engagement methods used by Trustpower highlights their commitment to ensuring that stakeholders are kept informed and aware throughout the development of the Project and the course of the EES. To keep the community informed of the Project, Trustpower has undertaken face-to-face meetings, produced and distributed newsletters, set up a website, information line and Project email address held two community information sessions and appointed a community engagement officer.

All issues raised as part of the consultation process have been recorded and taken into consideration wherever possible in the design of the Project.

If the Project is approved, Trustpower will establish a CLG, which will provide an ongoing discussion forum for any Project related construction issues. A variety of additional initiatives will also be implemented to facilitate collaboration between Trustpower and the Project community.

This page is intentionally blank

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 8 - GEOMORPHOLOGY AND SOILS

This page is intentionally blank

Contents

Figures

Tables

This page is intentionally blank

8 GEOMORPHOLOGY AND SOILS

This Chapter describes the potential impacts of the Project on the geosciences values of the wind farm site and the transmission line corridor as well as the proposed mitigation measures that are designed to ensure that the Project limits any potential adverse impacts.

A *Geoscience Features Significance and Sensitivity Assessment* and *Report on Desk Study – Geotechnical Assessment* has been undertaken and concluded as follows:

- The Project is not expected to significantly impact on the geoscience values of the wind farm site as the layout, including the location of the quarry pits, has been designed taking into account the constraints imposed by the identified geoheritage sites. Any potential impacts will be further reduced by minimising reshaping and filling of surfaces and by avoiding the construction of WTGs and other infrastructure on ridged higher stony rise surfaces and enclosed depressions on the lava flow surfaces.
- Direct impacts to the nature and significance of the geoscience sites identified along the transmission line corridor will also be avoided as a result of the footprint of the transmission line being narrow, limited in area and requiring minimal land surface excavation.
- The Project has been assessed as an 'acceptable use' within the Kanawinka Geopark.
- Whilst there are no known lava caves or open lava flow pathways within the wind farm site, there is the possibility that they do occur. Accordingly, detailed geotechnical investigations will be undertaken at the location of each WTG to determine the presence of potential caves and, if present, appropriate protocols implemented.
- There is the potential for erosion to occur during construction of the Project on both the wind farm site and in the transmission line corridor. However, these potential impacts will be appropriately minimised through application of environmental management measures during construction.
- The Project is not expected to expose hazardous materials relating to past agricultural uses and storage, however should they be found on the site during construction appropriate measures will be implemented to ensure their safe transport and disposal.

8.1 EES Objectives

The EES evaluation objective relevant to geomorphology and soils is:

Landscape and Geoscience Values - To avoid or minimise adverse effects on the landscape and geoscience values of the region.

This Chapter is based on the *Geoscience Features Significance and Sensitivity Assessment* undertaken by Environmental Geosurveys Ltd, dated August 2014 and the *Report on Desk Study – Geotechnical Assessment* undertaken by Douglas Partners, dated December 2011, contained at Volume 2.

This Chapter and the *Geoscience Features Significance and Sensitivity Assessment* and *Geotechnical Assessment* address the EES Scoping Requirements by:

- characterising the landscape character, features and values of the study area, their significance and sensitivity to change;
- characterising the soils on the wind farm site and transmission line corridor;
- identifying the features of geoscience value of the project site and the surrounding area, their significance and sensitivity to change;

- outlining and evaluating potential project design, and WTG and quarry siting options that could mitigate potential effects on significant landscape and geoscience values;
- assessing potential effects on significant volcanic or other landforms of geoscience value through removal or covering of features or reshaping of surfaces;
- assessing the likely effects of the Project on identified landscape and geoscience values, including in the context of the objectives of the Kanawinka Global Geopark;
- identifying and assessing potential effects of the Project on soil stability, erosion and the exposure and disposal of any waste or hazardous soils; and
- recommending additional measures to further manage or monitor effects on landscape and geoscience values and describing and evaluating any residual effects.

8.2 Study Area

The study area for the *Geoscience Significance and Sensitivity Assessment* comprised the wind farm site and the 38km transmission line corridor, including the off-site substation. The *Report on Desk Study – Geotechnical Assessment* addressed the general area of the wind farm site only.

8.3 Assessment Methodology

The methodology used for the *Geoscience Significance and Sensitivity Assessment* included:

- a desktop review of geology, geomorphology and geoscience values of the volcanic regions of western Victoria (in reporting previously prepared by Environmental Geosurveys);
- a desktop review of topographical, geological and soil maps, aerial photography, satellite and geophysical images and bore records;
- an aerial inspection of the wind farm site;
- an initial broad field visit and subsequent detailed and extended inspections of specific sites;
- consultation with participating landholders;
- consultation and discussion with geologists Professor Bernie Joyce (University of Melbourne) and Mr Ken Grimes (Regolith Mapping Pty Ltd, Hamilton), specialists in the volcanic terrain of western Victoria;
- discussions with Mr Chris Prowse of CK Prowse and Associates regarding aspects of subsurface geology determined from test pits and boreholes; and
- consideration of the WTG layout and transmission corridor.

No specific testing or investigation of the properties of materials was conducted. The geological and landform descriptions and assessments of processes are qualitative or based on previous studies sourced from literature, supplemented by non-invasive field inspection.

The methodology used for the *Report on Desk Study – Geotechnical Assessment* included:

- a desktop review of reporting previously prepared by Douglas Partners;
- a desktop review of topographical information, geological and hydrogeological reports and historical aerial photography; and
- project information provided by Trustpower.

8.4 Legislation and Policy

The relevant legislation and government policies for geomorphology, geology and soils are outlined in *Table 8-1*.

Table 8-1 Relevant Geomorphology, Geology and Soils Legislation and Policies

Legislation / Policy	Description
State	
Catchment and Land Protection Act 1994	The *Catchment and Land Protection Act 1994* (CLP Act) has the objective of establishing a framework for the integrated and coordinated management of catchments that will: • maintain and enhance long-term land productivity while also conserving the environment; and • aim to ensure that the quality of the State's land and water resources and their associated plant and animal life are maintained and enhanced. The Act provides for the development of Regional Catchment Strategies that must assess the nature, causes, extent and severity of land degradation of the catchments in the region and identify areas for priority attention. Local Planning Schemes must have regard for the Regional Catchment Strategies.
Environment Protection Act 1970	The *Environment Protection Act 1970 (EP Act)* enables the Environment Protection Authority (EPA) Victoria to implement *State Environmental Protection Policy (SEPPs)* which provide more detailed requirements and guidance for the application of the Act to Victoria.
State Environment Protection Policy (Waters of Victoria) 2004	*SEPP (Waters of Victoria (WoV)*) identifies the beneficial uses of waterways, which must be protected. Works undertaken for the Project on or near waterways would need to be managed to reduce the risks to aquatic ecosystems and other beneficial uses of the waterway, as defined by the SEPP (WoV).
State Environmental Protection Policy, Prevention and Management of Contamination of Land 2002	*SEPP Prevention and Management of Contamination of Land* is the main guidance document for the management of contaminated land in Victoria. The SEPP outlines the process for establishing land contamination and management and remediation of impacted sites.
Policy and planning guidelines for development of wind energy facilities in Victoria (DELWP, 2015)	The Wind Energy Guidelines are for responsible authorities, proponents and the community to provide guidance about wind farms and inform planning decisions about wind energy facility proposals. The guidelines set out information requirements for wind energy developments.
Local	
Moyne Planning Scheme	The Moyne Planning Scheme is implemented via the P&E Act and outlines the following planning overlays that are relevant to geomorphology: Land Subject to Inundation Overlay (LSIO), Environment Significance Overlay (ESO) and Vegetation Protection Overlay (VPO). The purpose of these overlays are as follows: • LSIO: *'To ensure that development within the 1 in 100 year flood extent maintains the free passage of floodwaters, and protects water quality in accordance with the SEPP (WoV).'* • ESO: *'To ensure development is compatible with identified environmental values.'* • VPO: *'To ensure that development minimises impact to significant vegetation.'* It is noted that these overlays do not apply to the wind farm site or transmission line corridor. Clause 52.32 of the Planning Scheme sets out the matters to be considered prior to the determination of an application for a wind energy facility, which includes consideration of the Wind Energy Guidelines.

8.5 Existing Conditions

8.5.1 Geomorphology

Wind Farm Site

The wind farm site is part of a broad landform referred to as Western Volcanic Plains. The Western Volcanic Plains are flat to gently undulating terrains derived from numerous short lived volcanoes with multiple low eruption points. The wind farm site is dominated by flows of basalt lava from Mt Fyans and is part of the 'stony rise' volcanic terrain unit, which is characterised by mounds and broad ridges of broken basalt blocks.

The wind farm site is predominantly covered in young lava flows (1 million to approximately 300,000 years ago) overlying older lava flows (6 million - 4 million years ago), which have well-preserved flow features, often with rocky outcrops, steep-sided linear ridges and irregular, stony surfaces with relief of ±10m (stony rises) and little or no soil cover. A series of lakes and swamps have developed along the flow margins in the west and south-west portion of the wind farm site.

The youngest flows from Mt Fyans include a complex of hills at Mt Violet, north of Post Office Lane. The Mt Violet hills comprise prominent narrow to elliptical domed structures with rounded to slightly sinuous crests; and broad flat-topped ridges and low plateau or mesas with steep crenulate margins. The Mt Violet hills are the most complex and significant group of primary lava flow features identified within the wind farm site.

In addition to weathering regimes, areas of the wind farm site have been modified to facilitate farming. The main agricultural impacts have been the removal and consolidation of loose stone into piles, construction of drystone walls and buildings; draining of wetland depressions and small excavations for quarry stone and stock dams.

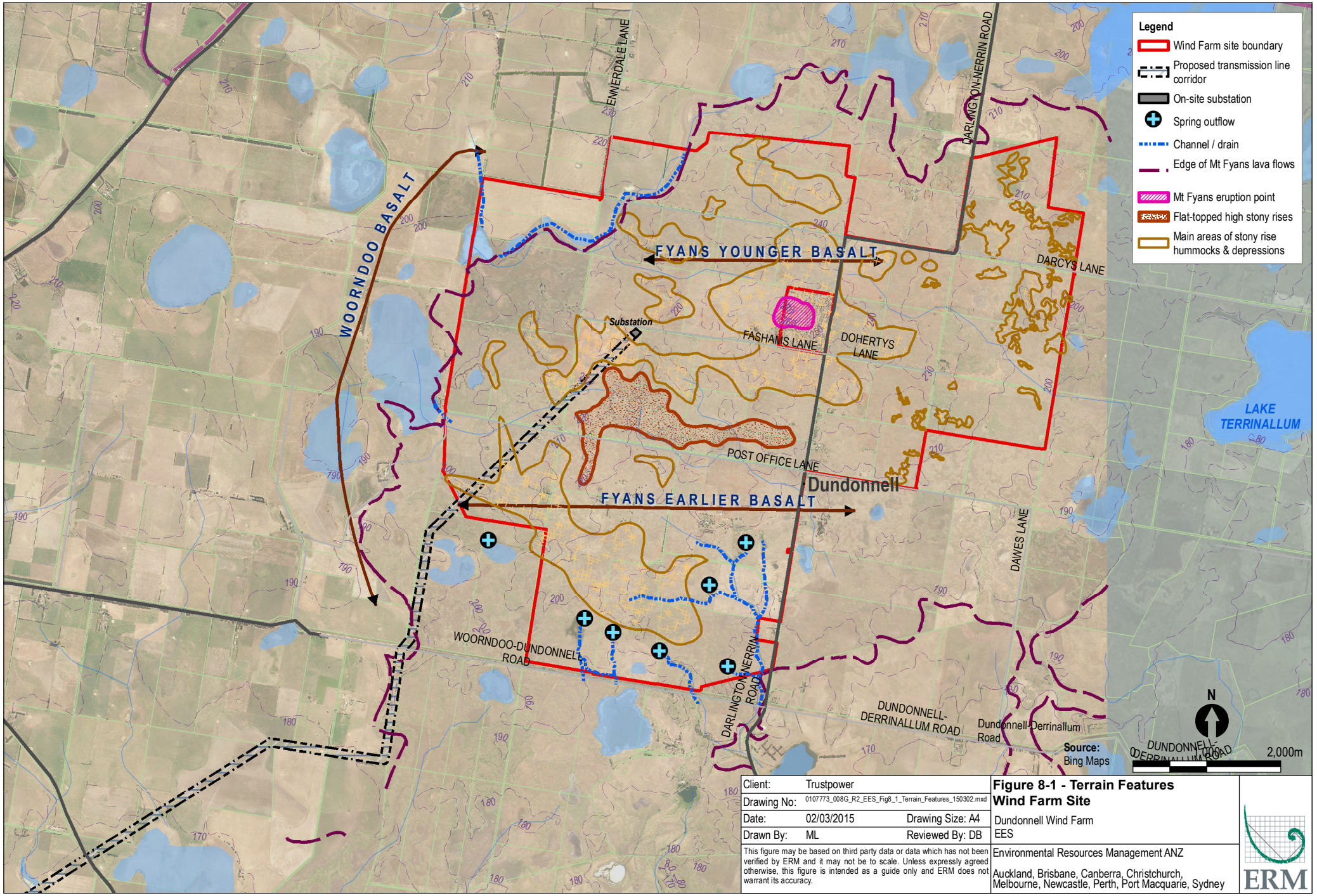
There are no known lava caves or open lava flow pathways within the wind farm site, although there is the possibility that lava tubes do occur that have not been unroofed by collapse or otherwise exposed.

The terrain features of the wind farm site are shown in *Figure 8-1*.

Transmission Line Corridor

The transmission line corridor traverses five terrain types comprised of volcanic and non-volcanic geology. The corridor crosses some enclosed and semi-enclosed depressions (localised lowering of the surface) and other low-lying areas that may capture run-off and be subject to seasonal or intermittent inundation. There are shallow drainage lines but no major stream crossings.

A description of the geological units along the route of the transmission line is provided at *Section 8.1* of the *Geoscience Features Significance and Sensitivity Assessment* contained at Volume 2.



Client:	Trustpower		
Drawing No:	0107773_008G_R2_EES_Fig8_1_Terrain_Features_150302.mxd		
Date:	02/03/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 8-1 - Terrain Features Wind Farm Site

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

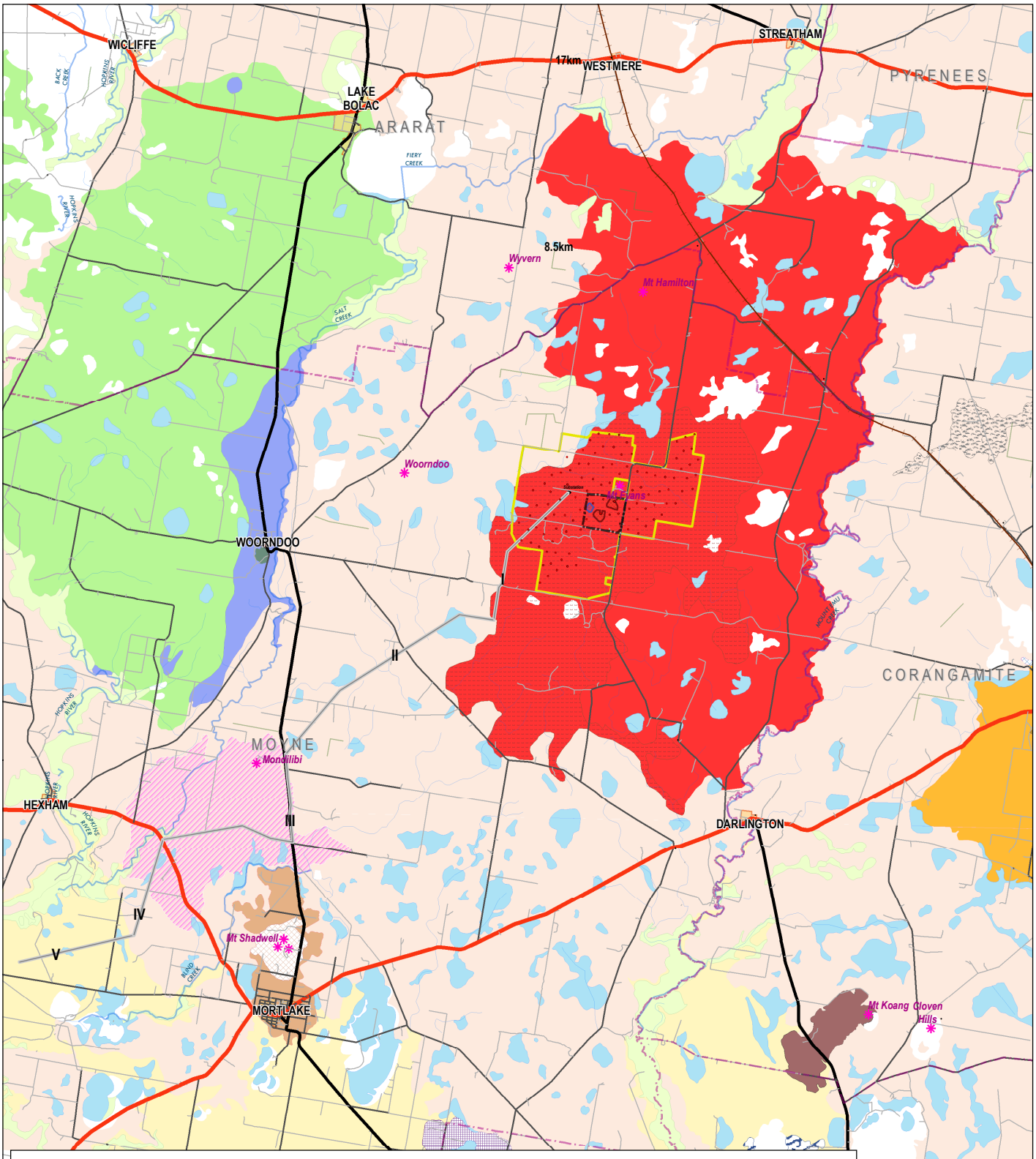
ERM

8.5.2 Geology

The geological and terrain units present across the wind farm site and along the transmission line corridor are identified in *Table 8-2* and *Figure 8-2.*

Table 8-2 Geological Units

Identifier	Age	Description	Location
Qu	Quaternary sediments - Lunette deposit	Crescent-shaped, windblown, deposit of sand and clay.	Adjacent to the north-west corner of the wind farm site.
Qrm	Quaternary sediments	Comprise clay silt and sand. Swamp and lagoonal deposits.	Localised deposits in the depressions in the volcanic terrain, predominantly in the western portion of the wind farm site, minor deposits in the south-western part of the wind farm site.
Qvs	Quaternary Volcanics Scoria Cone Deposit	Comprises scoria, basalt and other ejecta.	Present at the peak of Mt Fyans.
Qvh2	Quaternary Volcanics	Blocky vesicular olivine basalt flows associated with the Mt Fyans eruption point/scoria cone.	This unit covers approximately 80% of the wind farm site and extends to the south and east outside the boundary.
Qvn	Quaternary Volcanics	Olivine basalt.	Extensive basalt flow encroaches into the western edge of the wind farm site.
Qvn1	Quaternary Volcanics	Basalt unit associated with an eruption point, north of the site.	Adjacent to the northern boundary of the wind farm site.
Tae	Tertiary sediments	Fluvial and swamp deposits, coarse grained, sand, gravel, clay, lignite and coal.	Localised deposit in a perennial lake area, adjacent to the western boundary of the wind farm site.



Client:	Trustpower	
Drawing No:	0107773_008G_R4_EES_Fig8_2_Geology_Units_150603.mxd	
Date:	03/06/2015	Drawing Size: A4
Drawn By:	ML	Reviewed By: DB

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 8-2 - Geology and Terrain Units - Wind Farm Site and Transmission Line

Dundonnel Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

8.5.3 Soils

Soils within the Project area closely reflect landforms and are derived from the following main parent materials; basalt lava flows; organic material; lake and evaporite deposits and aeolian accessions, as detailed following.

Wind Farm Site

There are no significant bedrock exposures or areas of floodplain across the wind farm site and therefore, the range of parent materials contributing to soil development is limited to material produced by the lava flows and supplementary processes on the flows and at the flow margins.

The stony rises produce a soil pattern and sequence related to outcrop and degree of weathering of the basalt. The predominant soils on the gently inclined rocky slopes of the stony rises are shallow, red and black friable loams, while the steeper slopes have minimal soil development. On the gentle slopes, alluvial material has accumulated resulting in thicker soils with finer texture and defined horizons.

A small area in the north-west of the wind farm site has soils developed on older lava flows, including the Ennerdale eruption point. Red-brown residual basaltic clays are found in this area and the thickness of this clay profile commonly varies from 2m - 6m, progressively grading into variably weathered rock with depth.

The wind farm site has a history of agricultural land use and therefore, the potential for hazardous subsurface materials to occur is unlikely. Any that may be encountered are likely to be related to agricultural use and storage (e.g. fuels, chemical fertilisers and herbicides/pesticides, machinery and building ruins or construction residue).

Transmission Line Corridor

The transmission line includes diverse terrain and a variety of soil types. Soils along the transmission line vary with parent material and landform. They are derived from five main parent materials:

1. Basalt lava flows from Mt Fyans;
2. Basalt lava from Mondilibi eruption point;
3. Basalt lava from older eruption points;
4. Miocene and Pliocene sedimentary rocks (Brighton Group); and
5. Quaternary sediments in depressions and shallow drainage lines.

8.5.4 Geoheritage Values

Geoheritage values are the geological and/or geomorphological features of a site that represent a specific characteristic of a region or are an outstanding or unusual example of a geological and/or geomorphological feature in a wider context. A place or feature of geoscience significance is graded against recognised State and National principles on a comparative significance scale that ranges from Local to International. A very high significance rating is equivalent to State significance. Assigning a significance rating is dependent in part on the context in which the sites or study area occur, the specific professional skills, interests and experience of the investigator as well as their knowledge of the region and ability to make a valid comparative assessment of like features in and beyond the study area.

Wind Farm Site

No single feature within the wind farm site has attributes of National or International significance. There are three attributes of high (regional) geoheritage significance:

1. the extensive and complex basalt stony rise surfaces, in particular the Mt Violet tumuli-inflation complex of domes, mounds, ridges and flat-topped hills at Post Office Lane;
2. the flow boundaries of the Mt Fyans lavas (internal and external), which have shaped the position and form of lakes and swamps; and
3. the groundwater discharge zones at the southern boundary of the wind farm site, which are unusually well-developed and uncommon incised landscape features.

Mt Fyans itself is classified of high (regional) significance and part of a larger complex (including Mt Hamilton and other nearby eruption centres) that is of very high (State) significance. It is a relatively young volcanic complex that experienced several different phases of eruptive activity with eruption features (such as scoria, basalt dykes and small caves as displayed in the quarry), and stony rise features that are well preserved and unusual in a State context. The Mt Fyans quarry, outside of the wind farm site is also of high (regional) significance.

The wind farm site is also located within the boundaries of the Kanawinka Global Geopark. A Geopark is a broad concept developed by UNESCO's Division of Earth Sciences that recognises areas with geological heritage significance, with a coherent and strong management structure, and where a sustainable economic development strategy is in place. The Kanawinka Global Geopark extends across part of the coast and volcanic plains of western Victoria and into South Australia. The wind farm site is located in the Lakes and Craters Precinct of the Kanawinka Geopark. This precinct identifies and describes a number of eruption points, including Mt Hamilton, but does not refer to Mt Fyans or associated lava flows.

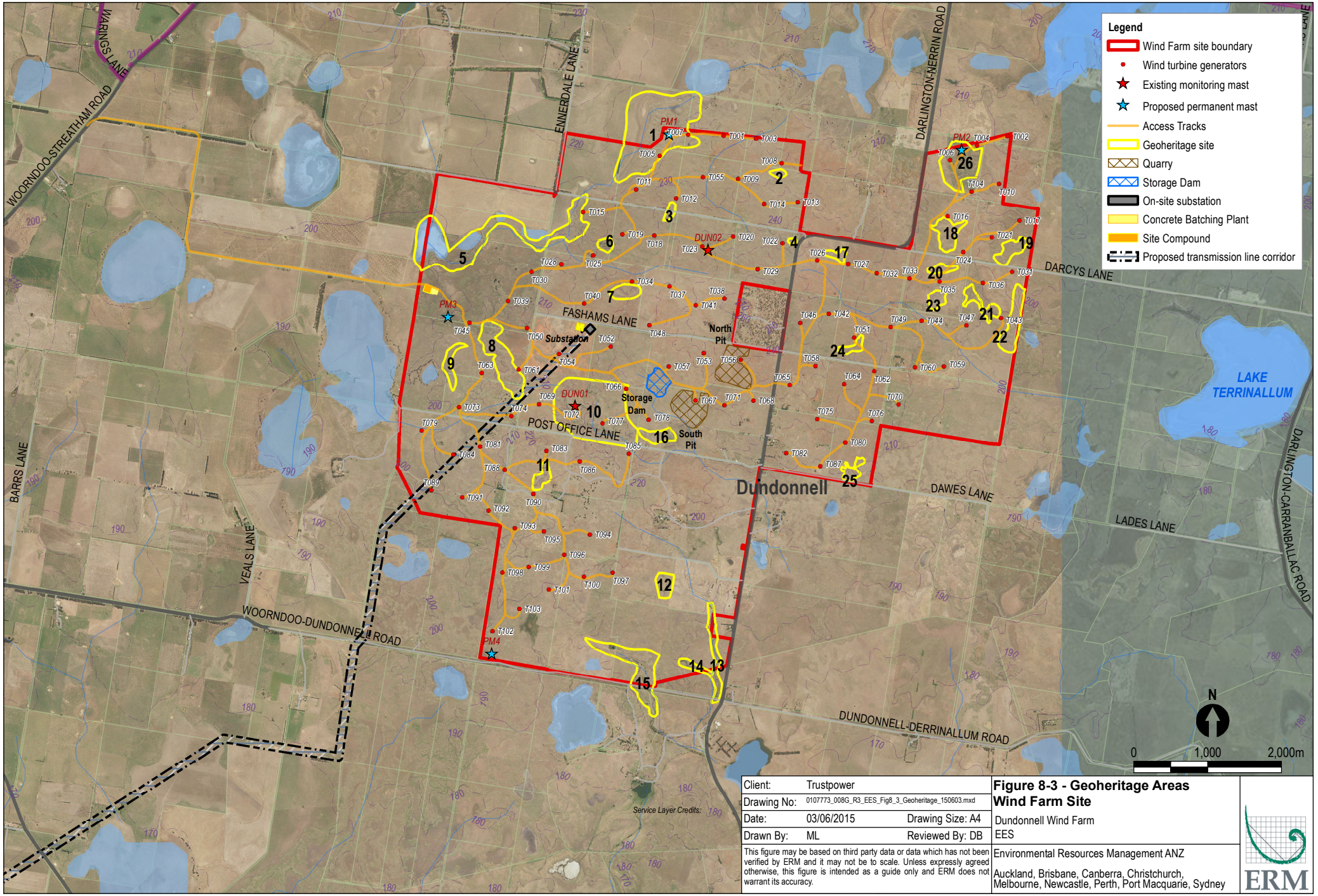
Geoheritage Sites

The desktop review and ground and aerial inspection identified 25 geoheritage sites within the study area. All of the sites are either on the lava surface or are geomorphic features at the flow margins developed by the emplacement of the lava over older terrain. There are clear examples of various primary lava features including volcanic topography of restricted occurrence in Victoria. Although the Mt Fyans eruption point, along with Mt Hamilton, Mt Vite Vite, Mt Elephant and Mt Shadwell and their associated lava flows are a volcanic complex of State and possibly National Significance, no single feature in the study area has attributes of National Significance. One geoscience site, number 10, north of Post Office Lane, is of State significance. Other sites identified in the study area range from very high regional significance (e.g. groundwater discharge sites 12 - 15) to local significance.

The geoheritage sites are identified in *Figure 8-3* and a detailed description of each site, including the significance level and rarity, is provided in *Section 7.1* of the *Geoscience Features Significance and Sensitivity Assessment* at Volume 2.

Transmission Line Corridor

The transmission line corridor crosses an area that is part of a larger site of high (regional) significance. This rating is due to a combination of attributes in the area including; exposures of varied volcanic and sedimentary geological materials; boundaries between geological formations of different ages; and landforms that illustrate palaeo and contemporary processes in shaping the terrain at the confluence of two major drainage lines (Hopkins River and Salt Creek).



Client:	Trustpower		
Drawing No:	0107773_008G_R3_EES_Fig8_3_Geoheritage_150603.mxd		
Date:	03/06/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 8-3 - Geoheritage Areas Wind Farm Site

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

8.6 Assessment of Impacts

8.6.1 Geomorphology

Wind Farm Site

Construction of the Project includes the installation of WTGs and hardstands, underground cables and vehicle access tracks. This will require excavation and potentially levelling of surfaces, removal of regolith and rock and creation of spoil.

The Project layout has been developed taking into consideration the constraints imposed by the identified geoscience features identified in *Figure 8-3*. Construction of the WTGs and other infrastructure will not result in direct impact to any of the known eruption points, including the Mt Fyans scoria and lava cone or other recognised eruption points in the Dundonnell-Woorndoo area.

Project infrastructure will be conspicuous on narrow and linear features and on steep slopes, both on ridge and plateau edges and on the margins of enclosed depressions. The installation of culverts and drains may result in the regrading of slopes on spring discharge sites, associated drainage lines and on marginal and internal lakes and swamps.

Given the relatively high intensity and long history of rural land use, the likelihood of unknown cave entrances occurring within the wind farm site is low, and impacts to cave features are unlikely.

Site selection for potential quarry sites was based on the potential availability of suitable rock in areas that would not directly affect geoscience sites. Preliminary assessment of two potential quarry locations (unpublished report by CK Prowse and Associates Pty Ltd, 2013) indicates the geoscience constraints have been taken into account when selecting sites for detailed field testing.

The Project is not considered to be inconsistent with the designation of the wind farm site as part of the Kanawinka Geopark. While tourism (specifically geotourism) is a major component of a Global Geopark; the concept also provides for socio-economic activities and the use of the resources or a region for sustainable regional development. It does not preclude the use of volcanic land for wind farm development.

Transmission Line Corridor

The significant geoheritage values of the corridor will not be affected by the construction of the transmission line. The nature of the construction required for the transmission line (i.e. periodically spaced poles along the corridor and the low impact of the construction of the transmission line) means that direct impacts to areas of geoheritage significance are able to be avoided.

8.6.2 Geology and Soils

Construction of the Project will require excavation into rock foundations and exposed clay and basalt soils. Having regard for the character of soils found within the wind farm site, there is considered to be low potential for sheet erosion, gully and tunnel erosion and wind erosion during construction.

As there is minimal soil cover over the majority of the wind farm site, movement of construction vehicles have the potential to result in compaction and breakdown of soil structure. Potential impacts will be reduced through the implementation of environmental management measures during construction as part of a Sediment, Erosion and Water Quality Management Plan.

There is also potential for construction activities to encounter previously unknown areas of hazardous waste or disposal related to past agricultural use of the sites. This potential impact will be reduced through consultation with landholders to identify areas used for historical waste disposal and sites used for chemical storage.

Transmission Line Corridor

Transmission line construction will require localised excavation of soils for the transmission poles. Lesser impacts will be caused by movement of construction vehicles around the pole sites, including boring or excavating machinery and those carrying the transmission line infrastructure (poles, cable etc.). The soils of the transmission line route are regarded as of low inherent susceptibility to gully and tunnel erosion and moderate susceptibility to sheet erosion (Baxter and Robinson, 2001).

8.7 Impacts and Mitigation Measures

The environmental impacts to geomorphology, geology and soils, and an initial impact rating are summarised in *Table 8-3.* Recommendations to minimise impacts, and the residual risk rating after environmental mitigation measures have been applied, are also provided in *Table 8-3*.

Table 8-3 Geomorphology, Geology and Soils Impacts, Mitigation Measures and Residual Impact Table

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
8-01	Excavation for Project infrastructure has the potential to impact on geomorphological values through the levelling of surfaces and removal of regolith and rock.	Moderate	• Final Project layout will avoid, where possible, impacts to previously identified geoscience features identified in *Figure 8-3,* with WTGs and other project infrastructure microsited if required, to avoid or minimise local direct impacts on geoscience features. • The reshaping and fill of surfaces will be minimised and access tracks will be constructed to avoid crossing ridge crests where possible.	Minor
8-02	Excavation for Project infrastructure has the potential to impact on geomorphological values through the creation of spoil.	Moderate	• Excess excavated rock and imported construction materials will be removed from the site on completion of construction. • If excess spoil is to be deposited on-site, it will be located to avoid identified geoscience features as shown on *Figure 8-3.*	Minor
8-03	Excavation for Project infrastructure has the potential to damage previously unknown lava caves.	Moderate	• Detailed geotechnical investigation will be undertaken at the location of each WTG to determine if there are indications of potential cavities (caves) in the lava. If necessary, subsurface testing will be undertaken at WTG sites identified at risk of cavities. • Should unknown caves or other significant features, such as unusual minerals be encountered during the investigation, construction and operation of the Project, protocols developed by the Geological Society of Australia (GSA) will be implemented, including principles regarding geological and geomorphological sites.	Minor
8-04	Erection of WTGs and other Project infrastructure has the potential to impact on geomorphological and landscape values if construction occurs on steep slopes, ridges and plateau edges and on the margins of enclosed depressions within the wind farm site.	Moderate	• WTGs and other project infrastructure will be located on subdued terrain rather than ridged, higher stony rise surfaces, where feasible. • WTGs and hardstands will be located 50m from the edges of escarpments, where possible. • WTGs, underground cabling and roadways will be micro-sited to avoid enclosed depressions on the lava flow surfaces.	Minor
8-05	Installation of culverts and drains around WTGs and regrading of	Moderate	• The regrading of slopes will be avoided and minimised where possible. • Underground cabling and roadways across spring outflow sites will be avoided and minimised where possible.	Minor

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
	slopes has the potential to impact on spring discharge sites, associated drainage lines and internal lakes and swamps.			
8-06	Construction of Project infrastructure will expose soils with the potential to create increased sedimentation and erosion processes.	Moderate	Project activities will be undertaken in accordance with a Sediment, Erosion and Water Quality Management Plan, which will include, but not be limited to, the following requirements: • installation of erosion and sedimentation controls; • minimise the amount of exposed erodible surfaces; • prompt covering of exposed surfaces; • progressive revegetation of the site; • management of stockpiles; and • avoidance of works near watercourses.	Minor
8-07	Construction of Project infrastructure has the potential to expose hazardous materials relating to past agricultural use and storage e.g. fuels, chemical fertilisers and herbicides/pesticides, machinery and building ruins or construction residue.	Moderate	• Project activities will be undertaken in accordance with a Hydrocarbon and Hazardous Substance Plan. • Landholders will be consulted to determine the location of former storage or waste disposal areas that may not be readily visible. • If hazardous materials or wastes are encountered during construction, appropriate measures for the removal, transport and disposal of any such material will be followed.	Minor

8.8 Impact Assessment Conclusions

In assessing the impact to geomorphology, geology, and soils, all of the impacts were initially assigned a moderate risk rating as it was considered that in each instance there is the potential for excavation for Project infrastructure to adversely impact on the geomorphological values of or the soil conditions within the site. Within sites of high significance, impacts have been avoided through the design process by relocating WTGs or other project infrastructure. Where there is still the potential for moderate impacts, management and mitigation measures have been identified to address these issues.

It is concluded that while there will be localised reduction of geoscience values, the geoscience character of the Mt Fyans lava flows and associated features will be maintained. While WTGs may have an impact on visual and landscape amenity, the essential details of the geological origin and geomorphic character of the site would be retained. The overall residual impact to geomorphology, geology and soils as a result of the construction and operation of the Project is therefore considered to be minor.

This page is intentionally blank

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 9 - HYDROGEOLOGY

This page is intentionally blank

Contents

Figures

Tables

This page is intentionally blank

9 HYDROGEOLOGY

This Chapter describes the potential impacts of the Project on the hydrogeology of the area and the proposed mitigation measures designed to ensure the Project minimises any potential adverse impacts.

A *Hydrogeological Study* has been undertaken for the wind farm site and transmission line corridor and concluded the following:

There are unlikely to be any impacts on the groundwater at the site as a result of the operation of the WTGs.

- There is the potential for other site activities to impact on groundwater supply, groundwater interactions with surface water, and groundwater dependent ecosystems without appropriate mitigation measures being implemented.
- One such impact includes the potential of leaks and spillages of chemicals and/or fuels. As such, best practice storage techniques will be applied in conjunction with an appropriate management plan to ensure potential impacts are minimised.
- There is also the potential for impacts to occur that are associated with groundwater abstraction for use in the concrete batching plant and on the wind farm site during construction.
- Mitigation measures to minimise potential impacts include locating any groundwater abstraction wells away from spring areas and away from current groundwater users.
- In addition to the above, necessary licenses and approvals will be obtained by the proponent once the required water quantities have been determined as part of the detailed design phase. Any potential impacts will be addressed further as part of that approvals process.

9.1 EES Objectives

The EES evaluation objective relevant to hydrogeology is:

Catchment Values – To maintain the functions and values of aquatic environments, surface water and groundwater, including avoiding effects on hydrology and protected beneficial uses.

This Chapter is based on the *Hydrogeological Study* undertaken by ERM, dated April 2015. This Report is contained at Volume 2: Supplementary Reports. This Chapter and the *Hydrogeological Study* address the EES Scoping Requirements by:

- characterising the groundwater environment in the study area, including baseline groundwater quality, chemistry and depth, locations of existing groundwater bores, and beneficial uses of groundwater (actual and potential);
- identifying and broadly assessing the potential effects of the Project on water environments and beneficial uses, including groundwater flow and quality; and
- identifying proposed measures to mitigate any potential effects, including any relevant design features or preventative techniques to be employed during construction and operation.

9.2 Study Area

The study area for the *Hydrogeological Study* included the wind farm site and an area extending approximately 4km from the wind farm boundary (for groundwater bore searches), as well as the 38km transmission line corridor (including the off-site substation). It is noted that the assessment focused on the wind farm site as the activities associated with construction and operation of the transmission line corridor and off-site substation are not considered to pose a risk of impact to groundwater.

9.3 Assessment Methodology

The methodology used for the hydrogeology assessment included:

- desktop review of publicly available information relating to groundwater resources in the study area, including:
  - http://gmu.geomatic.com.au
  - http://data.water.vic.gov.au/monitoring.htm
  - http://mapshare2.dse.vic.gov.au/MapShare2EXT/imf.jsp?site=geovic
  - http://vvg.org.au/
- consideration of the layout of the Project infrastructure (WTGs, quarry, concrete batching plant and the proposed transmission line corridor);
- development of a preliminary conceptual site model as a basis from which to assess potential impacts;
- a groundwater investigation drilling programme undertaken on 16 and 17 February 2015 comprising two boreholes (BH01 and BH02) to assess the depth to groundwater in proximity of the two quarry pits; and
- an initial drilling and testing program comprising one borehole (TW01) undertaken between 18 and 26 February 2015.

9.4 Legislation and Policy

The relevant legislation and government policies considered in the hydrogeological assessment are outlined in *Table 9-1*.

Table 9-1 Relevant Hydrogeology Legislation and Policies

Legislation / Policy	Description
State	
Environment Protection Act 1970	One of the key aims of the EP Act is to ensure the sustainable use and holistic management of the environment. The Act establishes the powers, duties and functions of the Environmental Protection Agency, including the recommendation of State environment protection policies and issuing works approvals, licences, permits and National Environment Protection Measures.
Water Act 1989	Approval for the extraction, use or disposal of groundwater is required under the Water Act. It is not yet known if this will be required for the Project and is anticipated to be confirmed during the detailed design phase.
State Environment Protection Policy (Groundwaters of Victoria) 1997	SEPP (Groundwaters of Victoria) has been prepared under the provisions of the EP Act. It aims to maintain and, where necessary, improve groundwater quality to a standard that protects existing and potential beneficial uses of groundwater.
State Environment Protection Policy (Waters of Victoria) 2003	SEPP (WoV) identifies the beneficial uses of waterways, establishes environmental quality objectives and articulates the broad actions that are needed to meet its purpose. Works undertaken for the Project on or near waterways will need to be managed to reduce the risks to aquatic ecosystems and other beneficial uses of the waterway, as defined by the SEPP (WoV).
Hydrogeological Assessment Guidelines – Environment Protection Authority, Publication 668 (EPA 2006)	The EPA hydrogeological assessment guidelines provide a framework for the assessment of potential Project impacts on groundwater quality and protected beneficial uses.

Legislation / Policy	Description
Publication 628 – Environmental Guidelines for the Concrete Batching Industry (EPA, 1998)	The Environmental Guidelines for the Concrete Batching Industry seeks to assist the concrete batching industry to achieve the best practical environmental outcomes whilst allowing flexibility.
EPA Victoria Publication 655.1 -Acid Sulfate Soil and Rock –(EPA, 2009)	The EPA Policy for Acid Sulfate Soil and Rock sets out the requirements for managing the disposal and reuse of waste acid sulfate soils, specifying the responsibilities of those involved.
Policy and planning guidelines for development of wind energy facilities in Victoria (DELWP, 2015)	The Wind Energy Guidelines are for responsible authorities, proponents and the community to provide guidance about wind farms and inform planning decisions about wind energy facility proposals. The Guidelines set out information requirements for wind energy developments; including the matters to be addressed in relation to sediment, erosion and water quality management.
Local	
Moyne Planning Scheme	The Moyne Planning Scheme is implemented via the P&E Act. Strategic policy within the Scheme relates to the management of water and includes Clause 14.02-1 'Catchment planning and management,' which seeks *'to assist the protection and, where possible, restoration of catchments, waterways, water bodies, groundwater, and the marine environment'.* Clause 52.32 of the Planning Scheme sets out the matters to be considered prior to the determination of an application for a wind energy facility, which includes consideration of the Wind Energy Guidelines.

9.5 Existing Conditions

9.5.1 Registered Groundwater Bores

Online searches were undertaken to identify registered groundwater bores within approximately 4km from the wind farm site boundary and along the route of the transmission corridor. Five boreholes were identified within the wind farm site, as described in *Table 9-2*. The five boreholes range in depth from 15mbgs to 104mbgs. Two are registered as observation wells (95072 and 95073) and three are registered for stock watering use (95065, 95069 and 95070) including one also registered for domestic use (95065). In addition, during the groundwater investigation field work, several boreholes that are not in the borehole database were surveyed and, where possible, groundwater levels in these bores were gauged. The location and details of these bores are shown in shown *Figure 6* in the *Hydrogeological Study* at Volume 2.

Table 9-2 Registered Database Bores within Site Boundary

Well ID	Date of completion	Total depth (mbgs)	Elevation top of casing (mAHD)	Date of elevation survey	Top of screen Metres below top of casing (mbTOC)	Bottom of screen (mbTOC)	Groundwater bore use
95065	22/07/1977	15	211.87	09/11/2011	6	15	Domestic/Stock
95069	26/07/1985	25.9	220.17	09/11/2011	3	25.9	Stock
95070	23/09/1985	14.93	209.69	09/11/2011	3	14.93	Stock
95072	24/10/1990	104	223.854	07/07/2011	84	90	Observation
95073	09/11/1990	42	223.796	07/07/2011	33	39	Observation
Data from http://vvg.org.au/ Visualising Victoria's Groundwater							

9.5.2 Geology and Aquifers

The main aquifer on the wind farm site occurs in the basalt. The basalt of the Newer Volcanics typically has a dual porosity, with groundwater flow occurring primarily through fractures and blocky zones. Groundwater storage occurs predominantly in the more weathered and vesicular zones of the basalt, as well as in fractures. Refer to the Conceptual Hydrogeological Model at *Figure 9-1.*

Due to the fractured nature of the basalt, its transmissivity and hydraulic conductivity are variable spatially and vertically and are dependent on fracture orientation, density and spacing, as well as the occurrence of vesicles and the extent of weathering within the basalt.

The data set acquired from online resources included hydraulic yields for 35 wells which had been subject to pumping or aquifer testing. The five registered database groundwater wells identified on-site had associated hydraulic yield data which are provided in *Table 9-3*.

Table 9-3 Yield Data of On-Site Wells by Depth

Bore ID	Yield (L/s)	Relative screened Depth of Well
95065	1.67	Shallow
95069	0.38	Medium
95070	0.63	Shallow
95072	1	Deep (90 m) – non basalt bore
95073	6	Deep
Data from http://vvg.org.au/ Visualising Victoria's Groundwater		

The yields identified in the basalt aquifer on-site ranged from 0.63 L/sec to 1.67 L/sec in the shallower basalt and 6 L/sec in the deeper basalt. Despite 6 L/sec being measured and reported in the deeper part of the aquifer, it is not considered to represent different conditions at depth.

During the drilling and testing program undertaken in February 2015, a 69m deep test well was installed and test pumped. The results indicate that the well appeared capable of sustaining a yield of approximately 2L/sec based on the step test and 24 hour constant rate test performed. This is within the range of reported yields for other on-site registered bores.

9.5.3 Springs and Wetlands

As discussed in the *Hydrogeological Study* and *Geoscience Features Significance and Sensitivity Assessment* (Environmental GeoSurveys Pty Ltd, 2014) provided at Volume 2, well defined groundwater discharge zones in the form of perennial springs and associated incised channels occur in the southern and eastern parts of the wind farm site. Based on the elevation of the springs ranging from approximately 191m AHD to 195.5m AHD) and the groundwater elevation data (water table at approximately 200m AHD), it is likely that the spring discharge represents a component of groundwater derived from the stony rise area on-site, which is likely to be a local recharge area. Groundwater that does not discharge at the springs will continue to flow down hydraulic gradient to discharge areas (e.g. rivers) lower down the catchment. It is noted that while some springs are located within the wind farm site boundary, they do not occur within the footprint of Project infrastructure. Refer to *Figure 8-1* at Chapter 8 for locations of the spring outflow.

The *Surface Water Assessment* (Water Technology, 2014) provided at Volume 2, identifies small wetlands to the south and north-east of the wind farm site and larger wetlands in the west of the site. Although the wetlands were not described as groundwater discharge areas in the Surface Water Assessment, it is possible they may receive groundwater discharge. As such, both wetlands and springs on-site have the potential to receive discharge from groundwater and host groundwater dependent ecosystems.

9.5.4 Protected Beneficial Uses of Groundwater and Chemistry

The SEPP (Groundwaters of Victoria) defines beneficial uses of groundwater based upon the range of Total Dissolved Solids (TDS) found in the groundwater. Groundwater is divided into segments (with associated suitable beneficial uses) based on the TDS range.

Review of regional bore water information (http://vvg.org.au) and mapping indicates that the salinity of the groundwater in the study area is likely to have TDS concentrations ranging between <500 mg/L and 3,500 mg/L.

The variable TDS values are considered to be indicative of the different hydrogeological environments present on-site. Stony rises are typically areas of recharge and therefore the TDS of groundwater in these areas is likely to be lower than that elsewhere in the basalt aquifer.

Groundwater chemistry data is available for four of the five wells identified within the wind farm site, as well as data collected from the southern quarry pit monitoring well (BH02) and the test well (TW01). The TDS concentrations are shown in *Table 9-4.*

Table 9-4 Total Dissolved Solids (TDS) in Groundwater On-Site

Bore ID	Reading date	Well completion date	TDS (mg/L)
95065	21/07/1977*	22/07/1977	466*
95069	09/08/1985	26/07/1985	660.43*
95072	Unknown	24/10/1990	867*
95073	18/03/2008	09/11/1990	509*
BH02	26/02/2015	17/02/2015	360
TW01	26/02/2015	20/02/2015	350
* assumed to be measured during drilling based on date of sample (data from http://vvg.org.au)			
The online groundwater chemistry data information relating to sample methodology or quality assurance or quality control (QA/QC) were not available.			

All reported TDS values (http://vvg.org.au) from registered bores on the wind farm site were below 1,000mg/L. Consequently, based on these values, groundwater beneath the site would be classified predominantly as Segment A1 to Segment A2 in accordance with the Groundwater SEPP definitions.

This segment classification would prescribe the beneficial uses as shown in *Table 9-5* below. The segment A1/A2 groundwater as found at the site is shaded blue to highlight the relevant protected beneficial uses.

Table 9-5 Beneficial Uses of Groundwater Classified by TDS (mg/L)

Beneficial Uses	Segments (mg/L TDS)				
	A1 (0-500)	A2 (501-1,000)	B (1,001-3,500)	C (3,501-13,000)	D (> 13,000)
Maintenance of ecosystems	✓	✓	✓	✓	✓
Potable Supply Desirable Acceptable	✓	✓			
Potable mineral water supply*	✓	✓	✓		
Agriculture, parks & gardens	✓	✓	✓		
Stock watering	✓	✓	✓	✓	
Industrial water use	✓	✓	✓	✓	✓
Primary contact recreation	✓	✓	✓	✓	
Buildings and structures	✓	✓	✓	✓	✓
* The site is not within a recognised mineral water zone therefore this beneficial use is not considered relevant.					

Based on the TDS of groundwater at the site, the relevant protected beneficial uses for groundwater will be:

- maintenance of ecosystems;
- potable supply;
- agriculture parks and gardens;
- stock watering;
- industrial water use;
- primary contact recreation; and
- buildings and structures.

Investigations have identified that the groundwater has a low TDS and a major ion composition considered to be consistent with rainfall recharge; likely to occur in the stony rise areas of the Newer Volcanics basalt aquifer.

9.5.5 Rainfall

In assessing trends between rainfall and groundwater, data sets were considered from seven rainfall gauging stations located within 25km of the wind farm site. A comparison of data from the four nearest stations show the drought period commencing in the mid to late 1990s and breaking in 2010 with a higher than average rainfall year. Similar trends were observed in data sets from the different rainfall stations in the surrounds.

9.5.6 Groundwater Elevations

Two of the on-site wells (95072 and 95073) have groundwater level data dating back to 1991 and continuing to the present. Both wells indicate similar trends in groundwater elevation, however the elevations in 95073 (shallow) are consistently higher than those in 95072 (deep). This indicates a downwards vertical gradient and, together with the groundwater quality, suggests that the monitoring wells are located in a recharge area.

A summary of groundwater elevation data for two of the on-site wells are provided in *Table 9-6.*

Table 9-6 Summary of Groundwater Elevation Data from Boreholes 95072 and 95073

Groundwater elevation record	95072	95073
Maximum Elevation*	204.23	212.38
Minimum Elevation*	201.64	207.53
Elevation Range (m)	2.59	4.85
*Elevations are shown in mAHD unless stated otherwise All data from http://vvg.org.au		

Groundwater levels were measured at the newly installed wells BH02 and TW01, and a number of existing bores not included in the registered bore database within the Project area. The locations, ground elevations and groundwater level elevations are summarised in *Table 9-7*.

Table 9-7 Groundwater Elevation Survey Data

Location Name	Total Depth (m BGS)	Ground Surface (m AHD)	Depth to Groundwater (m BGS)	Static Water Level (m AHD)	Date Gauged	Bore Use
Bore A	28.4	221.0	18.6	202.4	19/02/2015	Disused
BH02	25.5	219.3	18.9	200.4	24/02/2015	Observation
TW01	69.0	240.0	39.6	200.5	24/02/2015	Test Well
Windmill 4	31.0	228.4	27.6	200.8	19/02/2015	Stock
Windmill 5	16.0	211.4	11.1	200.3	19/02/2015	Stock
Windmill 6	31.5	230.7	30.2	200.5	19/02/2015	Disused
Spring 1	NA	195.5	NA	NA	19/02/2015	NA
Spring 2	NA	191.1	NA	NA	19/02/2015	NA
Spring 3a	NA	191.3	NA	NA	19/02/2015	NA
Spring 3b	NA	190.8	NA	NA	19/02/2015	NA

The groundwater investigations indicated that the slope of the water table was very flat, with the general groundwater flow direction considered to be to the south, consistent with topography. This is based on the inferred recharge area of the Mount Fyans topographic high (approximately 250m AHD) to the north, measured water table elevations and the elevation of spring issues to the south (approximately 191m to 195m AHD). The shape of the water table may vary seasonally, potentially responding to periods of higher recharge and controlled to some extent by the springs to the south.

9.5.7 On-Site Exploration Drilling Works and Quarry Pits

CK Prowse Associates Pty Ltd provided ERM with electronic data relating to exploration drilling works that took place in the vicinity of the two potential quarry pits between 22 May and 24 May 2013. A total of 26 locations were drilled using percussion drilling and a blast hole rig with hip samples collected. The drilled bore locations were in the vicinity of the proposed quarry pits. While the bores were not advanced for hydrogeological or environmental purposes; during drilling "damp" horizons were identified in some of the bores.

The elevations of the observed damp zones were generally between 206 and 212m AHD. The elevation data from the groundwater field investigations in February 2015 indicate that they are located above the regional water table which field monitoring indicated occurs between approximately 200 and 202m AHD on site. Consequently, these damp zones are considered to represent higher moisture content areas in the unsaturated zone of the basalt, above the water table.

Results obtained from the drilling investigations indicate that the water table in February 2015 was around 22m below the proposed floor level of the north quarry pit, and approximately 3.6m below the potential south quarry pit second floor level of 204m AHD. As such, the quarry pits are highly unlikely to intersect the groundwater table.

9.6 Assessment of Impacts

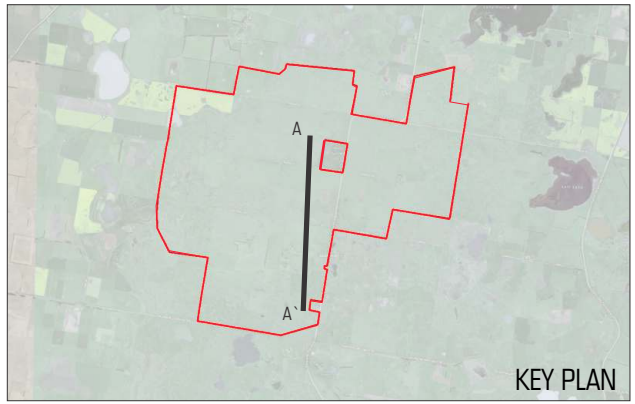
9.6.1 Hydrogeological Conceptual Site Model

A preliminary hydrogeological Conceptual Site Model (CSM) was developed using the site data presented above and informed by groundwater field investigations and the drilling program. The CSM is illustrated in *Figure 9-1*. The CSM is a working framework that presents groundwater flow and quality characteristics and has been used to assess potential impacts to groundwater from the Project.

The regional groundwater flow direction is considered to be from north to south and generally follows topography. The stony rise geological terrain typically acts as a recharge zone and the slope of the water table may increase with increased recharge (i.e. rainfall) such as is likely to occur over winter months.

Groundwater discharge from the basalt aquifer occurs in the form of springs located in the south-eastern portion of the wind farm site. The springs issue at basalt flow boundaries and have elevations of approximately 5 to 10m below the elevation of the water table measured in groundwater bores on the proposed wind farm site in February 2015. The springs are in hydraulic continuity with regional groundwater beneath the wind farm site, and are likely supplied by groundwater derived from the stony rise recharge area located on-site higher in the catchment with potentially a component of flow from deeper in the basalt.

Groundwater that does not discharge at the springs, wetlands or drainage lines would continue to flow down hydraulic gradient to discharge areas (e.g. rivers and wetlands) lower down in the catchment.



A
A'
0 m
1000 m
2000 m
3000 m
4000 m
FASHAMS LANE
POST-OFFICE LANE
TW01
BH01
(DECOMMISSIONED)
BH02
GROUT PLUG
BACKFILL
BASE OF PROPOSED NORTH QUARRY PIT
222m AHD
BASE OF PROPOSED SOUTH QUARRY PIT (SECOND CUT) 204m AHD
BORE 95065 (OFFSET)
PUMPING RATE - 1.67 LIT/SEC
(WELL NOT GAUGED)
240m AHD
230m AHD
220m AHD
210m AHD
200m AHD
190m AHD
180m AHD
170m AHD
2.0m VOID
INFERRED WATER TABLE
SCREEN
206 - 194m AHD
VESICULAR BASALT
(199-196m AHD)
"HONEYCOMB BASALT"
(198-195m AHD)
SPRING ISSUES AT 195-191m AHD
(19/02/2015)
SPRING #01
SPRING #02
SPRING #03
OPEN HOLE
211 - 171m AHD
0.5m VOID
SCREEN
193 - 175m AHD
INFERRED BROKEN BASALT
(182-179m AHD)

SECTION A-A' Elevations derived from Google Earth Terrain and Site Survey on 19/02/2015

Client:	Trustpower		
Drawing No:	0107773m_DWF_C009_R2.cdr		
Date:	27/03/2015	Drawing size: A3	
Drawn by:	ML	Reviewed by: MW	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 9-1 - Conceptual Hydrogeological Model

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Hunter Valley, Melbourne, Perth, Port Macquarie, Sydney

ERM

9.6.2 Screening

As an initial step in the impact assessment process, critical issues relating to groundwater were identified and assessed in the context of the data available at the time of the desktop study. The critical issues include:

- current or potential sensitive receptors;
- existing stress level of the groundwater body;
- magnitude of water demands;
- discharges and discharge quality; and
- duration and extent of impacts.

9.6.3 Potential Receptors

Potential receptors assessed as part of the impact assessment are described in *Table 9-8*.

Table 9-8 Potential Receptors

Receptor ID	Potential receptors	Effect
Groundwater Supplies (GWS)	Groundwater supplies (including spring flows) exploited for irrigation, stock watering, potable, commercial or industrial uses.	Reduction or increase in groundwater supply (depth to water, yield) or degradation of groundwater quality.
Groundwater Dependent Ecosystems (GWDE)	Groundwater dependent ecosystems.	Alteration or elimination of ecosystem habitat.
Groundwater and Surface Water Interactions (GWSW)	Where surface water flows are dependent on groundwater baseflow and endangered endemic or migratory aquatic species exist, or there are other dependent commercial or cultural issues.	Elimination and alteration of ecosystem habitat. Reduction in availability (volume, reliability, quality) or surface water as a resource where baseflow to streams occurs.

9.7 Impacts and Mitigation Measures

The hydrogeological impacts of the Project and an initial impact rating are summarised in *Table 9-9*. Recommendations to minimise impacts, and the residual impact rating after environmental mitigation measures have been applied, are also provided in *Table 9-9*. The impacts identified relate to both the construction and operational phases of the Project.

Table 9-9 Hydrogeology Impacts, Mitigation Measures and Residual Risk

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
9-01	Concrete batching plant may cause contaminated surface water runoff and infiltration into groundwater. Localised diversion of drainage patterns disrupting the natural recharge regime. Receptor: GWS, GWSW	Minor	The concrete batching plant will be developed and managed in accordance with a Sediment, Erosion and Water Quality Management Plan that will be incorporated within the EMP. This Plan will include measures to mitigate impacts from water runoff and sedimentation. The location of the concrete batching plant relative to key stony rise areas, springs and wetlands on-site will also be assessed.	Minor
9-02	Earthworks and WTG foundation design may impact physical interception of groundwater flow paths, loss of cement grout to aquifer, altered recharge and infiltration trends. Chemical alterations to groundwater quality. Receptor: GWSW	Minor	Whilst the final detailed site layout plans are not yet available and therefore an assessment of the infiltration effects has not been completed, the estimated combined area of land being used by low permeability WTG foundations equates to around 0.1% of the total site area and is unlikely to have a significant impact on the infiltration capabilities of the soils on site. WTG foundations will not be located in the near vicinity of identified spring discharges or wetlands. A Sediment, Erosion and Water Quality Management Plan will be developed and incorporated into the EMP to mitigate potential runoff and chemical alterations to groundwater quality.	Minor
9-03	Groundwater pumping for on-site water supply for concrete batching plant, earthworks and WTG foundations may result in water table decline affecting off-site groundwater users or reducing discharge to springs. Receptor: GWS, GWDE, GWSW	Minor	Abstraction wells will be located away from springs and site boundaries, where possible. If required, a pumping regime that manages pumping cycles and/or pumping rates will be implemented to ensure any impacts are minimised.	Minor

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
9-04	Groundwater pumping for on-site water supply for concrete batching plant, earthworks and WTG foundations may result in water table decline affecting on-site groundwater uses. Receptor: GWS, GWDE, GWSW	Minor/ Moderate	Abstraction wells will be located away from other on-site pumping wells where possible. If required, a pumping regime that manages pumping cycles and/or pumping rates will be implemented to ensure any impacts are minimised. Should water levels in pumping bores located nearest to the proposed abstraction bores decline during groundwater abstraction to the extent that those bores cannot be pumped, a temporary supply of water will be arranged to the affected user, if required.	Minor
9-05	Access tracks, surface water drainage may cause physical interception of infiltration, redistribution of recharge through stony rises. Receptor: GWS, GWSW	Minor	To mitigate potential impacts caused by impermeable surfaces, access tracks will be constructed using permeable surfaces and their locations relative to key stony rise areas, springs and wetlands will be assessed.	Minor
9-06	Leaks, spillages and losses of construction fluids, chemicals and/or fuels may introduce contaminants to groundwater through accidental leakage or direct or indirect discharge. Receptor: GWS, GWDE, GWSW	Moderate (Major in event of spill)	General best practice for storage and use of chemicals and fuels on-site will be adopted; including the implementation of an approved clean-up plan should a spill occur. A Sediment, Erosion and Water Quality Management Plan will be implemented which will incorporate appropriate pollution control measures outlined in EPA Publication 480 Environmental Guidelines for Major Construction Site. A Hydrocarbon and Hazardous Substance Plan will be prepared and Implemented.	Minor
9-07	Quarrying and management of potential groundwater inflow to the quarry may cause alteration of recharge to groundwater (rate, location) and/or impact on groundwater flow directions and, potentially, groundwater discharge (e.g. springs). May require groundwater control of localised water table to enable dry working. Receptor: GWS, GWDE, GSWS	Moderate	Hydrogeological investigations show that the quarry pits are unlikely to intersect the groundwater table. In the unlikely event that groundwater should be intersected, permission for groundwater extraction will be sought from SRW. In the event this occurs the potential lowering of water levels is considered to pose only a localised and temporary risk to groundwater.	Minor

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
9-08	Ongoing surface water management, runoff control may cause physical interception of infiltration, redistribution of recharge through stony rises. Receptor: GWS, GWSW	Minor	Project activities will be undertaken in accordance with a Sediment, Erosion and Water Quality Management Plan that will be incorporated within the EMP and will include measures to mitigate impacts of controlling runoff and interception of water which may redistribute recharge.	Minor
9-09	Potential for groundwater to flow into the quarry resulting in wetted quarry base during operation. Receptor: GWSW, GWDE	Negligible	Given the depth of the groundwater table, the potential for this to occur is unlikely and if the quarry base did wet, it is likely to be only temporarily and therefore, does not requiring on-going mitigation measures.	Negligible
GWS – Groundwater Supplies, GWDE – Groundwater Dependent Ecosystems, GWSW – Groundwater and Surface Water Interactions				

9.8 Impact Assessment Conclusions

This hydrogeological assessment identifies activities at the wind farm site that have the potential to impact on groundwater in the context of depth to the water table, groundwater quality, regional groundwater flow, and local groundwater receptors.

Based on the proposed WTG layout, foundation design and overall extent, the WTGs are considered unlikely to impact significantly on groundwater at the site and so from an operational perspective the residual impacts are expected to be minor.

Other site activities and infrastructure including the unlikely interception of the water table by the quarry pits, and any potential leaks and spillages of chemicals and/or fuels are identified as having the potential to impact on groundwater supply as well as groundwater-surface water interactions or groundwater dependent ecosystems. However, any anticipated impacts are not expected to be significant and, as a result of the various mitigation measures outlined in *Table 9-9,* residual impacts are expected to be minor.

Details regarding the rate and volume of groundwater abstraction required to support the concrete batching plant on site will be confirmed during the detailed design phase of the Project. If groundwater abstraction is required to support concrete batching, the development of detailed design documents will allow for a more tightly constrained assessment of associated potential impacts on the beneficial uses of groundwater. Abstraction wells will be sensitively located and if required, pumping regimes will be implemented to minimise impacts. Furthermore, necessary licenses and approvals will be obtained by the Proponent at that time and a detailed assessment of potential impacts will take place as part of this process. Nonetheless, based on the assessment undertaken to date, the residual impact as a result of groundwater abstraction is expected to be minor subject to the implementation of appropriate mitigation measures.

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 10- SURFACE WATER

This page is intentionally blank

Contents

Figures

Tables

This page is intentionally blank

10 SURFACE WATER

This Chapter describes the potential impacts of the Project on surrounding water environments (including permanent and ephemeral wetland systems, waterways, surface water flow and quality) and the proposed mitigation measures that are designed to manage and monitor effects on the catchment values.

A *Surface Water Assessment for the Dundonnell Wind Farm* has been undertaken to assess the potential impacts of the Project on surrounding water environments and concluded as follows:

- The wind farm site and transmission line corridor are located within the Glenelg Hopkins Catchment Management region (a non-designated water supply protection area) and does not drain to a designated water supply catchment.
- There are numerous designated waterways within the wind farm site; however none of these are within 20m of any wind farm infrastructure.
- Runoff from the wind farm site predominantly flows towards two wetland areas to the north-west and south-east. These have been identified as of low (or undefined) quality.
- The construction of the Project may result in increased stormwater, sediment and contaminant run off to receiving waterways and wetlands, and degradation of water quality. Impacts will be minimised through the implementation of an EMP to mitigate impacts to surface water during construction.
- Potential impacts associated with the quarrying of materials during construction will be reduced via the preparation of a drainage plan. The Plan will determine the need for, and/or size of, drains, sedimentation ponds and bunding around the quarry site. The Plan will assist in deterring increases in sediment load or peak runoff downstream of the quarries occurs.
- Winter-spring flood season may cause damage and prevent access/egress to infrastructure within the transmission line corridor during operation. This potential impact will be minimised through the appropriate design, type and positioning of the transmission line to mitigate flood risk. In addition, alternative access/egress points along the transmission line corridor will be used during flooding events.

10.1 EES Objectives

The EES evaluation objective relevant to surface water is:

Catchment Values - To maintain the functions and values of aquatic environments, surface water and groundwater quality, including avoiding effects on hydrology and protected beneficial uses.

This Chapter is based on the *Surface Water Assessment* undertaken by Water Technology, dated August, 2014, contained in Volume 2. This Chapter and the *Surface Water Assessment* address the EES Scoping Requirements by:

- characterising the surface water environments and drainage features in the study area, including the occurrence and representation of different wetland types;
- describing Project effects on hydrology and existing sedimentation and erosion processes;
- identifying proposed measures to mitigate any effects, including any relevant design features or preventative techniques to be employed during construction;
- identifying and assessing potential effects of the Project on water environments and beneficial uses, including on permanent and ephemeral wetland systems, waterways, surface water flow and quality; and
- outlining mitigation measures to manage and monitor effects on catchment values and identify likely residual effects.

10.2 Study Area

The study area for the surface water and hydraulic assessment was identified via a rainfall-on-grid model, which included the wind farm site and part of the 38km transmission line corridor, as shown in *Figure 3-2* of the *Surface Water Assessment* contained at Volume 2.

10.3 Assessment Methodology

The methodology used for the surface water assessment included:

- a desktop review of VicMap digital terrain model (DTM) with 20m resolution;
- a desktop review of Moyne Planning Scheme overlays, major roads, waterways, water bodies and localities;
- a desktop review of stream flow gauge and rainfall data; and
- output from 2D floodplain hydraulic modelling including 100-year average recurrence interval (ARI) flood extents and depths on the wind farm site and along the transmission line corridor. A catchment hydrologic model was used to estimate flows within drainage and stream networks for input to the model along the route of the transmission line corridor.

All flood modelling results generated using the DTM provide only an approximation of flood risk and absolute flood levels should not be utilised from this modelling for planning purposes. No fieldwork was undertaken for the assessment.

10.4 Legislation and Policy

The relevant legislation and government policies for surface water are outlined in *Table 10-1*. The key documentation relied upon in the preparation of the surface water assessment was the *Catchment and Land Protection Act 1994* (C&LP Act), the *State Environmental Protection Policy* (Waters of Victoria) 2004 and the Wind Energy Guidelines.

Table 10-1 Relevant Surface Water Legislation and Policies

Legislation / Policy	Description
State	
Catchment and Land Protection Act 1994	The C&LP Act has the objective of establishing a framework for the integrated and coordinated management of catchments that will: • maintain and enhance long-term land productivity while also conserving the environment; and • aim to ensure that the quality of the State's land and water resources and their associated plant and animal life are maintained and enhanced. The Act provides for the development of Regional Catchment Strategies that must assess the nature, causes, extent and severity of land degradation of the catchments in the region and identify areas for priority attention. Local Planning Schemes are to have regard for the Regional Catchment Strategies.
State Environmental Protection Policy (Waters of Victoria) 2004	SEPP (WoV) identifies the beneficial uses of waterways, which must be protected. Works undertaken for the Project on or near waterways would need to be managed to reduce the risks to aquatic ecosystems and other beneficial uses of the waterway, as defined by the SEPP (WoV).

Legislation / Policy	Description
Policy and planning guidelines for development of wind energy facilities in Victoria (DELWP, 2015)	The guidelines are for responsible authorities, proponents and the community to provide guidance about wind farms and inform planning decisions about wind energy facility proposals. The guidelines set out information requirements for wind energy developments; including the matters related to sediment, erosion and water quality management.
Local	
Moyne Planning Scheme	The Moyne Planning Scheme is implemented via the P&E Act and includes the following planning overlays relevant to surface water: Land Subject to Inundation Overlay (LSIO), Environment Significance Overlay (ESO) and Vegetation Protection Overlay (VPO). The key purpose of these overlays are as follows: • LSIO: 'To ensure that development within the 1 in 100-year flood extent maintains the free passage of floodwaters, and protects water quality in accordance with the SEPP (WoV).' • ESO: 'To ensure development is compatible with identified environmental values.' • VPO: 'To ensure that development minimises impact to significant vegetation.' It is noted that these overlays do not apply to the wind farm site or transmission line corridor. Clause 52.32 of the Planning Scheme sets out the matters to be considered prior to the determination of an application for a wind energy facility, which includes consideration of the Wind Energy Guidelines.

10.5 Existing Conditions

10.5.1 Wind Farm Site and Transmission Line

The wind farm site and transmission line corridor are located within the Glenelg Hopkins Catchment Management region. The local catchment is not within a designated water supply protection area and does not drain to a designated water supply catchment. There are numerous designated waterways within the wind farm site as shown in *Figure 10-1*, however none are located within 20m of wind farm infrastructure.

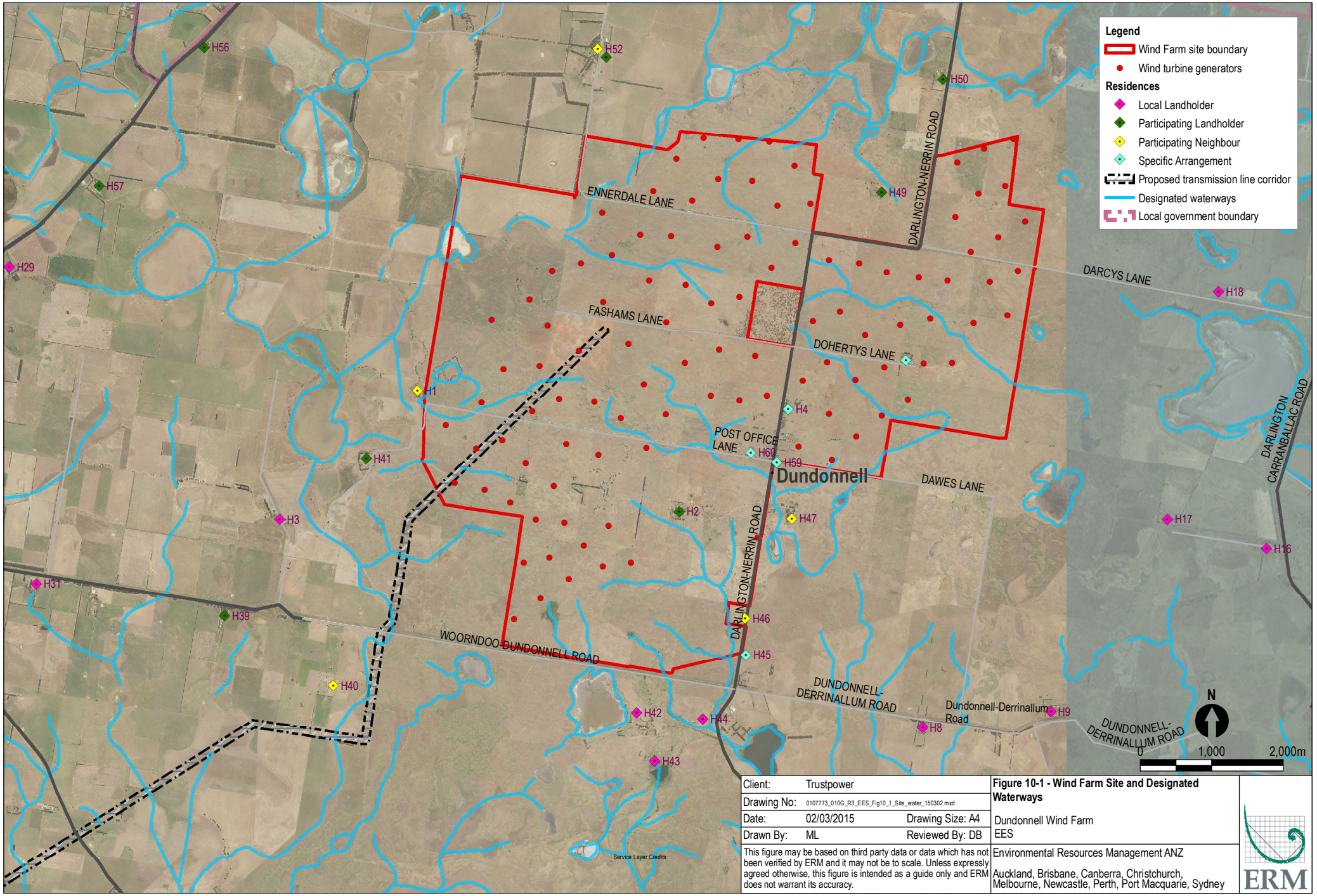
The transmission line corridor intersects approximately 14 designated waterways as shown in *Figure 10-2*. All these waterways are intermittently flowing and considered minor.

The wind farm site and transmission line corridor is characterised by flat, undulating plains, with a steeper upper catchment. The wind farm site is located at the high point of the catchment and water drains from the site in all directions but mainly from north to south.

The wind farm site is adjacent to Mt Emu Creek, which is approximately 5km to the east at its nearest point, and Salt Creek, which is 10km to the west. The southern end of the proposed transmission line corridor is approximately 100m from Salt Creek, and approximately 650m from the intersection of Salt Creek and the Hopkins River.

A number of other minor waterways exist within the catchment. The complex terrain formed by lava flows have blocked and diverted numerous streams, which have formed a series of wetlands and ponds. Lake Bolac is the largest water body in proximity to the wind farm site (approximately 13km north-west). Lake Bolac is situated on Salt Creek and has a storage capacity of 27,000ML and surface area (at capacity) of 1,460ha.

The wind farm site is surrounded by several wetlands of varying size and category (e.g. shallow/deep marsh, meadow). Runoff from the wind farm site predominantly flows towards two wetland areas to the north-west and south-east. These have been identified as low (or undefined) quality.



Client:	Trustpower		
Drawing No:	0107773_010G_R3_EES_Fig10_1_Site_water_150302.mxd		
Date:	02/03/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

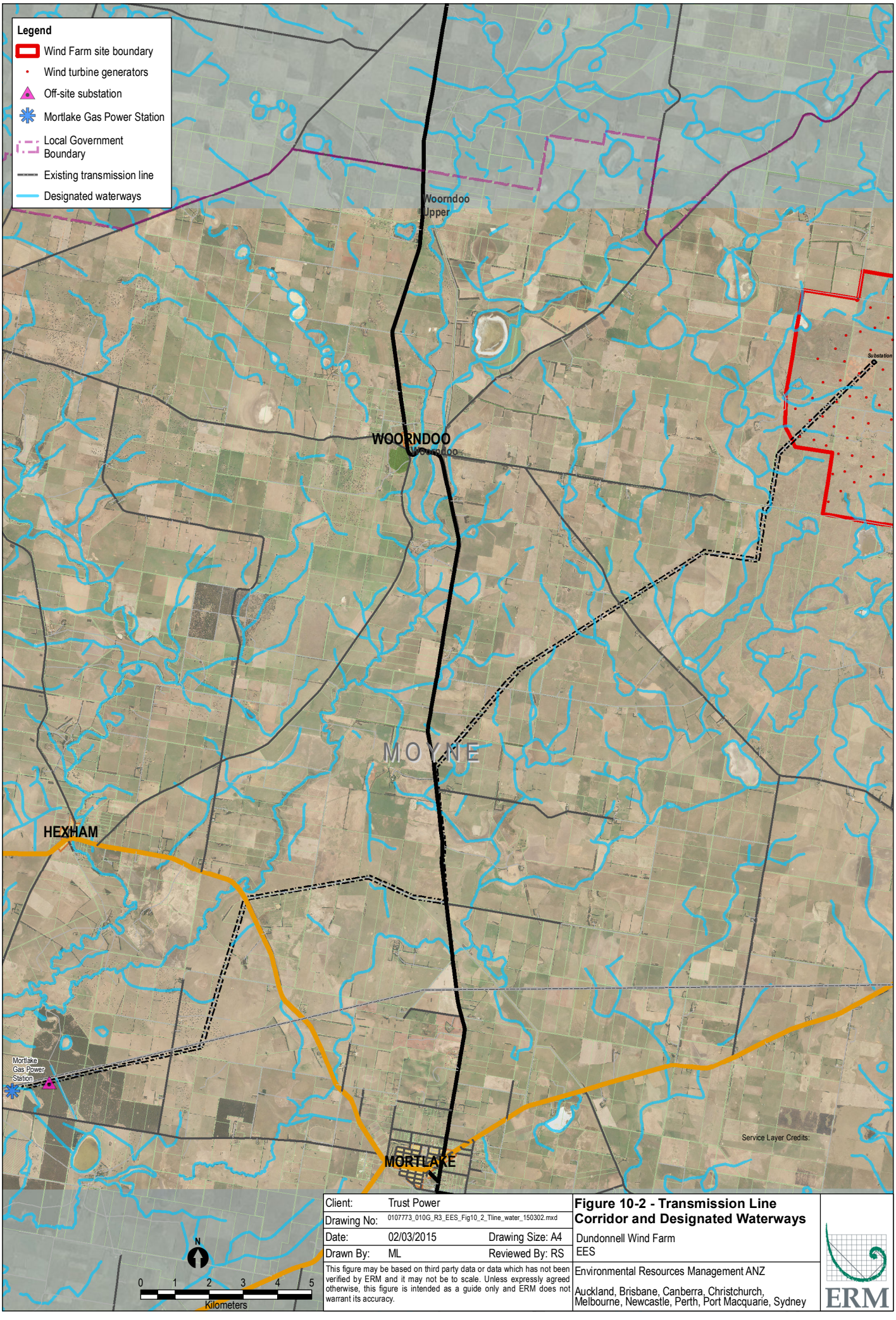
Figure 10-1 - Wind Farm Site and Designated Waterways

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Trust Power	
Drawing No:	0107773_010G_R3_EES_Fig10_2_Tline_water_150302.mxd	
Date:	02/03/2015	Drawing Size: A4
Drawn By:	ML	Reviewed By: RS

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 10-2 - Transmission Line Corridor and Designated Waterways

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

10.6 Assessment of Impacts

10.6.1 Hydraulic Modelling

Preliminary flood modelling was undertaken by Water Technology (2014). The 100-year ARI flood extent was estimated for a 21km x 20km area around the wind farm site.

In terms of the transmission line corridor, the preliminary flood modelling shows that the southern end of the transmission line corridor is considered to be at most risk of being impacted by surface water flows. This is due to its proximity to Salt Creek and the intersection of Salt Creek and the Hopkins River. A hydraulic model was therefore developed for an area of approximately 15km x 17km near Salt Creek and Hopkins River. Given the large catchment areas for the waterways within the transmission line corridor, it was impractical to run rainfall simulation for the entire area, as was done for the wind farm site. Instead rates of river flow in relation to rainfall were estimated using a rainfall runoff routing model.

Data collected during the January 2011 flood event including peak flows, was used by Water Technology (2014) in the calibration of the hydraulic model. The key potential impacts that have been identified as a result of the modelling are discussed further below.

Wind Farm Site

The modelling indicates that during a 100-year ARI flow paths across the wind farm site would typically be 300mm deep (although this may vary on closer inspection of detailed survey). Runoff would not pool on the wind farm site and four wheel drive (4WD) vehicles would be able to access the WTGs.

Whilst the wind farm site is not at high risk of flooding, it is considered important that temporary drainage control is implemented in conjunction with sediment control during the construction phase of the wind farm. These measures will be implemented as part of the EMP prepared for the construction phase of the Project.

In addition, once the wind farm construction has been completed it is recommended that on-site drainage works are constructed to control any runoff generated on the site during its on-going operation, potentially in the form of a series of drains and/or swales to direct runoff around the WTGs.

Quarry

The rainfall model indicates that runoff from the two quarry pits has the potential to connect to an unnamed waterway and downstream waterbody. While there is some potential for sediment to be deposited in this waterway and water body, sedimentation ponds and bunding are expected to provide sufficient protection to downstream water quality. The quarry pits will not receive significant runoff from other areas, although the southern quarry pit will receive some flow from nearby higher ground.

Drainage from disturbed areas associated with the quarry will be captured internally and directed to quarry drainage lines for redirection to a pit sump or to the storage dam. This will ensure no increase in sediment load or peak runoff downstream of the quarries occurs. As detailed in the *Draft Quarry Work Plan* (CK Prowse and Associates, 2015), the desired strategy is to conserve and reuse water supplies on-site. Surface water runoff from stripped areas, roads and processing or stockpile areas will be captured by diversion banks and channel drains, and diverted back to the storage dam.

Once the size, location and staging of the quarry pits are finalised, drains and sedimentation ponds will be sized and designed to meet the required grade, volume and water quality targets. Sedimentation ponds will be required within each quarry pit. Sedimentation ponds are not expected to be required for drainage around or external to the quarry. All sediment will be able to settle out in the open swale drains pending their design grade.

It is noted that quarry pits have been located to avoid identified groundwater discharge areas as discussed in more detail in *Chapter 8* of the EES and the *Geoscience Features Significance and Sensitivity Assessment* (Environmental Geosurveys Ltd, 2014).

Transmission Line Corridor

Hydraulic modelling indicates that the 100-year flood extent would reach approximately 120m from the transmission line corridor, at the intersection of Castle Carey Road and Hamilton Highway. The transmission line corridor would be intersected by one flow path from this flood event, at depths between 380mm and 430mm.

At the point where the floodwaters intersect the transmission line corridor, the model shows that velocities are less than 0.02m/s and therefore do not pose a risk of scour and/or damage from moving debris.

A Works on Waterways Licence will be required for any works occurring within 20m of the designated waterways intersected by the transmission line corridor. The waterways licence will contain a number of conditions largely related to erosion protection and maintaining waterway health during construction and operation. Due to the minor nature of the waterways the licence application process and conditions imposed are not anticipated to be onerous.

The proposed off-site substation site is greater than 500m from the modelled extent of the flood waters and therefore surface water impacts are not expected.

10.7 Impacts and Mitigation Measures

The environmental impacts to surface water and an initial impact rating are summarised in *Table 10-2.* Mitigation measures to reduce impacts, and the residual impact rating after these measures have been applied, are also provided in *Table 10-2*.

Table 10-2 Surface Hydrology Impacts, Mitigation Measures and Residual Impact

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
10-01	Construction of Project infrastructure results in increased sediment loadings to receiving waterways and wetlands, and degradation of water quality.	Moderate	Construction will occur in accordance with a Sediment, Erosion and Water Quality Management Plan and Hydrocarbon and Hazardous Substance Plan which will be implemented as part of the Environmental Management Plan. These will contain (but not be limited to) the following requirements: • Avoidance of works near watercourses where possible; • installation of drainage, erosion and sedimentation control measures; • completion excavation of open drainage lines, levees and sediment/water storage dam prior to commencement of extraction and processing operations; • appropriate bunding of fuel storage facilities; • minimisation of the amount of exposed erodible surfaces; • prompt covering of exposed surfaces; • progressive revegetation of the site; and • management of stockpiles.	Minor
10-02	Construction within transmission line corridor intersects with designated waterways.	Moderate	Works within 20m of a designated waterway will be avoided where possible. If works within 20m of a designated water course are required, additional investigation will be undertaken to ensure impacts to the waterways are minimised and works will be undertaken in accordance with a Works on Waterways License obtained from Glenelg Hopkins Catchment Management Authority.	Minor
10-03	Quarrying of materials during construction results in increased sediment loadings to receiving waterways and wetlands and degradation of water quality.	Minor	Once final details of the quarry are determined, a further detailed drainage assessment will be undertaken to determine the need for, and/or size of, drains, sedimentation ponds and bunding around the quarry site. Drains, sedimentation ponds and bunding will be designed to meet the required grade, volume and water quality targets.	Minor
10-04	Flood events within transmission line corridor damage infrastructure during operation.	Moderate	The type and location of transmission line infrastructure will be designed and located to mitigate flood risk.	Minor

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
10-05	Flood events within transmission line corridor prevent access/ egress to infrastructure during operation.	Minor	Alternative access/egress points along the transmission line corridor will be identified and used in the event of a flood.	Minor
10-06	Operation of Project results in increased stormwater, sediment and contaminant run off to receiving waterways and wetlands and degradation of water quality.	Minor	Drainage works will be designed and located to control any runoff generated during the operation of the Project (e.g. drains and/or swales to direct runoff around the WTGs) where necessary.	Minor

10.8 Impact Assessment Conclusions

In assessing the impact to surface water, potential impacts identified included the possibility of an increase in stormwater, sediment and contaminant runoff to receiving waterways and wetlands (and a subsequent degradation of water quality) as a result of the construction and operation of the Project infrastructure and also as a result of the quarrying of materials during construction.

An additional potential impact identified relates to damage to the transmission line during flooding, and restricted access to infrastructure within the transmission line during flood events.

Appropriate mitigation measures have been detailed to minimise the potential impacts in relation to increased runoff to waterways and wetlands. These measures include the identification of appropriate drainage and sediment control mitigation measures through an EMP for the construction phase of the Project, as well as the development of a drainage assessment and implementation of identified measures where appropriate for both the construction and operation periods.

Mitigation measures in relation to the potential impacts associated with the transmission line, such as the intersection with designated waterways and impacts from flooding have been identified. These primarily relate to the design and location of Project infrastructure to avoid designated waterways where possible, including the sensitive siting of access tracks and access and egress points.

With the implementation of these management and mitigation measures, it is concluded that the overall residual impact to surface water as a result of the construction and operation of the Project will be minor, and therefore the Project is not expected to result in any significant environmental impacts in relation to surface water.

This page is intentionally blank

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 11 - CULTURAL HERITAGE

This page is intentionally blank

Contents

Figures

Tables

This page is intentionally blank

11 CULTURAL HERITAGE

This Chapter provides a summary of the cultural and historic heritage assessments undertaken for the Project and outlines the proposed mitigation measures that are designed to ensure that the Project avoids and minimises impacts on heritage values.

Draft Cultural Heritage Management Plans (CHMPs) and Historic Heritage Assessments (HHAs) have been prepared for the wind farm site (including the major access track) and transmission line corridor (including the off-site substation). These assessments concluded as follows:

Cultural Heritage

- There are a total of six known Aboriginal cultural heritage places within the study area.
- Of these, three Aboriginal cultural heritage places and areas of scientific sensitivity were previously registered (VAHR 7422-0154, 7422-0156 and 7422-0314). These three place types are defined as earth features (mounds) and no evidence of these registered places was found.
- The three additional Aboriginal cultural heritage places were identified within the wind farm site during the assessments undertaken for the Project (VAHR 7422-0566, VAHR 7422-0568 and VAHR 7422-0567). These place types are defined as artefact scatters and comprise a total of 140 stone artefacts.
- During construction of the Project, impacts to four of the registered cultural heritage places (VAHR 7422-0154, 7422-0156 and 7422-0314 and VAHR 7422-0566) will be avoided by ensuring construction and ground disturbance does not occur within these places. Management measures will be implemented to avoid inadvertent harm to previously registered cultural heritage places.
- Subsurface testing identified two artefact scatters in locations to be impacted by the Project (VAHR 7422-0568 and VAHR 7422-0567). In accordance with measures identified within the Dundonnell Wind Farm CHMP, the artefacts will be managed appropriately with some salvage being undertaken.
- The Project has potential to impact on further cultural heritage within similar landforms. The assessments identified areas of archaeological potential which will be subject to management measures consisting of ground surface survey of access tracks during construction. Areas considered more likely to contain cultural heritage within the wind farm site and the transmission line corridor have been identified and a percentage of these areas will be subject to additional testing during construction of access tracks. Impacts to further artefact scatters of this nature encountered during works will be managed through the CHMP process.
- A Contingency Plan detailed within the CHMPs, will be implemented to identify discovery, notification, evaluation and reporting measures, if any unexpected cultural heritage is discovered during construction.

Historic Heritage

- At the commencement of the HHA, there were no statutory registered historic heritage places inside or within 10km of the centre of the wind farm site. Ten historic heritage places were identified during the course of the assessment and five of these were subsequently included on the Heritage Victoria Inventory.
- Two historic heritage places have the potential to be impacted by the Project; however these places are of low historic heritage significance.
- An Environmental Management Plan (EMP) will include contingency measures to manage the unexpected discovery of previously unregistered and unassessed historical cultural heritage sites and features.

In order to provide clarity and continuity of impacts between Aboriginal and historic cultural heritage, this chapter has been divided into two primary sections, the first for Aboriginal cultural heritage and the second for historic cultural heritage.

11.1 Aboriginal Cultural Heritage

11.1.1 Aboriginal Cultural Heritage EES Objectives

The EES evaluation objective relevant to Aboriginal cultural heritage is:

To avoid or minimise adverse effects on Aboriginal and historic cultural heritage and associated values.

This section describes the Aboriginal cultural heritage values of the study area, the potential impacts from the Project on these cultural heritage values and proposed management measures to reduce these impacts. This section is based on the *Dundonnell Wind Farm Draft Cultural Heritage Management Plan* (CHMP) dated January 2015 and the *Transmission Line Draft CHMP* dated March 2015, prepared by Archaeology At Tardis Pty Ltd. These Draft CHMPs are contained at Volume 2.

This Chapter and the Draft CHMPs address the EES Scoping Requirements in relation to Aboriginal cultural heritage by:

- Identifying and mapping places and sites of known cultural heritage significance within and adjoining the study area;
- identifying any harm to sites or places of Aboriginal cultural heritage significance;
- describing field investigations undertaken to identify previously unidentified or unassessed heritage places and sites, including archaeological sites, within or near the study area;
- providing contextual information on past and contemporary activities in the study area by Aboriginal people;
- identifying and documenting any Aboriginal cultural heritage sites or areas of sensitivity within the study area, supported by appropriate consultation and investigations;
- describing and evaluating proposed design, construction method or site protection measures which could avoid or minimise direct impacts on Aboriginal cultural heritage values; and
- outlining and evaluating any proposed additional measures to mitigate and manage residual effects on sites and places of Aboriginal cultural heritage significance, within the framework of a CHMP.

This Chapter addresses the EES Scoping Requirements in relation to historic cultural heritage by:

- Identifying places listed on the Victorian Heritage Register or Heritage Inventory as well as places subject to Heritage Overlays in the Moyne Planning Scheme;
- providing a thematic environmental history of the study area using Appendix 4 – "Guidelines for Thematic Environmental Histories" of the *Heritage Victoria Model Consultant Brief for Heritage Studies* (January 2010); and
- describing and evaluating proposed design, construction method or site protection measures which could avoid or minimise direct impacts on historic cultural heritage values.

11.1.2 Aboriginal Cultural Heritage Study Area

The study area for the Draft CHMPs comprised the wind farm site (including the major access track) and the 38km transmission line corridor (including the off-site substation).

11.1.3 Aboriginal Cultural Heritage Assessment Methodology

The methodology used for the Draft CHMPs included the following:

- Consultation with relevant stakeholders was undertaken including representatives from the Office of Aboriginal Affairs Victoria (OAAV), Kuuyang Maar Aboriginal Corporation (KMAC) and Eastern Maar Aboriginal Corporation (EMAC). There is no Registered Aboriginal Party (RAP) for the wind farm site, however the RAP for a small portion of the transmission line corridor (16%) is Martang Pty Ltd.

- a search of the following heritage databases and public records, as well as consultation with land managers, was undertaken to identify any registered heritage sites that exist in the study area:
  - Aboriginal Cultural Heritage Register and Information System (ACHRIS);
  - State Library of Victoria;
  - Land Victoria; and
  - Public Records Office.
- A desktop assessment was undertaken of relevant background information and previous studies relating to registered Aboriginal places, history and ethnohistory, landforms and geomorphology, land use history and strategic values. The desktop assessment informed the development of a sensitivity model to predict the likely Aboriginal cultural heritage values within the study areas in relation to strategic values and landform.
- A standard assessment, as defined in the Aboriginal Heritage Regulations 2007 was undertaken for the wind farm site and transmission line corridor. This included ground surveys to determine areas of good ground surface visibility and/or high potential archaeological sensitivity for Aboriginal cultural material. If any such areas were identified, a micro-survey was conducted to detect any obtrusive or surface Aboriginal cultural heritage. The standard assessment for the wind farm site was conducted in the following two phases:
  - Phase 1 was conducted between 27 August and 3 September, and 6 December 2013, with an additional day of survey undertaken on 21 January 2014 which included coverage of the proposed infrastructure layout at the time and land within 200 metres of previously recorded places; and
  - Phase 2 was conducted between 8 and 12 December 2014 during the second phase of complex assessment and involved specifically targeting land within 200 metres of complex assessment locations and also the re-inspection of previously recorded places.

  The standard assessment for the transmission line corridor was conducted between 2 and 6 December 2013.
- A complex assessment, as defined in the Aboriginal Heritage Regulations 2007, was undertaken for the wind farm site. This involved a program of subsurface testing comprising controlled hand excavation of test pits with a total of 165 test pits excavated. The assessment was undertaken in two phases with Phase 1 conducted between 2 and 6 December 2013 and Phase 2 conducted between 8 and 12 December 2014.

  The transmission line will avoid areas identified as likely to contain Aboriginal cultural heritage places and therefore, no complex assessment was required for this element.

11.1.4 Aboriginal Cultural Heritage Legislation and Policy

The relevant legislation and government policies for Aboriginal cultural heritage are outlined in *Table 11-1.* The key legislation relied upon was the *Aboriginal Heritage Act 2006* (AH Act) and the *Environment Protection and Biodiversity Conservation Act* (EPBC Act).

Table 11-1 Relevant Aboriginal Cultural Heritage Legislation and Policies

Legislation / Policy	Description
Commonwealth	
Environment Protection and Biodiversity Conservation Act 1999	Nationally significant heritage places are primarily registered and protected under the EPBC Act. The Australian Heritage Council (AHC) is the principal adviser to the Australian Government on heritage matters and assesses nominated places and recommends to the Minister whether or not a nominated place is appropriate for listing on the Australian Heritage Database (AHD).

Legislation / Policy	Description
State	
Aboriginal Heritage Act 2006	The AH Act provides for the protection and management of Victoria's Aboriginal heritage with processes linked to the Victorian planning system. Processes to manage activities that may harm Aboriginal cultural heritage include the preparation of CHMPs and Cultural Heritage Permits. In this instance, a mandatory CHMP is required as an EES is required for the Project. The Act recognises Aboriginal people as the primary guardians, keepers and knowledge holders of Aboriginal cultural heritage. Registered Aboriginal Parties (RAPs) have responsibility relating to the management of Aboriginal cultural heritage under the Act.
Aboriginal Heritage Regulations 2007	The Regulations give effect to the AH Act. The Regulations set out circumstances in which a CHMP is to be prepared and the standards for the preparation of a CHMP.
Policy and planning guidelines for development of wind energy facilities in Victoria (DELWP, 2015)	The Wind Energy Guidelines are for responsible authorities, proponents and the community to provide guidance about wind farms and inform planning decisions about wind energy facility proposals. The Guidelines set out the information requirements for wind energy developments, including the requirement to consider Aboriginal cultural heritage protected under the AH Act.
Local	
Moyne Planning Scheme	The Moyne Planning Scheme is implemented via the P&E Act. Clause 15.03-2 'Aboriginal cultural heritage' requires planning to take into consideration cultural heritage sites and to protect places and sites with significant Aboriginal cultural heritage value. Moreover, it ensures consideration is given to the AH Act and the findings and recommendations of the Aboriginal Heritage Council and the Victorian Heritage Council for post-contact where relevant. Clause 52.32 of the Planning Scheme sets out the matters to be considered prior to the determination of an application for a wind energy facility, including the consideration of the Wind Energy Guidelines.

11.1.5 Aboriginal Cultural Heritage Existing Conditions

The findings of the desktop, standard and complex assessments are summarised below and identify the potential for Aboriginal cultural heritage on the wind farm site and the transmission line corridor.

Desktop Assessment

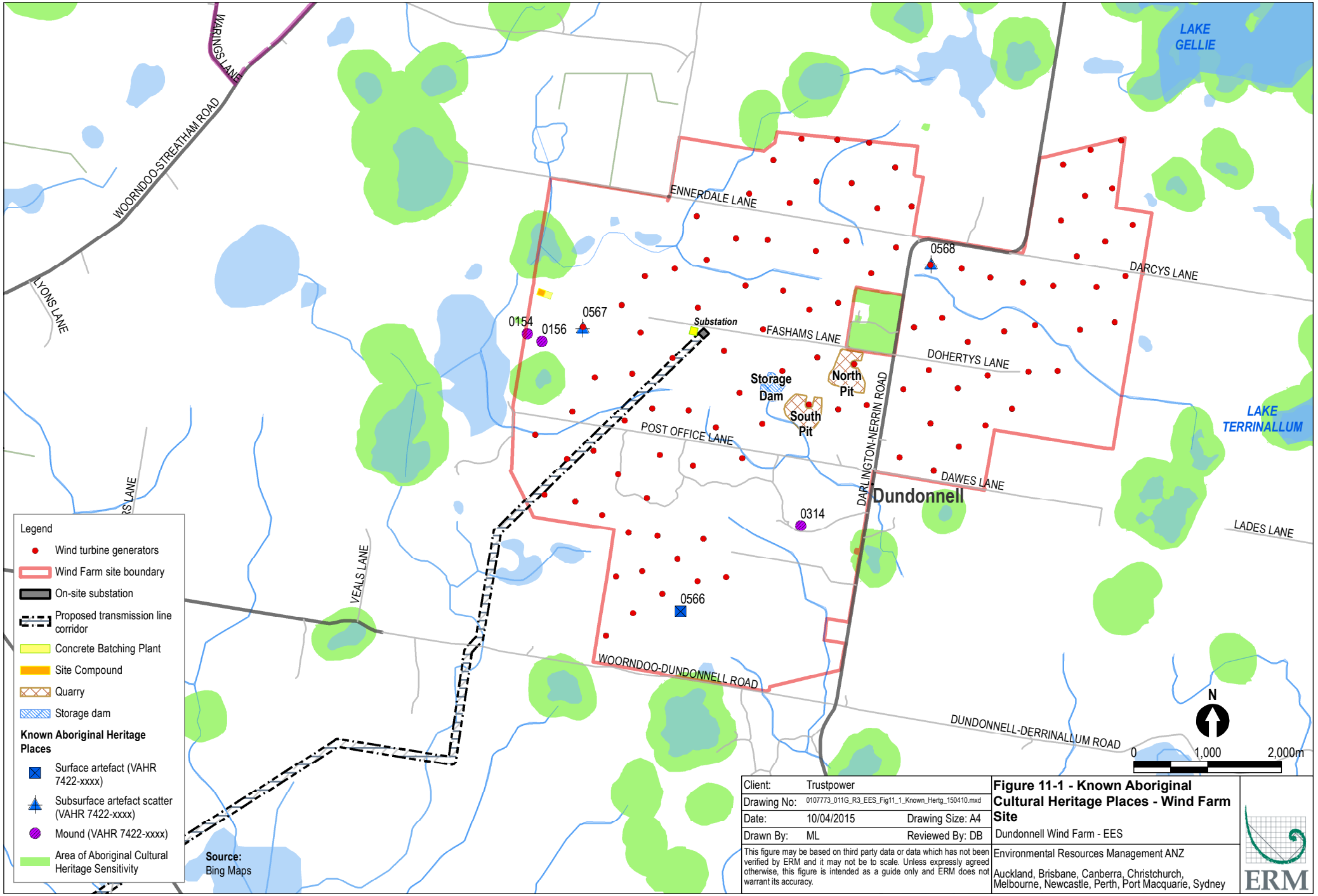
The desktop assessment identified three registered Aboriginal places (VAHR 7422-0154, 7422-0156 and 7422-0314) within the wind farm site. VAHR 7422-0154 and VAHR 7422-0156 were registered as earth features (mounds) with associated stone artefacts and VAHR 7422-0314 was recorded on the site form as a 'small oven'. VAHR 7422-0154 and 7422-0156 were recorded near the western boundary of the wind farm site in an area associated with low lying land and drained marshes. No registered places were identified within, or within 200m, of the study area of the transmission line.

A summary of the registered Aboriginal places known when undertaking the desktop assessment within the wind farm site is presented in *Table 11-2* and the locations are identified in *Figure 11-1*.

As detailed in the *Standard Assessment* section following, no evidence of these places was found.

Table 11-2 Previously Registered Aboriginal Places

VAHR Number and Place Name	Relevant Aboriginal Group Cultural Significance	Place Type	Scientific Significance
7422-0154 Mogila 1	Not provided	Earth Feature (Mound)	Not provided by original recorder – no evidence of place found
7422-0156 Mogila 3	Not provided	Earth Feature (Mound)	Not provided by original recorder – no evidence of place found
7422-0314 Mount Violet 1	Not provided	Earth Feature (Mound) – 'small oven'	Not provided by original recorder – no evidence of place found
Source: Archaeology At Tardis, 2015			



Client:	Trustpower		
Drawing No:	0107773_011G_R3_EES_Fig11_1_Known_Hertg_150410.mxd		
Date:	10/04/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 11-1 - Known Aboriginal Cultural Heritage Places - Wind Farm Site

Dundonnell Wind Farm - EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

Standard Assessment

The ground survey undertaken as part of the standard assessment did not identify any evidence of the three previously registered cultural heritage places (mounds) within the study area. Furthermore, no registered Aboriginal cultural heritage places are identified within the transmission line corridor and no new places were found during the ground survey.

While no evidence of the previously registered places were found, areas of cultural heritage sensitivity within and surrounding the wind farm site were identified, including elevated land adjacent to waterways, and the boundary of the Mt Fyans lava flow and Ennerdale plain.

With regards to the transmission line corridor, the standard assessment demonstrated that there are no areas of Aboriginal cultural heritage sensitivity of moderate or above archaeological potential, except for artefact scatters within 50m of the margins of former large freshwater meadows and marshes north of North Road. For a detailed map showing the location of these areas refer to *Map 11* in the *Transmission Line Draft CHMP* provided at Volume 2.

Based on the assessment results, a refined Aboriginal Cultural Heritage Model was presented, as detailed in *Table 11-3*.

Table 11-3 Standard Assessment Aboriginal Cultural Heritage Scientific Sensitivity Model

Place Type	Location / Landform	Sensitivity
Artefact Scatters	Wind Farm Site Elevated land within 100m of freshwater springs, elevated land within 100m of the boundary of the Mt Fyans lava flow & Ennerdale plain have the highest potential for larger high density artefact scatters.	Likely
	Transmission Line Land within 50m of former large freshwater meadows and marshes have the highest potential for larger high density artefact scatters.	Likely (low-moderate)
Earth Features (Mounds)	Wind Farm Site Low-lying land subject to inundation in the vicinity of previously recorded mounds VAHR 7422-0154 & 7422-0156 and near 7422-0314 may have other earth features that are not visible on the surface or will only be identified with high ground surface visibility or by subsurface testing. All other areas are unlikely to have mounds.	Likely
	Transmission Line Entire Activity Area.	Likely (low)
Scarred Trees	Wind Farm Site and Transmission Line Remnant mature indigenous trees in the construction zone. All mature Red Gums will be avoided by the activity and no Red Gums investigated during the assessment were identified with cultural scars.	Unlikely
	Transmission Line Remnant mature indigenous trees in the construction zone.	Unlikely
Human Remains, quarries, rock art, shell middens and stone features	Wind Farm Site and Transmission Line	Unlikely
Source: Archaeology At Tardis, 2015a and 2015b		

The standard assessment demonstrated that while there was no evidence of the previously registered places (i.e. the earth features) and no new places were found, there are areas of Aboriginal cultural heritage scientific sensitivity in the Project area and, it is likely that Aboriginal cultural heritage, specifically in the form of artefact scatters is present. As such, a complex assessment was considered necessary for the wind farm site.

Complex Assessment

A complex assessment, involving subsurface testing, was conducted to identify the extent, nature and significance of the Aboriginal cultural heritage in the study area for the wind farm site. No complex assessment was conducted for the transmission line corridor as it will avoid areas considered likely (i.e. identified with moderate or above potential) to contain Aboriginal cultural heritage places.

The excavations undertaken as part of the complex assessment for the wind farm site found Aboriginal cultural heritage in 19m² of the total 81.25m² tested. A total of three cultural heritage places were identified (VAHR 7422-0566, VAHR 7422-0567, VAHR 7422-0568) with a total of 140 stone artefacts recorded. These comprised one surface (VAHR 7422-0566) and 139 subsurface artefacts. The highest density of artefacts was found at VAHR 7422-0568 with 30 artefacts found within the test pit. All the other test pits had low artefact densities range from 1 to 13 artefacts per square metre. These cultural heritage places were registered and are identified in *Figure 11-1*.

The known Aboriginal cultural heritage within the study area based on the evidence from the Project investigations is listed in *Table 11-4*.

Table 11-4 Known Cultural Heritage Places within the Study Area

VAHR Number and Place Name	Relevant Aboriginal Group Cultural Significance	Place Type	Scientific Significance
7422-0566 Dundonnell Wind Farm 1	Not provided (default to high)	Surface Artefact	Extremely low
7422-0568 Dundonnell Wind Farm 2	Not provided (default to high)	Subsurface Artefact Scatter	Low
7422-0567 Dundonnell Wind Farm 3	Not provided (default to high)	Subsurface Artefact Scatter	Low
7422-0154 Mogila 1	Not provided (default to high)	Earth Feature (Mound)	Not provided by original recorder – no evidence of place found
7422-0156 Mogila 3	Not provided (default to high)	Earth Feature (Mound) Updated to a (Mound and Artefact Scatter) in 2015	Not provided by original recorder – no evidence of place found
7422-0314 Mount Violet 1	Not provided (default to high)	Earth Feature (Mound) – 'small oven'	Not provided by original recorder – no evidence of place found
Source: Archaeology At Tardis, 2015			

No Aboriginal cultural heritage with moderate or above significant heritage values was discovered during the assessment.

The identification of artefact scatters VAHR 7422-0567 and VAHR 7422-0568 may be indicative of differential use of the landscape in the study area. The small but high density cluster of artefacts found at VAHR 7422-0568 may be the result of a short term stop to repair toolkits while on a hunting foray. It is important to note that this scatter, being situated on the open plain, does not appear to be associated with any strategic values, such as proximity to water,

special views or other local resource. In contrast, VAHR 7422-0567 was a lower density but larger diffuse scatter of artefacts with a much wider range of raw materials. This may indicate the place was repeatedly visited albeit with a lack of intensive stone reduction.

The presence of local resources in the study area and previously recorded places, suggests that it is reasonably possible that additional Aboriginal cultural heritage may be present than that identified to date.

11.1.6 Aboriginal Cultural Heritage Assessment of Impacts

The known cultural heritage values within the Project area comprise VAHR 7422-0154, 7422-0156, 7422-0314, 7422-0566, 7422-0567 and 7422-0568. It is acknowledged however, that further Aboriginal cultural heritage is likely within the Project area. Nonetheless, the investigations have demonstrated that the proposed infrastructure within the wind farm site and transmission line corridor is unlikely to impact on significant Aboriginal cultural heritage values.

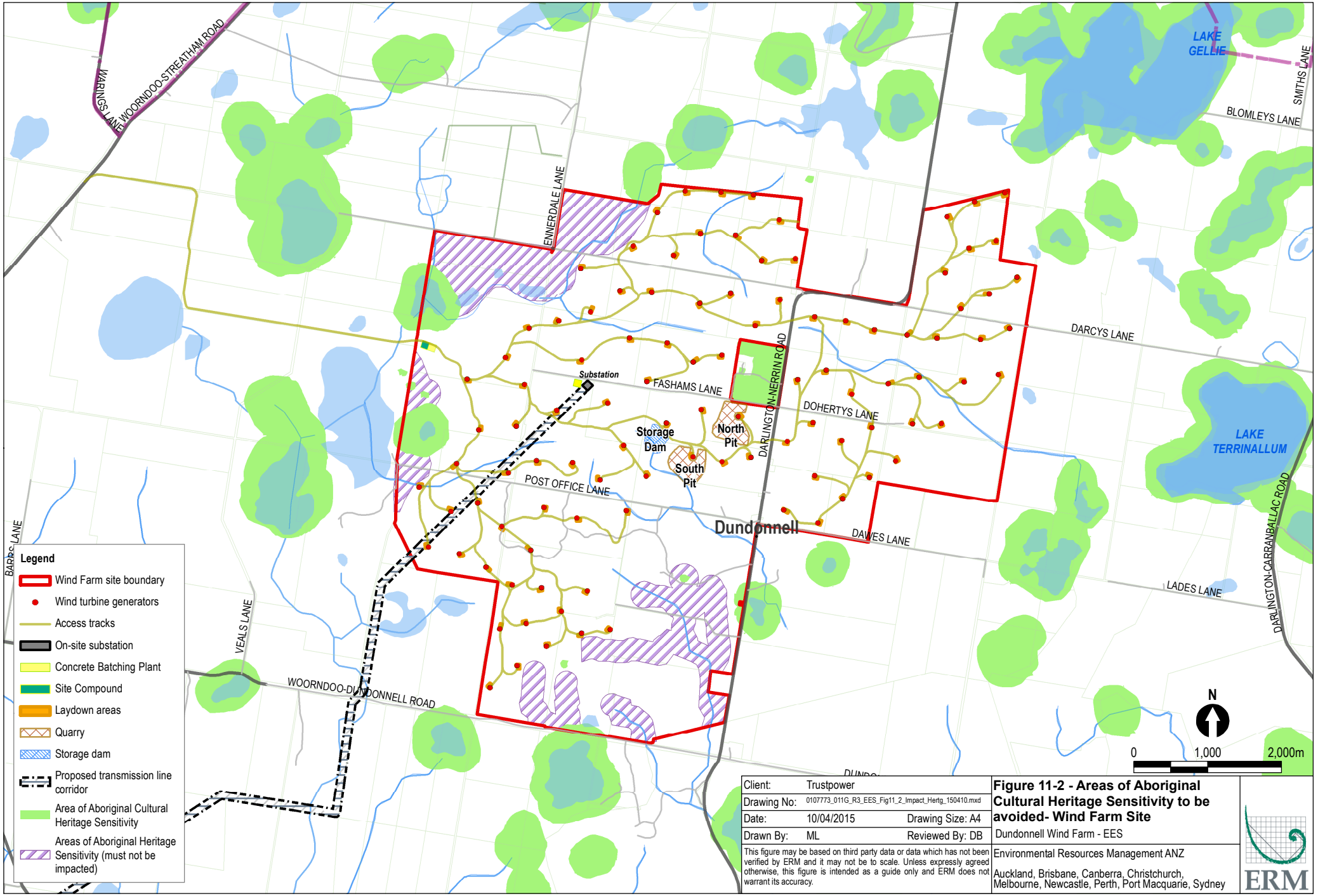
Figure 11-2 identifies the 'no go' areas of Aboriginal cultural heritage scientific sensitivity within the wind farm site that are not proposed to be subject to impact from the Project. These areas comprise elevated land adjacent to freshwater springs and their watercourses and elevated land adjacent to the Mt Fyans lava flow and Ennerdale Plain (excluding the road reserve). It also includes the deeply weathered volcanic plain in the north-west of the study area. Following the artefact scatters identified within the wind farm site, consideration has been given to landforms within the study area and site types that may be more likely to contain cultural heritage in areas to be impacted by the Project. These areas are shown in *Figure 11-3*. As recommended by the Draft CHMP, areas of archaeological potential will be subject to management measures consisting of ground surface survey during construction of at least 5% of access tracks. The preferred locations for the surveys are also shown on *Figure 11-3*. The surveys will further inform the relationship of the nature of archaeological sites with regional and local scale resources.

The three previously registered Aboriginal cultural heritage places (VAHR 7422-0154, 7422-0156 and 7422-0314) are located more than 200m away from proposed infrastructure. Registered place VAHR 7422-0566 is located within approximately 100m of proposed wind farm infrastructure and therefore, management measures will be implemented to prevent inadvertent harm to this place, as detailed in *Table 11-5*.

VAHR 7422-0567 and 7422-0568 will be impacted by the construction of access tracks and WTGs. Following consultation with OAAV, it was considered preferable to impact these places rather than risk harm to unknown Aboriginal heritage in areas that have not been investigated, which would occur if the infrastructure were moved. No salvage management measures are required for VAHR 7422-0567 because its values have been documented, however salvage of VAHR 7422-0568 will be undertaken. With regards to the transmission line corridor, this would cross some areas of moderate potential for Aboriginal cultural heritage sensitivity, being land within 50m of the margins of former large freshwater meadows and marshes, as shown in *Figure 11-4*. Project activities will avoid these areas and therefore, as they will not be subject to ground disturbance, no impacts to significant cultural heritage are expected. Areas that are still considered likely to contain cultural heritage (i.e. areas of low archaeological potential) have been identified and are illustrated in *Figure 11-5.* In accordance with *Section 8.2* of the Draft CHMP, management measures consist of ground surface survey during construction of at least 10% of access tracks within areas of low archaeological potential.

In summary, while it is considered unlikely that significant cultural heritage will be harmed by the activity, there is some potential for harm to Aboriginal cultural heritage not discovered during the assessment. Therefore, the CHMPs recommend management measures for ground surface survey during construction of a proportion of access tracks in areas of low archaeological potential.

A Contingency Plan will be implemented to manage potential issues, including specific measures in the event that any Aboriginal cultural heritage beyond known cultural heritage is unexpectedly discovered during the Project activity; measures in relation to delays and other obstacles that may affect the conduct of the activity; details of compliance review with the CHMPs and mechanisms for remedying non-compliance; the notification of the discovery of Aboriginal cultural heritage during the carrying out of the activity; and requirements relating to the custody and management of any Aboriginal cultural heritage found during the course of, and after, the activity.



Client:	Trustpower		
Drawing No:	0107773_011G_R3_EES_Fig11_2_Impact_Hertg_150410.mxd		
Date:	10/04/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

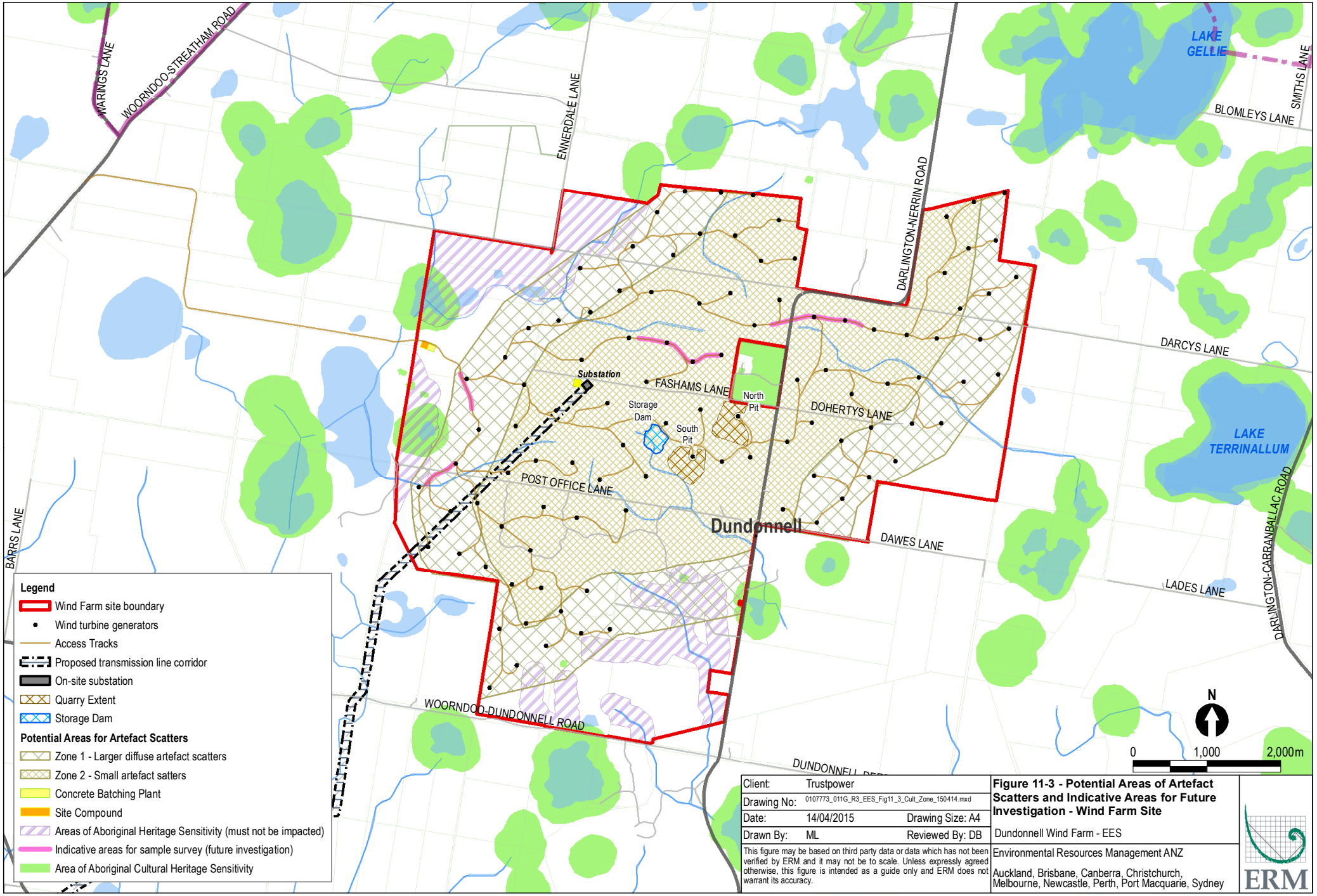
Figure 11-2 - Areas of Aboriginal Cultural Heritage Sensitivity to be avoided- Wind Farm Site

Dundonnell Wind Farm - EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Trustpower		
Drawing No:	0107773_011G_R3_EES_Fig11_3_Cult_Zone_150414.mxd		
Date:	14/04/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

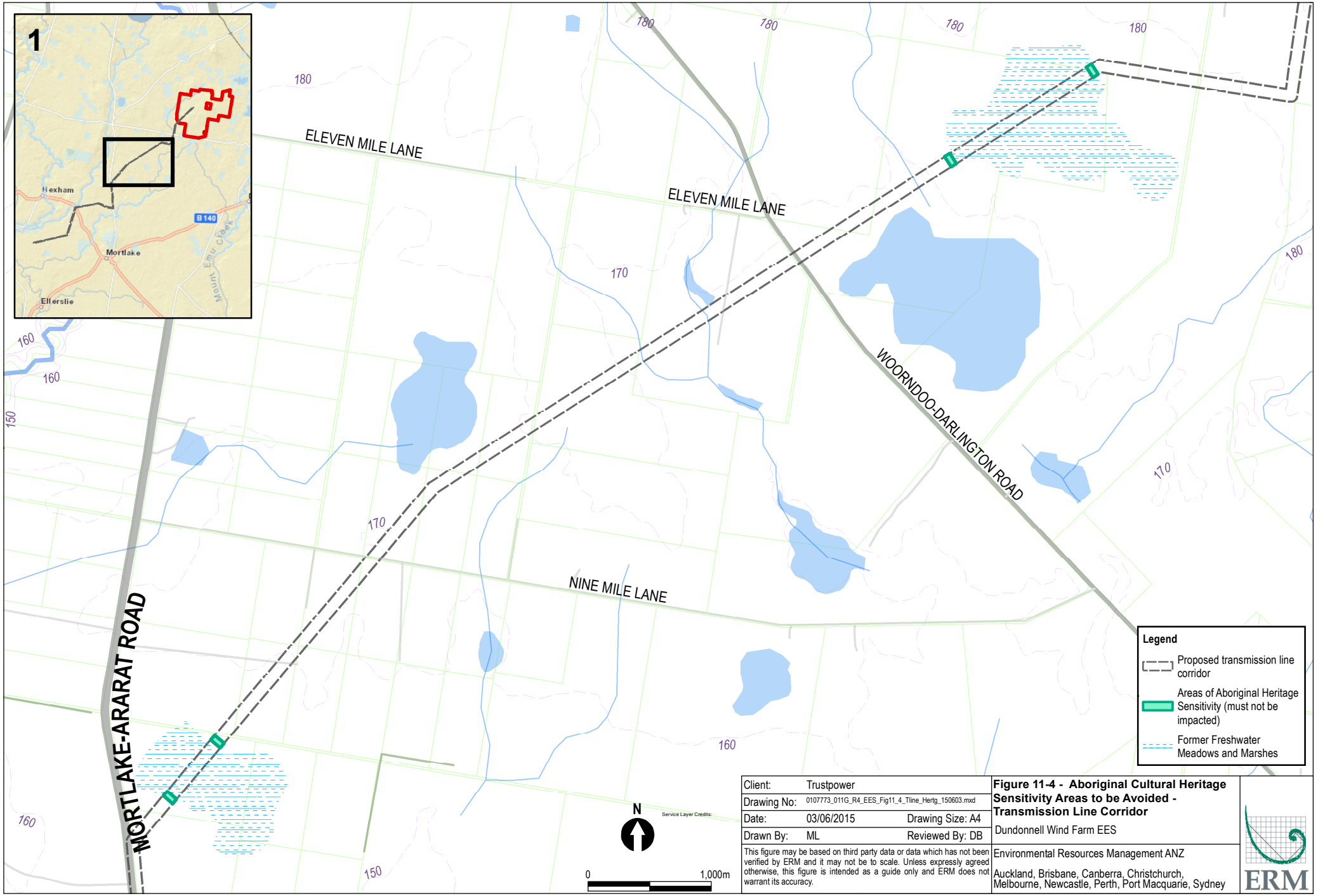
Figure 11-3 - Potential Areas of Artefact Scatters and Indicative Areas for Future Investigation - Wind Farm Site

Dundonnell Wind Farm - EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Trustpower	
Drawing No:	0107773_011G_R4_EES_Fig11_4_Tline_Hertg_150603.mxd	
Date:	03/06/2015	Drawing Size: A4
Drawn By:	ML	Reviewed By: DB

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

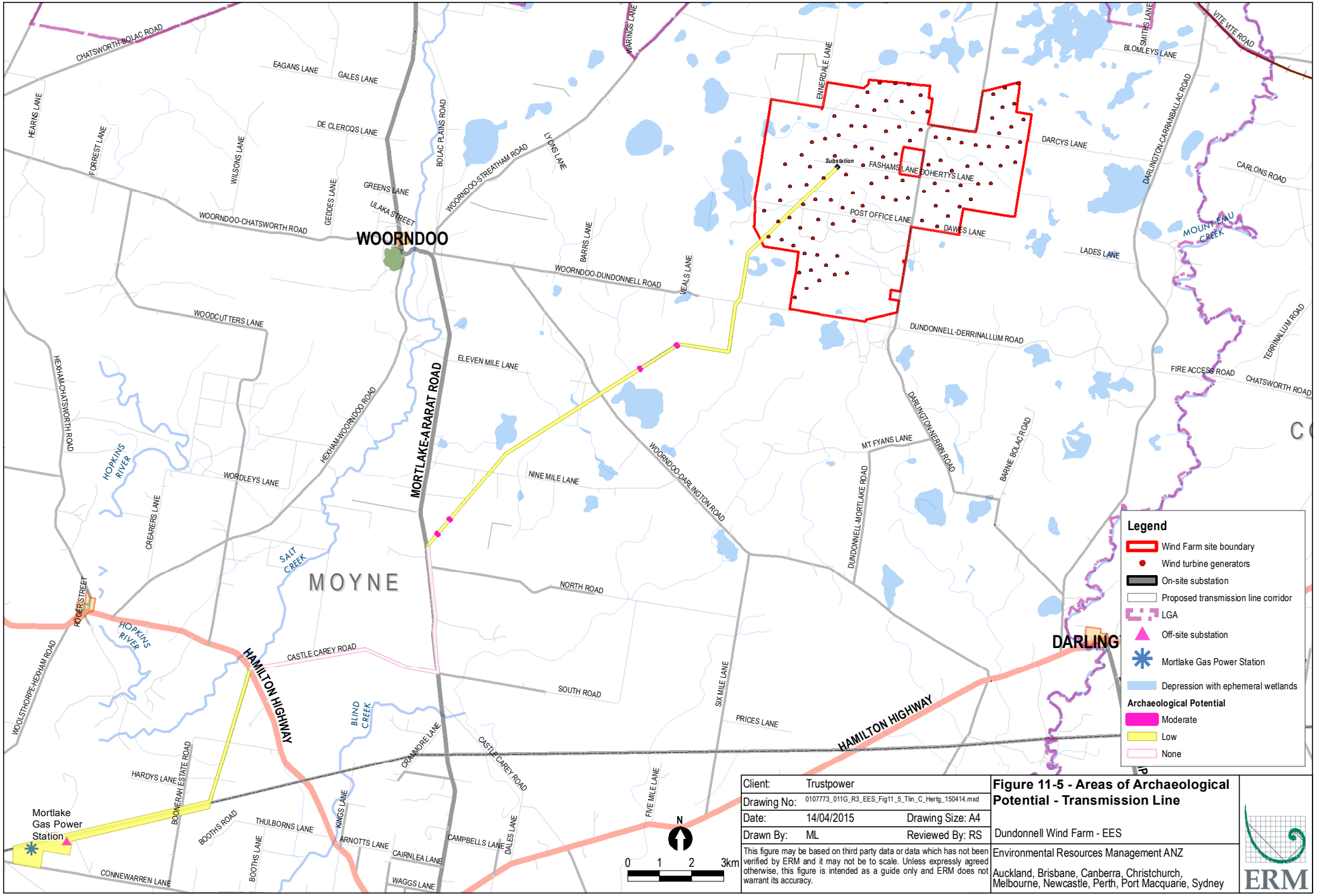
Figure 11-4 - Aboriginal Cultural Heritage Sensitivity Areas to be Avoided - Transmission Line Corridor

Dundonnell Wind Farm EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Trustpower		
Drawing No:	0107773_011G_R3_EES_Fig11_5_Tlin_C_Hertg_150414.mxd		
Date:	14/04/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: RS	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 11-5 - Areas of Archaeological Potential - Transmission Line

Dundonnell Wind Farm - EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

11.1.7 Aboriginal Cultural Heritage Impacts and Mitigation Measures

In keeping with the intent of the AH Act, and following the recommendation of OAAV, the environmental impacts to Aboriginal cultural heritage have been based on 'impact', 'potential impact' or 'no impact' to Aboriginal cultural heritage values. This is because it is not considered meaningful to distinguish between negligible, minor, moderate and major impacts, when the key concern is whether harm will occur to values and if so, whether any impact is appropriately managed. Initial impact ratings are summarised in *Table 11-5.*

Mitigation measures and the residual impact rating after these measures have been applied, are also provided in *Table 11-5.* Given the above, residual impact ratings have been defined as 'harm avoided', 'harm minimised' and 'harm appropriately managed'. For impacts that are not yet known (i.e. if additional Aboriginal cultural heritage is discovered) then the final residual impact rating will be determined by the management and mitigation measures undertaken in accordance with the approved CHMP.

Table 11-5 Aboriginal Cultural Heritage Impacts, Mitigation Measures and Residual Impacts

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
11-01	Construction encounters Aboriginal heritage place, VAHR 7422-0566.	No Impact	Harm will be avoided as no wind farm infrastructure is proposed at the place. Therefore no harm minimisation measures are required. In order to avoid inadvertent harm to the place, the following management measures will be implemented: • Prior to the conduct of the activity, secure protective fencing will be erected with a 10m radius around the recorded place location as shown on Map 21 of the Dundonnell Wind Farm CHMP. • During the conduct of the activity, Heritage No Go Zone signs will be attached to the protective fence. • The fenced Heritage No Go Zone location will be shown on all relevant work plans. • The secure protective fencing and Heritage No Go Zone signs will be maintained during the activity. • Fence and signs will be removed only once the activity has finished. • Information in relation to the above management measures will be provided to all relevant contractors before working in the study area.	Harm Avoided
11-02	Construction encounters the following previously identified Aboriginal cultural heritage places: • VAHR 7422-0154; • VAHR 7422-0156; and • VAHR 7422-0314.	No Impact	Impacts will be avoided as no wind farm infrastructure is proposed at these places and therefore, no harm minimisation measures are required. Since the places are more than 200m from any proposed wind farm infrastructure, no fencing of the place locations is considered necessary. In order to avoid inadvertent harm to the places, the following management measures will be implemented: • The place locations will be shown on all relevant work plans. • Work plans will clearly state that the place locations must not be impacted by the activity. • Information in relation to the places will be provided to all relevant contractors before working in the study area.	Harm Avoided

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
11-03	Construction encounters newly identified Aboriginal heritage places: • VAHR 7422-0567; and • VAHR 7422-0568	Impact	These places will be impacted as an access track and WTGs are proposed at these place locations. The places have been assessed as being of low significance. With regards to VAHR 7422-0567, the artefact values have been documented and the stone artefacts collected will be managed in accordance with the requirements of *Section 10.8* of the *Dundonnell Wind Farm Draft CHMP*. With regards to VAHR 7422-0567, salvage of the place will be undertaken. This will occur prior to the commencement of works within the place in accordance with *Section 10.2* of the *Draft Dundonnell Wind Farm CHMP*.	Harm Managed Appropriately
11-04	Wind farm design may result in ground disturbance of areas likely to contain Aboriginal cultural heritage.	Potential Impact	Areas of sensitivity shown in *Figure 11-2* will not be subject to ground disturbance by any proposed wind farm infrastructure. These areas will be included in 'no go' zones. A consolidated map of the 'no go' zones will be prepared as part of the EMP and work plans for the Project and will be displayed in work sheds on-site. Further ground surveys will be undertaken of the access tracks during construction, with a minimum of 5% of new tracks surveyed. If cultural heritage is found, management measures will be implemented in accordance with *Section 10.6* of the Wind Farm CHMP. All contractors will be provided with a booklet/pamphlet that provides information on the identification of Aboriginal cultural heritage and details the requirements of the CHMP. Contractors or employees involved in ground disturbing work will be provided with cultural heritage awareness and inductions, including: • information in relation to the requirements of the approved CHMP, • requirements of the relevant Contingency Plan; and • Management and reporting requirements for any Aboriginal cultural heritage, if discovered. If any Aboriginal cultural heritage is found during construction, management measures detailed in the CHMP and specifically, the Contingency Plan, as detailed in *Impact 11-06* below, will be implemented.	Harm Avoided/ Managed Appropriately

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
11-05	Transmission line design may result in ground disturbance of land sensitive for Aboriginal cultural heritage.	Potential Impact	No ground disturbance is proposed on land within 50m of former freshwater meadows and marshes. These areas will be included in 'no go' zones. A consolidated map of the 'no go' zones will be prepared as part of the EMP and work plans for the Project and will be displayed in work sheds on-site. Further ground surveys will be undertaken of the access tracks during construction, with a minimum of 10% of new access tracks surveyed. If cultural heritage is found, management measures will be implemented in accordance with *Section 8.2* of the *Draft Transmission Line CHMP*. In the Martang Pty Ltd RAP area, the following will be undertaken: • Inductions for construction personnel in regards to Aboriginal cultural heritage within the transmission line corridor. These inductions will be carried out by Martang Pty Ltd before the commencement of any works and will include information relating to the identification of stone artefacts and deposits in which they may occur. Personnel who will be working permanently within the transmission line corridor will attend this induction. • An on-site tool box meeting regarding Aboriginal cultural heritage will be required for contractors who are not permanent. Contractors will be provided with a booklet/pamphlet on the identification of artefacts prior to commencement of ground work. In the remainder of the transmission line corridor where there is no RAP, all contractors will be provided with a booklet/pamphlet that provides information on the identification of Aboriginal cultural heritage and details the requirements of the CHMP. If any Aboriginal cultural heritage is found during construction, management measures detailed in the CHMP and specifically, the Contingency Plan, as detailed in *Impact 11-06* below, will be implemented.	Harm Avoided/ Managed Appropriately

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
11-06	Construction works encounter a previously unregistered Aboriginal cultural heritage places.	Potential Impact	Areas considered more likely to contain Aboriginal cultural heritage have been identified within the wind farm site and transmission line corridor. Access tracks within these areas will be subject to further testing. On the wind farm site, a ground survey of at least 5% of the access tracks will be conducted during construction in accordance with *Section 10.6* of the *Dundonnell Wind Farm Draft CHMP*. Within the transmission line corridor, at least 10% of any new access track in areas of low archaeological potential will be surveyed in accordance with *Section 8.2* of the *Transmission Line Draft CHMP*. Management measures will be implemented in accordance with the CHMPs if any Aboriginal cultural heritage is discovered. Any Aboriginal cultural heritage found during the conduct of the activity must be dealt with according to the Contingency Plan detailed in *Section 11* of the *Dundonnell Wind Farm Draft CHMP* and *Section 9* of the *Transmission Line Draft CHMP*. The Plan includes: • specific measures in the event that any Aboriginal cultural heritage beyond known places (comprising human remains, stone artefact scatters and all other place-types) is unexpectedly discovered during the activity; • the notification of the discovery of Aboriginal cultural heritage during the carrying out of the activity; • contingency plans required in relation to disputes, delays and other obstacles that may affect the conduct of the activity; • compliance with the cultural heritage management plan and mechanisms for remedying non-compliance; • requirements relating to the custody and management of any Aboriginal cultural heritage found during the course of the activity.	Harm Avoided/ Managed Appropriately

11.1.8 Aboriginal Cultural Heritage Conclusions

The CHMPs identified a total of six Aboriginal cultural heritage places within the study area (three previously registered and three newly identified places as part of the complex assessment for the Project). In addition, there are areas of Aboriginal cultural heritage sensitivity within the study area, however the Project has been designed to avoid areas most likely to contain significant Aboriginal cultural heritage. Nonetheless, there is still potential for cultural heritage to be present throughout the Project area and thus, the CHMPs detail measures to ensure any impact to cultural heritage will be managed appropriately.

Impacts to the majority of known Aboriginal cultural heritage places have been avoided by ensuring there is no proposed construction or ground disturbance in the location of previously registered places and management measures will be implemented to prevent any inadvertent harm to these places. Newly registered places (VAHR 7422-0568 and VAHR7422-0567) will be impacted by the construction of tracks and WTGs. Salvage will be undertaken for VAHR 7422-0568, however no further measures are required for VAHR7422-0567. Harm is considered acceptable to these places as their values have been documented and impacting these known places is preferable to risking harm to areas that have not been investigated and may contain further cultural heritage. Further investigations, comprising ground surveys of new access tracks within areas considered likely to contain cultural heritage will be undertaken during construction. This will assist in gaining a greater understanding of the archaeological potential and cultural heritage within the Project area.

Given the assessments undertaken, and the proposed mitigation measures to be implemented, including the management of unregistered Aboriginal cultural heritage encountered during works, it is considered that the impact to Aboriginal cultural heritage as a result of the construction of the Project will be appropriately managed through the approved CHMPs.

11.2 Historic Cultural Heritage

11.2.1 Historic Cultural Heritage EES Objectives

The EES evaluation objective relevant to historic cultural heritage is:

To avoid or minimise adverse effects on Aboriginal and historic cultural heritage and associated values.

This Section describes the historic cultural heritage values of the study area, the potential impacts from the Project on these cultural heritage values and proposed management measures to minimise these impacts. This section is based on the *Dundonnell Wind Farm Historic Heritage Assessment* (HHA) and *Transmission Powerline Historic Heritage Assessment*, prepared by Archaeology at Tardis, dated August 2014. These reports are contained in Volume 2.

This section and the HHAs address the EES Scoping Requirements by:

- identifying any destruction or disturbance of sites or places of historic cultural heritage significance;
- providing a thematic environmental history of the study area using Appendix 4 – "Guidelines for Thematic Environmental Histories" of the Heritage Victoria Model Consultant Brief for Heritage Studies (January 2010);
- identifying and mapping places and sites of known historic cultural heritage significance within and adjoining the study area, including places listed on the Victorian Heritage Register or Heritage Inventory and places subject to Heritage Overlays in the Moyne Planning Scheme;
- describing field investigations undertaken to identify previously unidentified or unassessed heritage places and sites, including archaeological sites, within or near the study area;
- preparing a heritage impact statement for each identified place and site of historic cultural heritage significance within the study area;
- outlining and evaluating any proposed additional measures to mitigate and manage residual effects on sites and places of historic heritage significance, including site investigation, documentation and recording procedures;
- describing and evaluating the proposed design, construction method or site protection measures which could avoid or minimise direct impacts on historic cultural heritage values; and
- in consultation with Heritage Victoria and Moyne Shire Council, preparing a heritage assessment of any previously unidentified or unassessed historic cultural heritage places or sites, including mapping the extent of the place or site.

11.2.2 Historic Cultural Heritage Study Area

The study area for the HHAs included the wind farm site and the 38km transmission line corridor, including the off-site substation.

11.2.3 Historic Cultural Heritage Assessment Methodology

The methodology used for the HHA included:

- desktop assessment of relevant environmental, historical and archaeological background information including previous archaeological and heritage studies;
- a search of the following heritage databases to identify any registered heritage sites that exist in the study area:
  - Australian Heritage Database, which includes places on the World Heritage List; National Heritage List; Commonwealth Heritage List and Register of the National Estate;
  - Victorian Heritage Database, which includes the Victorian Heritage Registry; Victorian Heritage Inventory; and Moyne Shire, Corangamite Shire and Ararat Shire Planning Scheme Heritage Overlays;
  - National Trust of Victoria Register; and
  - Moyne Shire Council Heritage Study;

- the formulation of a historic heritage sensitivity model to predict the likely historic cultural heritage values that may be present in the study area; and
- ground surface surveys undertaken at the wind farm site between 27 August to 3 September 2013 and along the transmission line corridor between 2 and 6 December 2013.

11.2.4 Historic Cultural Heritage Legislation and Policy

The relevant legislation and government policies for historic cultural heritage are outlined in *Table 11-6.* The key legislation relied upon was the *Heritage Act 1995* and the EPBC Act.

Table 11-6 Relevant Historic Cultural Heritage Legislation and Policies

Legislation / Policy	Description
Commonwealth	
Environment Protection and Biodiversity Conservation Act 1999	Nationally significant heritage places are primarily registered and protected under the EPBC Act. The Australian Heritage Council (AHC) is the principal adviser to the Australian Government on heritage matters and assesses nominated places and recommends to the Minister whether or not a nominated place is appropriate for listing on the Australian Heritage Database (AHD).
State	
Heritage Act 1995	Non-Aboriginal archaeological sites in Victoria are protected by the *Heritage Act 1995*. There are two levels of protection for cultural heritage places: Victorian Heritage Register: sites which are considered to be of significance to the State; and Heritage Inventory: lists all known historical archaeological sites in Victoria. The following statutory obligations apply to non-Aboriginal historic archaeological sites: it is an offence to excavate, damage or disturb relics and sites whether they are included on the Heritage Inventory or not (Section 127), unless a consent has been issued (Section 129); it is an offence to damage, disturb, excavate or alter a place or object on the Heritage Register (Section 64), unless a permit is granted (Section 67); and any person discovering or uncovering an archaeological relic is required to report the discovery to the Executive Director of the Heritage Council (Section 132).
Policy and planning guidelines for development of wind energy facilities in Victoria (DELWP, 2015)	The Wind Energy Guidelines are for responsible authorities, proponents and the community to provide guidance about wind farms and inform planning decisions about wind energy facility proposals. The guidelines set out information requirements for wind energy developments including the requirement to consider historic cultural heritage.
Local	
Moyne Planning Scheme	The Moyne Planning Scheme is implemented via the P&E Act. Clause 15.03-1 'Heritage conservation' requires planning to take into consideration heritage sites and to protect places and sites with significant cultural heritage value. Clause 52.32 of the Planning Scheme sets out the matters to be considered prior to the determination of an application for a wind energy facility, which includes consideration of the Wind Energy Guidelines. Clause 52.37 'Post Boxes and Dry Stone walls' requires the conservation of post boxes and dry stone walls constructed prior to 1940. In addition, heritage places may be protected under the Planning Scheme by way of a Heritage Overlay (HO). HOs include places of local significance and places included on the Victorian Heritage Register.

11.2.5 Historic Cultural Heritage Existing Conditions

A review of the various heritage databases outlined at *Section 11.2.3* indicated that there were no statutory registered historic places inside or within a 10km radius of the centre of the wind farm site.

The desktop evidence was used to formulate a historic heritage sensitivity model, which predicts the likely historic cultural heritage values that may be present in the study area. The relevant information and approximate locations and features that potentially exist in the study area are presented in *Table 11-7.*

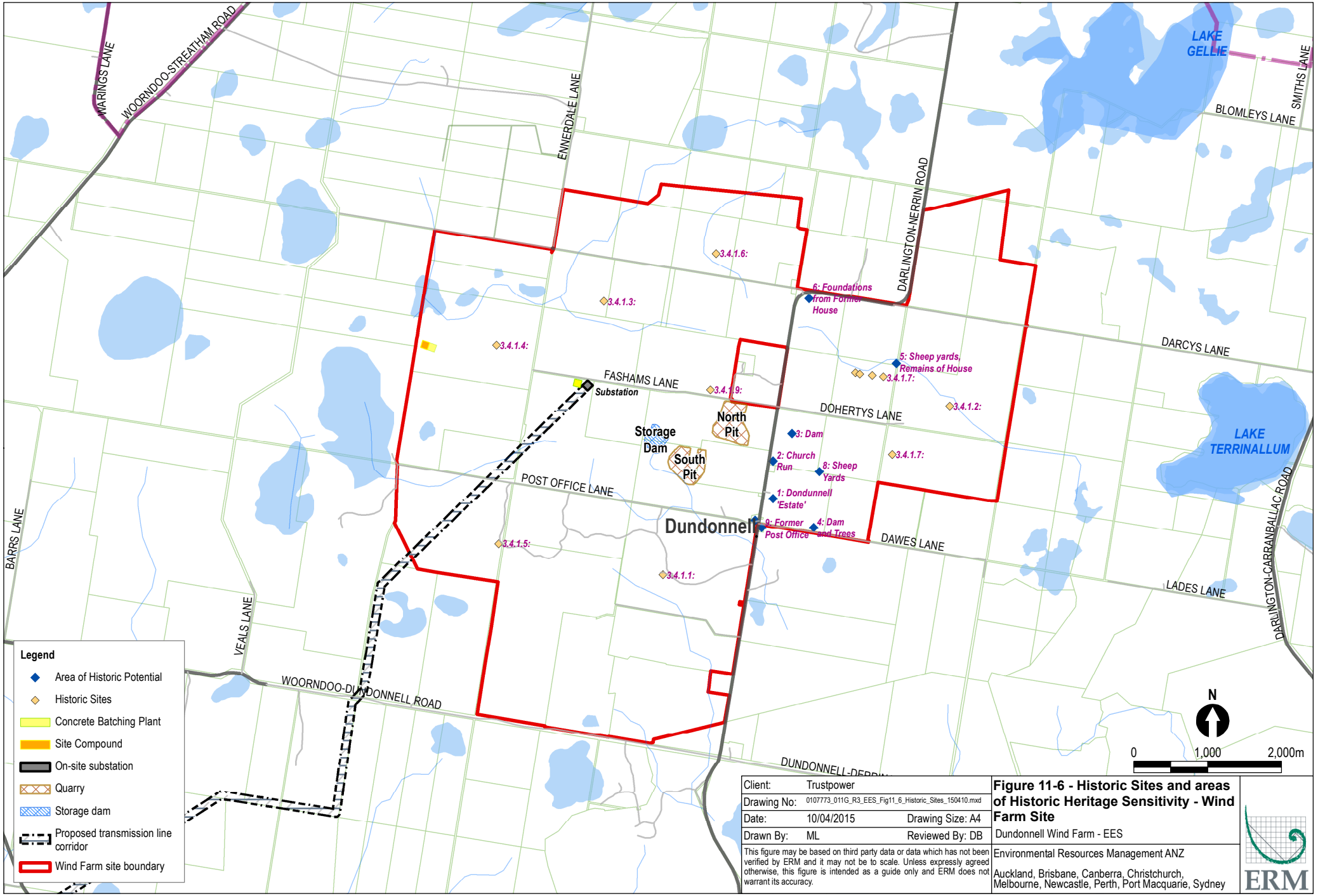
Table 11-7 Desktop Assessment Historic Heritage Sensitivity Model

Period	Places & Location	Sensitivity	
		Wind Farm Site	Transmission Line
Pastoral Era & Estates (mid-19th century)	Homesteads, staff quarters & outbuildings Shepherds huts and stockyards.	Likely	Unlikely
	Dry stone walls (stony rises).	Likely	Likely
Early Selection & Freehold (mid to late 19th century)	Houses & sheds (close to roads), farming infrastructure including dry stone walls (entire activity area).	Likely	Likely (low)
Closer & Soldier Settlement (late 19th century to 1950s)	Houses & sheds (close to roads), farming infrastructure (entire activity area).	Likely	Likely (low)

Whilst there were no registered historic places, the ground survey identified ten places of historic cultural heritage value. These places are presented in *Table 11-8* and identified in *Figure 11-6*.

Table 11-8 Identified Historical Cultural Heritage Places

Place/Site Name	Registration	Description	Historic Significance/ Archaeological Potential
Wind Farm Site			
Mount Violet homestead Complex- bluestone cottages	H7422-0005/ (Potential Heritage Overlay)*	Homestead, stable / barn, woolshed and ruined bluestone cottages	Regional/ Moderate
Shepherds / Boundary Riders Hut & Stockyards	H7422-0007*	Ruined shepherds or boundary riders hut and stockyards	Local/Moderate
McColl House Complex	H7422-0008*	Ruined bluestone chimneys, garden, stockyards	Local/Moderate
Fasham House Complex	H7422-0006*	Homestead site with house removed, palm tree & stoned Causeway	Local/Low
Grant House Complex	No registrations submitted (No registration recommended)	House and sheds possibly associated with Grant's Soldier Settlement block	Local/Low
Stone lined dam	No registrations submitted (No registration recommended)	At least 15 dry stone cairns constructed from volcanic stone collected from fields and demolished dry stone walls	Local/None
Stone cairns	No registrations submitted (No registration recommended)	At least 15 dry stone cairns constructed from volcanic stone collected from fields and demolished dry stone walls	Local/None
Dry stone walls	No registrations submitted (No registration recommended)	Various dry stone walls	Local/None
O'Donnell House Complex	H7422-0009*	Lined driveway to farm buildings, sheds and yards	Local/Low
Transmission Line Corridor			
Dry stone walls	No registrations submitted (No registration recommended)	Various dry stone walls	Local / None
Castle Carey Road Culverts	No registrations submitted (No registration recommended)	Ashlar basalt culverts	Local / None
Source: Archaeology At Tardis, 2014a and 2014b *Following the preparation of the draft HHA, site cards were submitted to Heritage Victoria and these sites were included on the Heritage Inventory in August 2014.			



Client:	Trustpower		
Drawing No:	0107773_011G_R3_EES_Fig11_6_Historic_Sites_150410.mxd		
Date:	10/04/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 11-6 - Historic Sites and areas of Historic Heritage Sensitivity - Wind Farm Site

Dundonnell Wind Farm - EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

11.2.6 Historic Cultural Heritage Assessment of Impacts

The impact of the Project on the ground surface of the study area is expected to be minimal. In addition, wind farms have the flexibility to microsite infrastructure, including the WTGs and transmission line poles, and avoid impact to discrete historic cultural heritage places.

Apart from the Fasham House Complex and dry stone walls, no other historic places were identified to be impacted by the Project.

The dry stone walls are difficult to avoid in relation to access tracks for construction vehicles and ongoing maintenance during operation. In relation to the Fasham House complex, WTGs are proposed within a ruined dry stone enclosure on the track to the site house.

There is potential for additional historic heritage places to be found in areas that will not be impacted by the construction of the Project and which were not accessed during the ground survey. These areas were not surveyed because they will not be impacted, however, if items of historic heritage are present it is considered unlikely they will be of high significance.

11.2.7 Historic Cultural Heritage Impacts and Mitigation Measures

The environmental impacts to historical cultural heritage and an initial impact rating are summarised in *Table 11-9.* Mitigation measures and the residual impact rating after environmental mitigation measures have been applied are also provided in *Table 11-9*.

Table 11-9 Historical Cultural Heritage Impacts, Mitigation Measures and Residual Impacts

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
11-05	Alteration to design could cause damage to, or completely destroy, previously unregistered historical cultural heritage places/sites.	Moderate	• Additional fieldwork will be undertaken if required to fully document all historic heritage to a level which satisfies Heritage Victoria Inventory recording requirements. • Additional historic research on soldier settlement blocks and examination of high definition aerial photography will be undertaken if required to identify remaining historic heritage in the study area. Soldier Settlement blocks outside the areas surveyed during the historic assessment will be identified so they can be avoided if there are any changes to the design of the wind farm. • An EMP for the Project will include contingency measures to manage the unexpected discovery of historic cultural heritage sites and features, in accordance with the Heritage Act. • If places listed on the Heritage Inventory will be impacted by the development, further archaeological investigation will be undertaken. This will be a two stage process, and will require a 'Consent to Excavate' followed by a 'Consent to Destroy' from Heritage Victoria prior to any impact to Heritage Inventory places by the proposed Project.	Minor
11-06	Damage to Fasham House Complex (H7422-0006)	Minor	Wind farm infrastructure will be located away from known historical places such as Fasham House Complex, where possible. If places listed on the Heritage Inventory will be impacted by the development, further archaeological investigation will be undertaken. This will be a two stage process, and will require a 'Consent to Excavate' followed by a 'Consent to Destroy' from Heritage Victoria prior to any impact to Heritage Inventory places by the proposed Project.	Minor

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
11-07	Damage to, or destruction of the dry stone walls during construction	Moderate	Impacts to dry stone walls will be avoided by using existing tracks and gates where possible. If any impacts are proposed to dry stone walls, consideration will be given to the following: • Sections in poorest condition, as determined by an historic archaeologist, must be considered in the first instance for gates and access track locations. These comprise sections where only the basal course or only loose stone remains. • Damage to the original dry stone fabric must be mitigated by the reconstruction of walls and wall terminals to the same specification and traditional style as the existing walls and by using the same materials. • Any dry stone wall work must be conducted by a suitably qualified dry stone wallers. • In order to avoid any inadvertent harm to the dry stone walls, a buffer of 5m during construction should be considered by the contractor. • The location of dry stone walls should be shown on all relevant work plans.	Minor
11-08	Alteration to design could cause damage to, or completely destroy registered historical cultural heritage places identified during ground surface survey.	Moderate	If the wind farm design were to be significantly altered, consideration and assessment will be made of potential impacts on the following places listed on the Victorian Heritage Inventory: • Fasham House Complex (H7422-0006) • Mount Violet Homestead Complex – Bluestone Cottages (H7422-0005) • Shepherds / Boundary Rider Hut & Stockyards (H7422-0007) • McColl House Complex (H7422-0008) • O'Donnell House Complex (H7422-0009). Additionally, consultation with Moyne Shire Council will be undertaken where appropriate to determine whether any of the historic places should be included in the Heritage Overlay under the Moyne Planning Scheme.	Minor

11.2.8 Historic Cultural Heritage Conclusions

There are five statutory registered historic heritage places inside or within a 10km radius of the centre of the wind farm site. Of the total ten historic heritage places identified during the ground survey, two places have been assessed as potentially being impacted by the Project, however these values are of low historic heritage significance. It is therefore concluded that the residual impact to historic cultural heritage as a result of the construction of the Project would be minor.

An EMP will include contingency measures to manage the unexpected discovery of previously unregistered and unassessed historical cultural heritage sites and features.

This page is intentionally blank

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 12 - FLORA AND FAUNA

This page is intentionally blank

Contents

Figures

Tables

This page is intentionally blank

12 FLORA AND FAUNA

This Chapter describes the potential impacts of the Project on flora and fauna and the proposed mitigation measures that are designed to ensure that the Project results in minimal impacts on flora and fauna.

A *Flora and Fauna Assessment* was undertaken and presents the results of all flora and fauna investigations undertaken between 2009 and 2014 (with the exception of Brolga impacts which have been assessed separately in a *Brolga Assessment* and discussed in *Chapter 13*). Further discussion of EPBC Act related flora and fauna matters are also provided in *Chapter 24*.

Key flora and fauna assessment work undertaken during the period included:

- initial vegetation mapping and flora assessment;
- overview fauna assessment to define and locate potential habitats and propose further investigations;
- targeted Striped Legless Lizard, Fat-tailed Dunnart, Growling Grass Frog, bird and bat investigations;
- detailed vegetation mapping;
- targeted surveys for threatened flora species;
- habitat mapping for Golden Sun Moth and Corangamite Water Skink;
- a vegetation assessment along Woorndoo-Streatham Road and the transmission line corridor; and
- the formulation of recommendations in relation to construction and operational management to avoid and/or minimise impacts on flora and fauna.

The *Flora and Fauna Assessment* has informed the layout of the proposed wind farm and assisted in the development of rigorous management and mitigation measures, including 'no go' zones and buffer zones, to be implemented during the construction of the Project. In accordance with the Assessment, the Project has been designed to minimise direct and indirect impacts on threatened flora and fauna species.

With regards to the wind farm site and major site access track and Woorndoo-Streatham Road, no significant flora and fauna impacts are expected. Direct impacts could occur through bird and bat collisions, trapped animals and collisions during construction. Indirect impacts could be caused through erosion, sedimentation, pollution, noise and visual impacts, alteration of habitat use and avoidance behaviour and spread of weeds and diseases. Given the results of the targeted surveys, it is considered that no significant impacts will occur to threatened flora and fauna species through direct impacts. Moreover, mitigation measures will ensure that indirect impacts are avoided or minimised to a level that will not significantly impact any threatened species or communities.

It is not anticipated that there will be any significant flora and fauna impacts as a result of the transmission line. However, as the final detailed design of the transmission line is not yet confirmed, further targeted surveys will be undertaken prior to construction. These assessments will inform the final layout of the transmission line, which will be designed to avoid native vegetation and habitat for threatened flora and fauna species where possible. In addition, the targeted surveys will inform mitigation measures to be implemented and will ultimately ensure any impacts to flora and fauna are appropriately managed and can be reduced to an acceptable level so not to significantly impact threatened species or communities.

12.1 EES Objectives

The EES evaluation objective that is most relevant to the *Flora and Fauna Assessment* is as follows:

To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, including those listed under the FFG Act or EPBC Act, and address opportunities for offsetting potential losses consistent with relevant policy.

This Chapter is based on the *Flora and Fauna Assessment* undertaken by BL&A, dated February 2015, included at Volume 2: Supplementary Reports. This Chapter addresses flora and fauna issues associated with the Project, with the exception of Brolga, which is discussed in detail in *Chapter 13* and the *Brolga Assessment* undertaken by BL&A, dated September 2014. In addition, this Chapter briefly addresses impacts to EPBC Act listed species, however a detailed assessment of Matters of National Environmental Significance (MNES) is provided in *Chapter 24*.

This Chapter addresses the EES Scoping Requirements by:

- Describing the loss of native vegetation, associated listed vegetation communities and flora, in particular the Spiny Rice-flower, Basalt Rustyhood , Button Wrinklewort, Fragrant Leek-orchid, Small Golden Moths, Clover Glycine, Natural Temperate Grassland of the Volcanic Plains, Grassy Eucalypt Woodland of the Victorian Volcanic Plain and Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains;
- describing the direct and indirect impacts of the Project on fauna, in particular the loss of, or degradation to, habitat for species of fauna listed under the FFG and EPBC Acts, in particular Latham's Snipe, Corangamite Water Skink, Growling Grass Frog, Striped Legless Lizard, Southern Bent-wing Bat and Yellow-bellied Sheath-tail Bat and relevant migratory species;
- characterising the distribution and quality of biodiversity values that could be affected by the Project, including native vegetation, terrestrial and aquatic habitat and patterns of wildlife movement in the area that could be impacted by the Project;
- identifying the existence or likely existence of any species or communities listed under the EPBC Act and the FFG Act and any declared weeds or pathogens;
- assessing the direct and indirect impacts of the Project on native vegetation, listed ecological communities and flora species and listed threatened and migratory fauna species;
- identifying and describing the potential and proposed design and mitigation measures, which could avoid or minimise significant effects on native vegetation, and/or any listed flora, fauna and ecological communities;
- describing and evaluating proposed measures or performance requirements, as appropriate, to further mitigate or manage residual effects of the Project on biodiversity values and provide an estimation of likely residual effects; and
- identifying proposed offset measures to address requirements of applicable state government native vegetation policy and the EPBC Act Environmental Offsets Policy.

12.2 Study Area

The flora and fauna study area broadly covers the wind farm site, Woorndoo-Streatham Road and the transmission line corridor, as detailed following.

The study area for the wind farm site refers to all land within the boundary of the wind farm site and the major site access track from the public road network to the wind farm site.

The study area for Woorndoo-Streatham Road comprises the road reserves within a 7.5km stretch of Woorndoo-Streatham Road, Bolac Plains Road and Woorndoo-Ararat Road between Woorndoo and the proposed wind farm site entrance. This area was included as a precautionary measure, should a widening of this road section be unavoidable, as detailed in *Chapter 19* and shown in *Figure 19-3*.

As the final design detail of the transmission line is not yet confirmed, a conservative approach has been undertaken for the study area for the transmission line corridor. The study area comprises a corridor 50m to each side of the proposed 38km route. Given that each mono-pole is expected to have a footprint of approximately 4m², the 50m corridor is considered sufficient to allow for a flexible layout of the poles, if required, to avoid significant impacts to flora and fauna. In addition, the study area was increased to 80m north and south of the existing Mortlake transmission line at the southern end of the proposed route, where it would be located next to the existing transmission line to enable greater flexibility in the final transmission line siting.

For some EPBC Act listed species investigated, differing buffer areas were used. Further detail is provided in the *Flora and Fauna Assessment* contained at Volume 2.

12.3 Assessment Methodology

In undertaking flora and fauna assessments, the following guidelines, as relevant to this Chapter, were used to inform the methodologies for the Project:

- *Wind Farms and Birds: Interim Standards for Risk Assessment* (BL&A and AIRA Professional Services, Report No. 2003.35(2.2), 2005);
- *Significant impact guidelines for 36 migratory shorebird species - Migratory species: EPBC Act policy statement 3.21 (Draft)* (Department of the Environment, Water, Heritage and the Arts (DEWHA), 2009);
- *Permitted clearing of native vegetation: Biodiversity assessment guidelines* (DEPI, 2013);
- *Background Paper to EPBC Act Policy Statement 3.12 – Nationally threatened Species and Ecological Communities, Significant Impact Guidelines for the Critically Endangered Golden Sun Moth (Synemon plana) (*DEWHA, 2009a);
- *Significant impact guidelines for the vulnerable Growling Grass Frog - Nationally threatened species and ecological communities EPBC Act Policy Statement 3.14* (DEWHA, 2009b);
- *Policy and planning guidelines for development of wind energy facilities in Victoria (*DPCD, 2012);
- *Native Vegetation: sustaining a living landscape, Vegetation Quality Assessment Manual – guidelines for applying the Habitat Hectare scoring method (Version 1.3)* (DSE, 2004a);
- *Guidelines for managing the endangered Growling Grass Frog in urbanising landscapes: A report for the Victorian Department of Sustainability and Environment* (Arthur Rylah Institute for Environmental Research, 2010);
- *Referral guidelines for the Striped Legless Lizard, Delma impar* (DSEWPAC, 2011); and
- Visual encounter surveys in *Measuring and Monitoring Biological Diversity: standard methods for amphibians* (Eds. W.R. Heyer, M.A. Donnelly, R.W. McDiarmid, L.C. Hayek and M.S. Foster., pp. 84-91) (Smithsonian Institution Press, Washington) (Crump, M.L. and Scott, N.J., 1994).

An overview flora and fauna assessment was undertaken for each element of the Project. Targeted surveys were then undertaken for the wind farm site and Woorndoo-Streatham Road to detail the impact of the Project infrastructure on threatened species. Targeted surveys were not undertaken for the transmission line corridor as the detailed design, specifically the exact location of the power poles and access tracks, is not yet confirmed. Targeted surveys will be undertaken prior to construction for this element of the Project.

Further information regarding individual methodologies employed for the specific flora or fauna assessed is provided in the *Flora and Fauna Assessment* contained at Volume 2. A timeline of flora and fauna surveys undertaken are summarised at *Table 1.1* in the Assessment.

Wherever appropriate, a precautionary approach has been adopted in the discussion of implications. Where insufficient evidence is available on the occurrence or likelihood of occurrence of a species, it is assumed that it could be in an area of habitat, if suitable, and the implications under legislation and policy are considered accordingly.

12.4 Legislation and Policy

The relevant legislation and government policies for flora and fauna are outlined in *Table 12-1*.

Table 12-1 Relevant Flora and Fauna Legislation and Policies

Legislation / Policy	Description
Commonwealth	
Environment Protection and Biodiversity Conservation Act 1999	The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, defined in the EPBC Act as matters of national environmental significance.
State	
Flora and Fauna Guarantee Act 1988	The FFG Act is designed to protect flora and fauna by requiring a license to remove listed threatened species or communities or protected flora from public land (e.g. road reserves). The license must be obtained from DELWP.
Wildlife Act 1975	The Wildlife Act defines certain wildlife and 'protected wildlife'. Its purposes are: *'To establish procedures in order to promote* • the protection and conservation of wildlife; and • the prevention of taxa of wildlife from being extinct; and • the sustainable use of and access to wild life; and • to prohibit and regulate the conduct of persons engaged in activities concerning or relation to wildlife'. A permit may be needed pursuant to the *Wildlife Act 1975* if the removal or relocation of native fauna species is required.
Environment Effects Act 1978	Under the *Environment Effects Act 1978*, proponents are required to prepare a Referral to the State Minister for Planning, who will determine if an EES is required for the project.
Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria (DELWP 2015)	The Wind Energy Guidelines are for responsible authorities, proponents and the community to provide guidance about wind farms and inform planning decisions about wind energy facility proposals. The Guidelines set out information requirements for wind energy developments, including the preparation of a vegetation management plan. Clause 52.32 of the Victorian Planning Provisions sets out the matters to be considered prior to the determination of an application for a wind energy facility, which includes consideration of the Wind Energy Guidelines.
Local	
Moyne Planning Scheme	The Moyne Planning Scheme is implemented via the P&E Act 1987. Clause 12.01 of the Moyne Planning Scheme requires the protection and conservation of Victoria's biodiversity, including important habitat for Victoria's flora and fauna.
Catchment Management Authority Native Vegetation Management Plan - Glenelg Hopkins Native Vegetation Management Plan	The Project is located within the Glenelg Hopkins Catchment Management Authority. The Authority has a *Native Vegetation Management Plan* (2006). Under certain circumstances the Framework refers to this *Native Vegetation Management Plan*, which provides alternative offset targets requirements specific to the Glenelg Hopkins Catchment.

12.5 Existing Conditions and Assessment

The siting of the wind farm and associated infrastructure (WTGs, access tracks, underground cabling, batching plant, temporary site office, quarry pits and on-site substation) has been designed to avoid the majority of native vegetation on-site.

The following section contains a summary of the existing conditions for flora and fauna on the wind farm site, Woorndoo-Streatham Road and the transmission line route. Specifically, this section assesses the conditions and impacts on native vegetation, listed ecological communities, birds, migratory birds, bats, Striped Legless Lizard, Fat-tailed Dunnart, Growling Grass Frog, Corangamite Water Skink and the Golden Sun Moth. The project element of the quarry pits were included in the initial vegetation survey, however it was found that the pits did not impact native vegetation and therefore, further targeted surveys were not required. Most of the quarry site comprises improved pasture, with only very limited areas of remnant vegetation. No native vegetation is proposed to be impacted, or threatened fauna habitat impacted as a result of the quarry. As the quarry pits will not have a significant impact on flora and fauna, a detail assessment of this element has not been included in this Chapter. Refer to the *Draft Quarry Work Plan* provided at Volume 2 for further discussion regarding quarry impacts.

12.5.1 Wind farm and Major Access Track

An overview flora and fauna assessment was undertaken to identify native vegetation and indigenous flora and fauna habitats within the wind farm and major access track. Subsequently, targeted surveys were undertaken where required to ascertain the potential impact for threatened species. This information has been used to inform the Project layout to ensure flora and fauna impacts are avoided where possible and minimised. The following summarises the existing conditions of the wind farm site and major access track and the potential flora and fauna impacts of this element of the Project.

Flora

The following vegetation and flora assessments were undertaken in relation to the Project:

- An initial overview vegetation assessment in October 2009;
- a vegetation survey, specifically of the central-west of the wind farm site, in early September 2010;
- native vegetation mapping of two areas containing Stony Knoll Shrubland to assist WTG micro-siting in July 2012;
- an updated vegetation assessment over the entire wind farm site to inform the final WTG and access track layout in September and November 2013; and
- a habitat hectare assessment of areas impacted by WTGs and internal access tracks in May 2014.

In addition to these assessments, targeted threatened flora surveys were undertaken in June and November 2013, during flowering periods for potential threatened species, to determine whether they occur in areas of native vegetation to be affected by WTGs, access tracks and associated infrastructure. Details of these targeted surveys are outlined in *Section 2.2.3* of the *Flora and Fauna Assessment*.

From these assessments it was concluded that the wind farm site was dominated by improved pasture, mainly comprising introduced grass species. Small numbers of scattered indigenous trees were recorded within the wind farm site, however these will be avoided and therefore, further detailed assessment of these trees is not necessary. The results from the flora assessments are detailed following.

Native Vegetation

Scattered patches of remnant native vegetation were present in the form of shallow grassy wetland, escarpment Shrubland, Plains Grassland and River Red Gum trees. An initial desktop assessment was undertaken utilising the Pre–European Ecological Vegetation Class (EVC) mapping of the wind farm site, the major site access track and surrounds. The initial assessment was then supplemented with current DEPI (now DELWP) mapping and an overview field assessment.

As the location of the wind farm and associated infrastructure avoids most of the native vegetation on-site, habitat hectare assessments were undertaken only along the proposed main access route on private land and small areas impacted on by WTGs and internal access tracks at the wind farm site.

The assessment concluded that a total of 187 (136.4 ha) patches of remnant vegetation of the following EVCs, or EVC mosaics, were present throughout the wind farm site. These sites comprised:

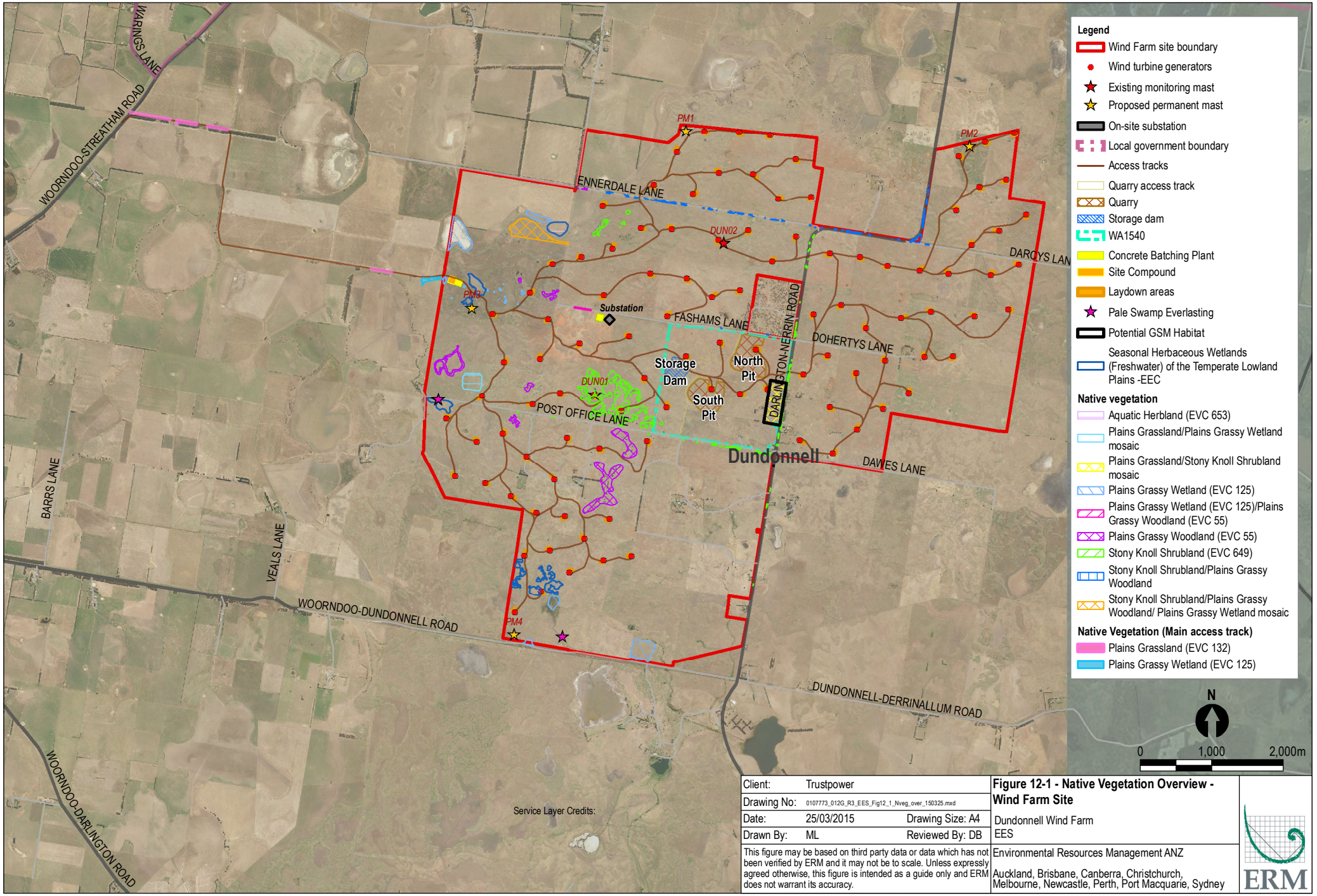
- Plains Grassy Woodland (EVC 55);
- Plains Grassy Wetland (EVC 125);
- Plains Grassland (EVC 132);
- Plains Sedgy Wetland (EVC 647);
- Stony Knoll Shrubland (EVC 649);
- Aquatic Herbland (EVC 653);
- Plains Grassland/Plains Grassy Wetland mosaic;
- Plains Grassland/Stony Knoll Shrubland mosaic;
- Plains Grassy Wetland /Plains Grassy Woodland mosaic;
- Stony Knoll Shrubland/Plains Grassy Woodland mosaic; and
- Stony Knoll Shrubland/Plains Grassy Woodland/ Plains Grassy Wetland mosaic.

Figure 12-1 shows an overview of the native vegetation on the wind farm site, including the major access track. Numerous remnant patches of native vegetation were recorded as mosaics, including two or more EVCs. The recorded EVCs varied in quality depending on the level of degradation caused by weed invasion, pasture improvement, grazing and other agricultural activities.

The assessment concluded that 1.285ha of remnant native vegetation will require removal as a result of the proposed wind farm site and major site access track. No scattered trees will be impacted. A habitat hectare assessment was undertaken for these areas of remnant vegetation to be impacted. The results are detailed in *Table 2.3* of the *Flora and Fauna Assessment* provided at Volume 2. The vegetation removal will include the removal of a number of EVCs comprising Stony Knoll Shrubland, Heavier-soils Plains Grassland and Plains Grassy Wetland. This equates to a loss of 0.114 biodiversity equivalence units (with a weighted biodiversity score of 0.682), as determined by the online Native Vegetation Information Management system (NVIM).

The offset required by DELWP to compensate for the predicted removal of native vegetation at the proposed wind farm site and major site access track is 0.172 general biodiversity equivalence units (BEU), with a minimum strategic biodiversity score of 0.505. An offset of 0.26ha specific biodiversity equivalence units of habitat for the Fragrant Leek-orchid is required for the removal of native vegetation along the proposed major site access track.

As the predicted native vegetation to be removed is greater than the DELWP criteria of 0.5ha, the Project requires a referral to DELWP. Under the provisions of the *Permitted clearing of native vegetation – Biodiversity assessment guidelines*, the proposal will be assessed under the high risk assessment pathway in accordance with the requirements of the Planning Scheme and subsequent planning permit applications. A general offset will apply to any approved native vegetation removal which is expected to be required as a condition of any planning permit issued.



Client:	Trustpower		
Drawing No:	0107773_012G_R3_EES_Fig12_1_Nveg_over_150325.mxd		
Date:	25/03/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 12-1 - Native Vegetation Overview - Wind Farm Site

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

EPBC Act Flora

The potential habitat for three threatened flora species under the EPBC Act was present within the wind farm site and along the major site access track. These species were:

- Adamson's Blown-grass (*Lachnagrostis adamsonii*) (endangered);
- Basalt Rustyhood (*Pterostylis basaltica*) (endangered); and
- Spiny Rice-flower (*Pimelea spinescens* subsp. *Spinescens*) (critically endangered).

Subsequent targeted surveys were undertaken for the three species in suitable habitat potentially to be affected by the wind farm. These three species were not found.

The EES scoping requirements specifically detail the four EPBC Act listed species of the Button Wrinklewort (*Rutidosis leptorrynchoides*), Small Golden Moths Orchid (*Diuris basaltica*), Fragrant Leek-orchid (*Prasophyllum suaveolens*) and Clover Glycine (*Glycine latrobeana*). The assessments found that suitable habitat is absent for all four species and therefore, no further assessment is required.

FFG Act Flora

Under the FFG Act, seven listed species were deemed potentially to occur in the wind farm site and along the major site access track:

- Adamson's Blown-grass (*Lachnagrostis adamsonii*) (threatened);
- Basalt Rustyhood (*Pterostylis basaltica*) (threatened);
- Clumping Golden Moth (*Diuris gregaria*) (threatened);
- Dense Greenhood (*Pterostylis sp. Aff. Bicolor) (Woorndoo*) (threatened);
- Leprechaun Greenhood (*Pterostylis conferta*) (threatened);
- Purple Blown-grass (*Lachnagrostis punicea filifolia*) (threatened); and
- Spiny Rice-flower (*Pimelea spinescens* subsp. *Spinescens*) (threatened).

Targeted surveys did not record any of these species. As a consequence, no licence from the DELWP is required to remove threatened flora species from public land.

It is noted that whilst the EES scoping requirements detail the FFG Act listed species as the threatened Button Wrinklewort *(Rutidosis leptorrynchoides),* Fragrant Leek-orchid *(Prasophyllum suaveolens*), Small Golden Moths *(Diuris basaltica)* and Clover Glycine *(Glycine latrobeana)*, as discussed above, suitable habitat is absent for these species and therefore, no further assessment is required.

In summary, no EPBC or FFG Act listed flora species were found during targeted flora surveys in or near areas of native vegetation to be impacted by the wind farm and the major access track.

EPBC Act Listed Ecological Communities

Two critically endangered (EPBC Act) ecological communities occur in the wind farm site:

- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (SHWTLP); and
- Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP).

Field investigations confirmed numerous patches of remnant native vegetation in the wind farm site constitute SHWTLP and a few constitute NTGVVP. Full details of these communities are provided in the *Flora and Fauna Assessment* in *Section 2.3*, specifically *Tables 2.2, 2.3* and *2-5* and *Maps 2-2 to 2-9*.

A third critically endangered ecological community, Grassy Eucalypt Woodland of the Victorian Volcanic Plain (GEWVVP) had the potential to occur, however this community was not identified during the on-site assessments.

Of the 1.285ha of remnant native vegetation to be removed, 1.023ha comprises NTGVVP which is proposed to be removed along the major site access track. All other areas of listed EPBC Act communities will be avoided. Any offset requirement will be determined in accordance with Commonwealth Department of the Environment (DoE) requirements.

No other listed EPBC Act communities have been identified on site or are expected to be affected by the proposed works.

FFG Act Listed Ecological Communities

Under the FFG Act, one ecological community listed as threatened was identified to occur in several patches of remnant native vegetation in the wind farm site. This is the Western (Basalt) Plains Grassland Community (WPGC).

A second threatened ecological community; Western Basalt Plains (River Red Gum) Grassy Woodland Floristic Community (WBPGWFC) had the potential to occur, however this community was not identified during the on-site assessments.

As above, of the overall 1.285ha of vegetation to be removed, 1.023ha along the major access track also comprises WPGC. No licence under the FFG Act is required for this removal as it occurs on private land. The local planning authority may consider impacts on FFG Act listed communities when deciding on planning permit applications for removal of native vegetation.

Birds

For information regarding Migratory Birds, refer to the *Migratory Birds* section following in this Chapter. For detailed information on Brolga, refer to *Chapter 13*.

The Bird Utilisation Survey (BUS) undertaken during summer 2009 indicated that most species frequenting the proposed wind farm site were the following common farmland birds:

- Common Starling (*Sturnus vulgaris*) (introduced);
- Raven spp., mainly Little Raven (*Corvus mellori*);
- Australian Magpie (*Cracticus tibicen*);
- Eurasian Skylark (*Alauda arvensis*) (introduced); and
- House Sparrow (*Passer domesticus*) (introduced).

These five species accounted for more than 60% of the total number of birds counted. The additional five species of European Goldfinch *(Carduelis carduelis)* (introduced) Noisy Miner (*Manorina melanocephala*), Red-rumped Parrot (*Psephotus haematonotus*), Yellow-rumped Thornbill *(Acanthiza chrysorrhoa)* and Brown Songlark *(Megalurus cruralis)* accounted together with the first five species for 80% of all birds observed. These species are generally common farmland birds found in Victoria. The remaining 20% of birds recorded included other common Victorian farmland birds, birds of prey (raptors) and waterbirds.

Raptors formed 1.6% of all individuals surveyed and 3.7% of all birds flying at RSA heights. Seven raptor species were recorded during the surveys, including; the Brown Falcon *(Falco berigora),* Nankeen Kestrel *(Falco cenchroides),* Whistling Kite *(Haliastur sphenurus),* Wedge-tailed Eagle *(Aquila audax),* Black-shouldered Kite *(Elanus axillaris),* Peregrine Falcon *(Falco peregrinus),* and Swamp Harrier *(Circus approximans).* Given, the comparatively low number of these species, it is unlikely that the Project will have a significant impact on the regional population of these raptors, given that these species are common and widespread in agricultural landscapes in Victoria.

Waterbirds were recorded within the wind farm site and the radius of investigation (10km from the area). Waterbirds formed 0.9% of all individuals surveyed during the BUS and comprise all common species with the exception of the low risk, near threatened (DELWP threatened species advisory list) Whiskered Tern (*Chlidonias hybridus*). The Whiskered Tern is seasonal in Victoria (spring and summer) and no individuals were recorded within the wind farm site boundary.

Previous wind farm studies of waterbird utilisation rates around wetlands undertaken by BL&A indicate that waterbirds generally do not move further than 450m beyond the edge of the wetland habitat while inhabiting a wetland until they decide to leave the wetland (BL&A, unpublished data). As such, most waterbird activity occurs on and within 450m of wetlands. Activity beyond this distance generally involves background waterbird activity of either small numbers using farm dams, or the occasional and infrequent movement between wetlands.

The Project area does not comprise any significant wetlands and furthermore, when leaving a wetland, waterbirds generally usually fly higher than WTG height (B. Lane pers. observation). As such, given the distance of proposed infrastructure from important wetlands, it is not considered that any significant impacts will result to waterbird populations.

Bird Collision Mortality and Non-collision Impacts

Mortality of birds can result from both collision and non-collision impacts. Collision impacts include collision with WTGs and associated structures, such as guy cables, transmission lines and meteorological masts. There is also evidence of birds being forced to the ground as a result of being drawn into the vortex created by moving rotors. It is important to note however, that birds are generally able to avoid collisions and do not blindly fly into WTGs.

Non-collision impacts include habitat avoidance which can lead to displacement and exclusion of birds from areas of suitable habitat.

With regards to collision impacts, in Australia, determining the impact of wind farms on bird species is still in its early stages with limited information publically available. As such, Europe and North America studies are often utilised where wind farms and bird collision have been studied comparatively well. There are however, differences in the ways that Australian birds use the landscape compared with the northern hemisphere. While higher collision mortality has been documented in the northern hemisphere, with a large proportion being from migratory birds, in Australia, long distance north-south bird and bat migration is not common as is the case in Europe and North America. For instance, a review by Erikson et al. (2001) found that 78% of carcasses at wind farms in the USA outside California were migratory birds. In contrast, one of the few relevant published studies in Australia covering two coastal wind farms in north-west Tasmania (Hull et. al 2013), found that 52% of birds (identified to a species level) that collided with WTGs were migratory. Excluding seabirds (which would not be an issue at Dundonnell), the proportion was reduced to 20%. Consequently, it is considered that applying the results of North American and European studies to the Australian situation would likely result in an over-estimate of the number of birds that collide with wind farm infrastructure.

The birds surveyed at the proposed wind farm site were recorded for their flying heights and were compared with the Rotor Swept Area (RSA). A significant majority of birds (88%) occurred below RSA height (23m to 165m), of this 80.3% were on the ground and 7.3% were flying below 20m. The results for the Project were similar to those recorded for other Australian wind farms. Of the 13 wind farms analysed across Australia, the average bird counts indicated that 95% flew below RSA height, 4.8% at RSA height and 0.2% above RSA heights.

Bird species flying at RSA height comprised mainly common farmland birds, of which two were introduced species (Eurasian Skylark and Common Starling). As discussed previously, raptors formed only 3.7% of birds observed at RSA height and therefore, it is considered that the Project is unlikely to have a regional impact on raptors based on this low occurrence.

In relation to waterbirds, the low risk, near threatened (DELWP threatened species advisory list) Whiskered Tern is generally observed flying 10m from the ground or water surface. There are no records of this species flying at RSA heights. Furthermore, no individuals were recorded within the wind farm site. Therefore, for these reasons, minimal impact is anticipated on this species.

In terms of non-collision impacts, these relate to disturbance and indirect habitat loss and direct habitat change and loss. Indirect impacts include disturbance, which can lead to displacement and exclusion of birds from areas of suitable habitat, even if the habitat remains intact, and can effectively cause the loss of habitat for the birds. In general, disturbance impacts are variable and the scale of disturbance caused by wind farms varies greatly. Impacts

generally result from increased human activity in the area and noise from WTGs and construction. In contrast, direct habitat change and loss generally results from the construction of the wind farm and associated infrastructure.

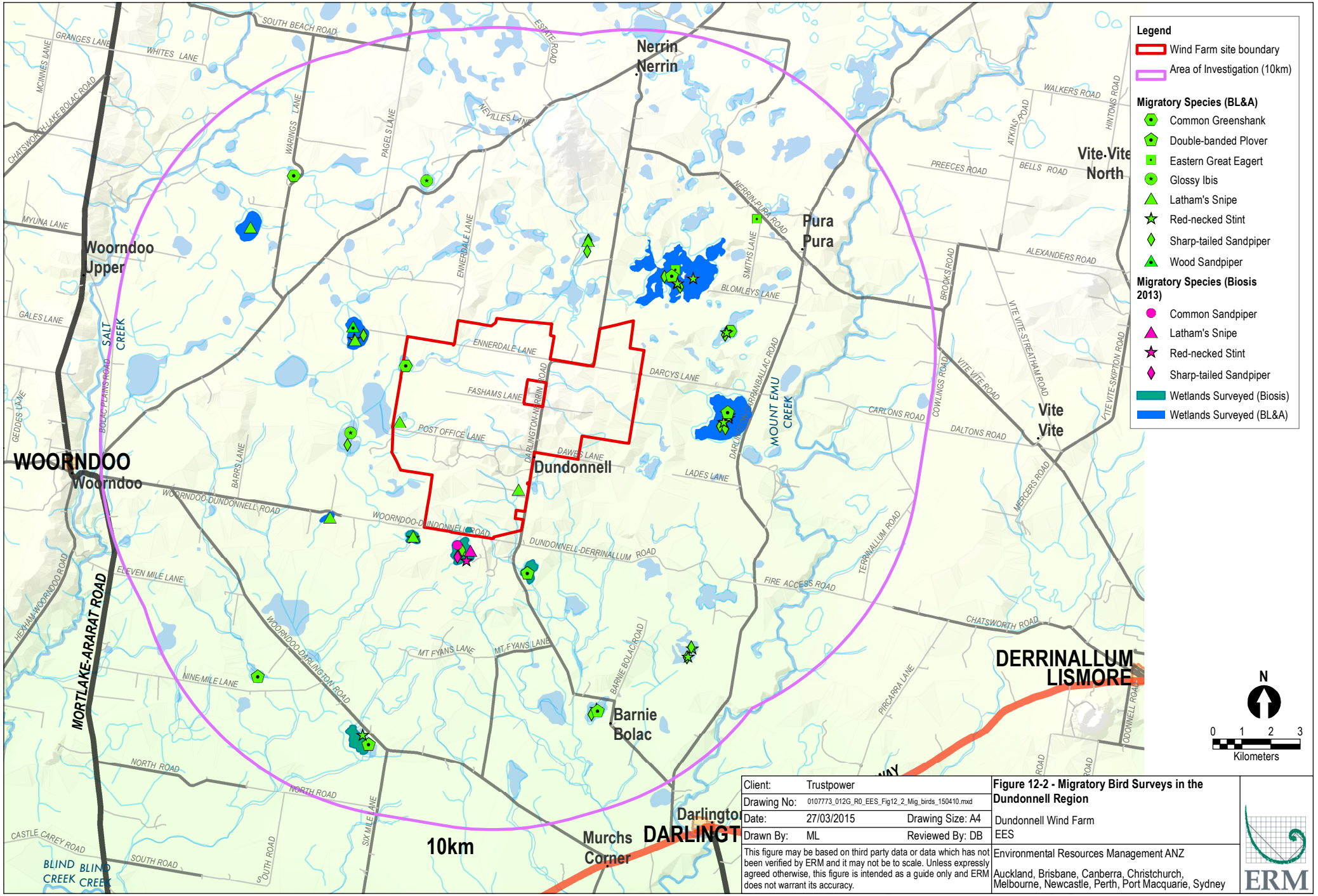
The proposed wind farm infrastructure will constitute approximately 2% of the site. The Project has been designed to avoid vegetation removal and minimise habitat disturbance where possible. Furthermore, mitigation measures will be implemented to ensure that indirect impacts are avoided or minimised to a level that will not significantly impact threatened bird species. For these reasons, no significant impact is expected to result on threatened bird species from non-collision impacts.

Migratory Birds

A review of background information, coupled with a review of suitable habitat, identified the potential for 18 species of EPBC Act listed migratory birds to occur within the region. Given this potential, further investigations in the form of four survey periods (in accordance with federal guidelines) were undertaken during summer 2010/11, summer 2012/13, winter 2013 and spring 2013. Further details of the migratory bird surveys are found at *Section 5* of the *Flora and Fauna Assessment*, including detailed *Maps 5-2* to *5-5*.

The targeted survey area included the wind farm site and an area comprising a 10km buffer around the proposed wind farm boundary termed the 'radius of investigation'. Within this area, a focus was placed on all wetlands holding water during the survey periods where migratory birds would potentially occur or have been recorded in the past. This was supported by anecdotal information obtained from local landholders.

The wetlands surveyed and locations of migratory species are shown in *Figure 12-2.*



Client:	Trustpower		
Drawing No:	0107773_012G_R0_EES_Fig12_2_Mig_birds_150410.mxd		
Date:	27/03/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 12-2 - Migratory Bird Surveys in the Dundonnell Region

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

Within the proposed wind farm site, the overall migratory shorebird activity was found to be relatively low. The Common Greenshank *(Tringa nebularia)* and Latham's Snipe *(Gallinago hardwickii)* were the two migratory birds located within the wind farm site. These two species were recorded in low numbers within the wetlands located on the western boundary and the Latham Snipe was recorded on the south-eastern corner of the wind farm site. In 2013, 20 Latham Snipe were recorded in a wetland within the western part of the wind farm site. These are defined as an important population under the EPBC Act Draft Impact Assessment Guidelines. The wetlands within the wind farm site usually supported low numbers of Latham Snipe during the targeted migratory bird surveys (one to four birds). This is attributed to the lack of extensive suitable habitats within the site, as they are considered suboptimal habitat and generally too dry to support a significant number of this species. Furthermore, no WTG or other infrastructure are located within wetland areas at the wind farm site and the closest WTG proposed is located approximately 450m south-east of the wetland where 20 Latham Snipe have been recorded.

On wetlands outside the wind farm site, targeted migratory bird surveys determined the presence of nine listed migratory species in the radius of investigation. These species were:

- Sharp-tailed Sandpipers *(Calidris acuminata);*
- Red-necked Stints *(Calidris ruficollis);*
- Double-banded Plovers *(Charadrius bicinctus);*
- Eastern Great Egret *(Ardea alba modesta);*
- Glossy Ibis *(Plegadis falcinellus);*
- Common Sandpiper *(Actitis hypoleucos);*
- Wood Sandpiper *(Tringa glareola);*
- Common Greenshank *(Tringa nebularia);* and
- Latham's Snipe *(Gallinago hardwickii).*

Habitats where most migratory bird species were found to occur were situated away from areas where WTGs and associated infrastructure are proposed to be located, generally on large open saline wetlands several kilometres from the proposed wind farm. Due to the geographical location of the main wetlands, it is expected that very few migratory birds would cross the wind farm site, as detailed in *Section 5.5* of the *Flora and Fauna Assessment*.

Assuming straight line flights between wetlands, the movements of migratory birds between most wetlands in the radius of investigation would not cross the wind farm site. Furthermore, migratory shorebirds are particularly strong fliers, generally flying high, with a steep climbing rate from take-off when flying between wetlands that are more than a few kilometres apart (B. Lane, pers. observation). The risk that migratory bird species will collide with WTGs is considered low given the geographical distribution of habitats away from the elevated country on which the wind farm is to be constructed (main movement likely to be north-south within these habitats rather than across the wind farm site) and the usual behaviour of shorebirds when migrating of rapidly climbing to flight heights higher than WTGs.

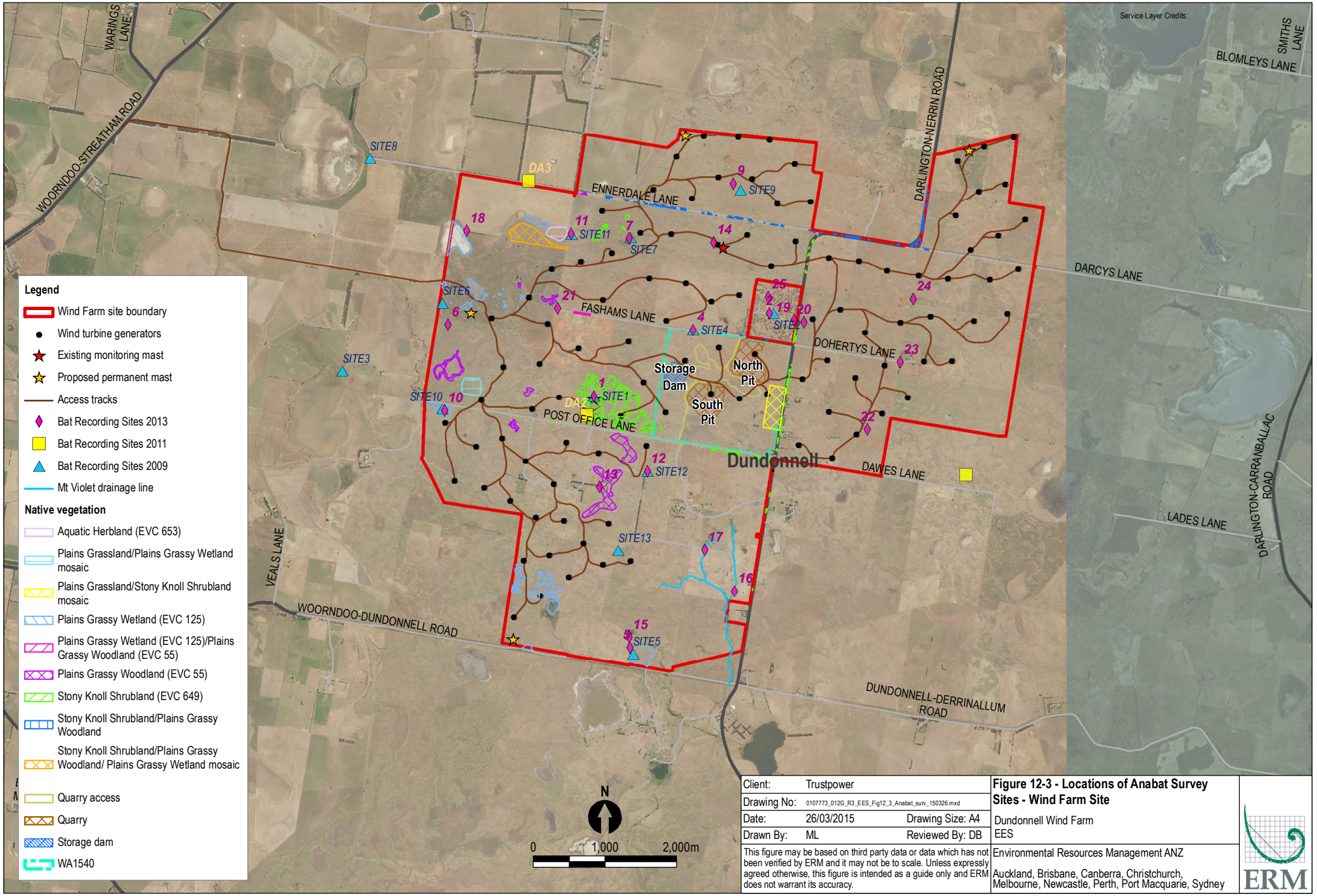
Consequently, the likely very low number of shorebirds colliding with WTGs would not represent a significant impact on the populations of the species that regularly occur. As such, migratory birds are unlikely to be significantly impacted by wind farm construction and operation.

Bats

The Southern Bent-wing Bat (*Miniopterus schreibersii bassanii*) is listed as a critically endangered species under the EPBC Act, threatened under the FFG Act and critically endangered under the DELWP threatened species advisory list. The Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*) is listed as threatened under the FFG Act and is listed as data deficient under the DELWP threatened species advisory list, which means there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status.

A total of four surveys were undertaken from 2009 to 2013 of 29 sites across the wind farm site (consisting of various habitats) with a total of 838 Anabat recording nights, to determine existing conditions in relation to various

species of bats. For the location of the survey sites refer to *Figure 12-3*. For further details of these surveys, refer to Section 6 of the *Flora and Fauna Assessment* in Volume 2.



Client:	Trustpower		
Drawing No:	0107773_012G_R3_EES_Fig12_3_Anabat_surv_150326.mxd		
Date:	26/03/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 12-3 - Locations of Anabat Survey Sites - Wind Farm Site

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

During the survey, 12 bat species were recorded, comprising ten common and two threatened species; the Southern Bent-wing Bat and Yellow-bellied Sheathtail Bat. The majority of bat activity was attributed to the 10 common species. The bat survey results for the two threatened species are detailed in *Table 12-2*.

Table 12-2 Bat Survey Results for the Southern Bent-wing Bat and Yellow-bellied Sheathtail Bat

Bat Species	November 2009	March 2011	February – April 2013	September-November 2013	Total
Southern Bent-wing Bat	0	16	5	0	21
Yellow-bellied Sheathtail Bat	3	0	8	0	11
Refer to the Flora and Fauna Assessment in Volume 2 for full survey results					

Table 12-2 indicates that a total of 21 Southern Bent-wing Bat and 11 Yellow-bellied Sheathtail Bat calls were recorded over the four survey periods. These numbers represent an extremely low percentage of the overall calls recorded. For example, in the February-April 2013 results, the combined number of recordings for the Southern Bent-wing Bat (five) and the Yellow-bellied Sheathtail Bat (eight) was 13 from a total of 57,000 bat call recordings over the 8.5 week period, of which 30,350 were identified to a species.

Two known caves have been investigated in the vicinity of the wind farm site, Mt Hamilton Cave, approximately 7km north of the wind farm site and a small cave within the Mt Fyans Wildlife Reserve at the wind farm site. These two caves were assessed for the presence of Southern Bent-wing Bat and it was concluded that they are not suitable as roosting sites due to the structure of the cave (Mt Fyans) and cave opening being too narrow or blocked with metal and rubbish for safety reasons (Mt Hamilton). No other roosting sites where identified on or in the vicinity of the wind farm site.

The low number of calls confirmed as the Southern Bent-wing Bat and Yellow-bellied Sheathtail Bat and the low activity levels suggest there is a very small number of these species using the wind farm site. Thus, the implications of the Project for the bat population are considered to be negligible and it is unlikely the Project will have a significant impact on these two threatened bat species.

Bat Collision Mortality and Barotrauma

During the bat surveys, bat flight heights were analysed in association with rotor swept area (RSA) height. Detectors, with a 25m recording range, were placed at three different heights: ground level, 25m above ground level and 50m above ground level on two masts located within open paddock areas where the wind WTGs are proposed to be located. It was found that the majority of bats flew close to ground level, with the following recorded:

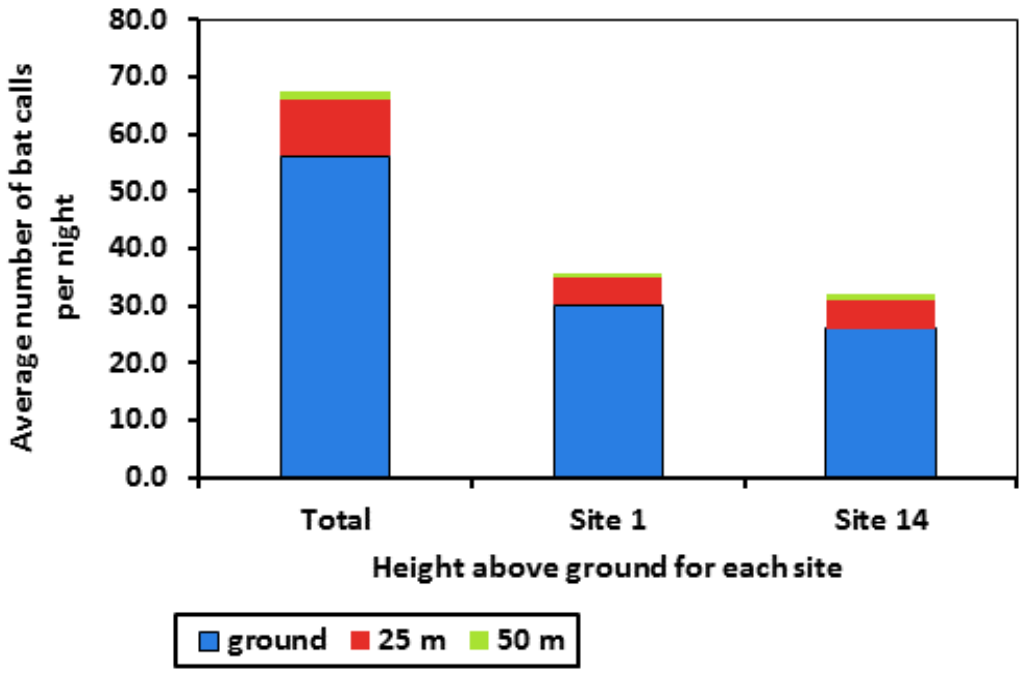
- 83.4% of bat calls were recorded from the ground detector;
- 14.4% of bat calls were recorded from the 25m detector; and
- 2.2% of bat calls were recorded from the 50m detector.

The common and geographically widespread White-striped Freetail Bat (*Tadarida australis*) was the only bat recorded flying above 50m from the ground. The listed Southern Bent-wing Bat and Yellow-bellied Sheathtail Bat generally fly at low heights in open spaces (such as the wind farm site comprising predominantly grassland habitat) and were not recorded above a height of 30m. Given their low activity levels in comparison to common and widespread bat species and their flying height being generally outside RSA heights, it is unlikely that the Project will have a significant impact on the population of these two threatened species.

Bat calls recorded at RSA heights constituted 16.6% of all bat calls recorded at the wind monitoring masts. This indicates that only a small proportion of bats on the site would actually be exposed to collision risk with operating WTGs. In addition, the majority of these bats would be the common White-striped Freetail Bat recorded at 25m and

50m with lower numbers of Gould's Wattle Bat and Southern Freetail Bat recorded at 25m. *Figure 12-4* shows the distribution of flight heights recorded at the two wind mast sites.

Figure 12-4 Distribution of flight heights of bats recorded at the two wind mast sites (1 and 14)



Source: BL&A, 2015

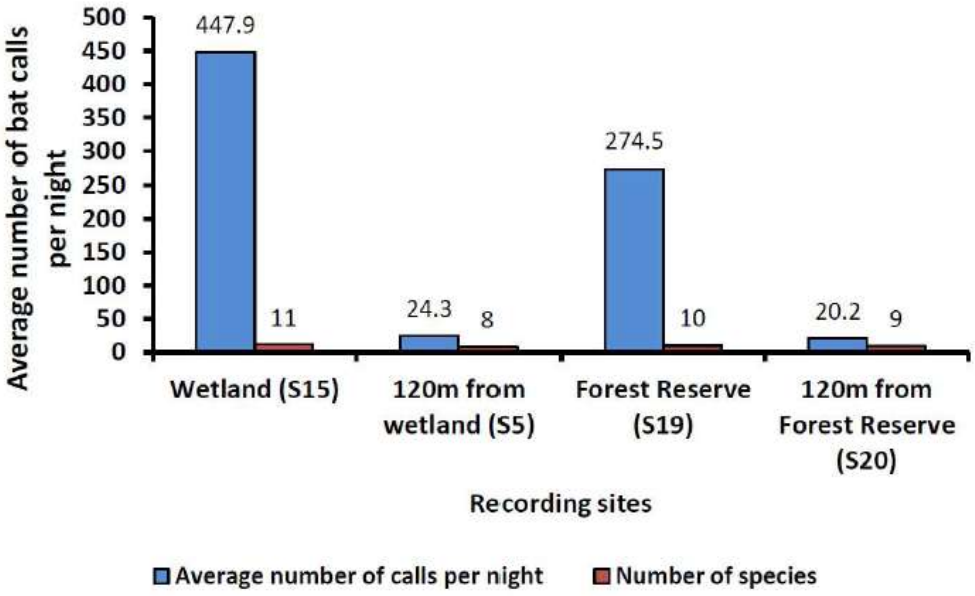
In addition to collision, barotrauma has been reported to induce a significant proportion of bat mortality at WTGs. This involves tissue damage to air-filled structures due to excessive changes in pressure. For example, pulmonary barotrauma involves damage to lung tissues by expansion of air in the lungs without exhalation. Reduced pressure is caused by the aerofoil of rotating WTG blades (Baerwald et al. 2008). Therefore bats may be killed either by direct collision or barotrauma by flying close to the WTG blades.

Given the low activity levels of the threatened bat species on the wind farm site compared with common and widespread bat species, any impact on these species from collision or barotrauma is unlikely to put their population at significant risk.

Favoured Bat Habitats

In addition to RSA height studies, surveys were also undertaken to determine the level of bat activity away from favoured habitats, such as wetlands and woodland areas, refer to *Figure 12-5*. Anabat detectors were placed next to favoured bat habitat as well as at a 120m distance to these habitats to compare bat activity at these sites. This survey was undertaken to inform the implementation of buffer distances from WTGs to avoid or minimise potential bat collision. The results showed that bat activity (average calls per night) declined significantly at a distance of 120m from favoured habitats in the wind farm site. This finding has been used to help inform management and mitigation measures in relation to appropriate buffer areas.

Figure 12-5 Bat Activity at Favoured Habitats (Wetland and Forest)



Source: BL&A, 2015

Striped Legless Lizard and Fat-tailed Dunnart

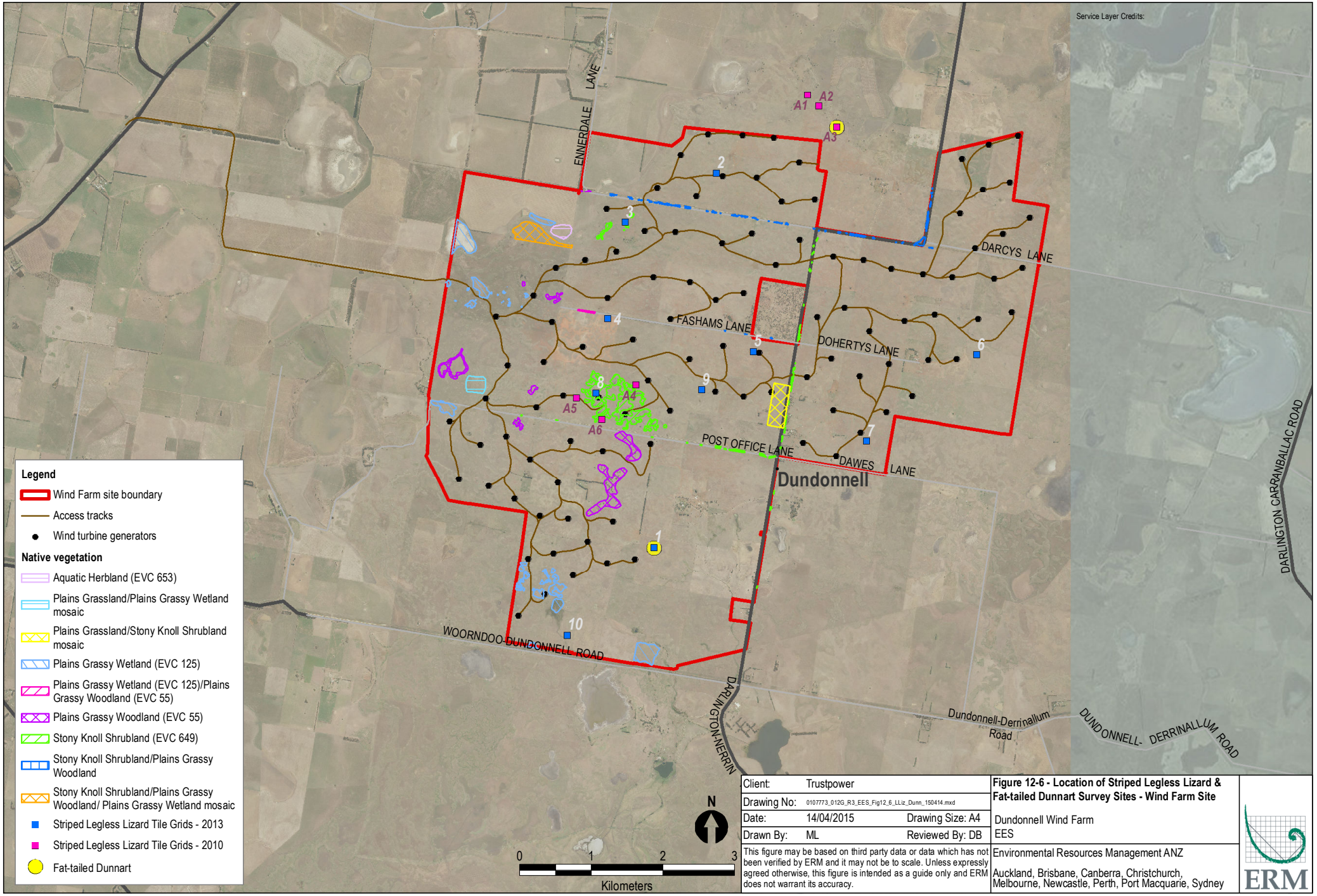
The Striped Legless Lizard (*Delma impar*) is listed as vulnerable under the EPBC Act, listed under the FFG Act and listed as endangered on the DELWP threatened species advisory list. The Fat-tailed Dunnart (*Sminthopsis crassicaudata*) is listed as lower risk-near threatened on the DELWP threatened species advisory list. The potential presence of these species to occur within the wind farm site was considered possible within suitable habitat consisting of remnant native grassland and shrubland. Furthermore, nine recent records (in four locations) within 10km of the wind farm site have been documented for the Striped Legless Lizard.

Two Striped Legless Lizard surveys were undertaken using methods consistent with the DSE's Biodiversity Precinct Planning Kit, including the tile grid method, previously used successfully to survey for Striped Legless Lizard in the basalt plains grasslands of Melbourne. The surveys were undertaken in 2010 and 2013 and are detailed in *Section 7* of the *Flora and Fauna Assessment* at Volume 2.

The 2013 survey was undertaken in accordance with the EPBC Act survey guideline for the Striped Legless Lizard, whereas the 2010 survey predated the guidelines. Locations of tiles were chosen to distribute them evenly over the entire wind farm site in areas determined based on habitat suitability and potential to be impacted by WTGs or associated infrastructure. The surveys resulted in a total of 3,900 tile checks undertaken.

No Striped Legless Lizards were detected within the wind farm site during targeted surveys, and therefore no significant impacts on this species are expected from the Project.

The Fat-tailed Dunnart was surveyed using the same method as the Striped Legless Lizard surveys. The Fat-tailed Dunnart was recorded twice during the targeted surveys (one record within the present wind farm site and one record outside the present wind farm site) and is considered vulnerable to impacts from the proposed wind farm. These locations are shown in *Figure 12-6*. Mitigation measures will be implemented where suitable habitat for this species is proposed to be removed, as detailed in *Table 12-3*.



Client:	Trustpower		
Drawing No:	0107773_012G_R3_EES_Fig12_6_LLiz_Dunn_150414.mxd		
Date:	14/04/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 12-6 - Location of Striped Legless Lizard & Fat-tailed Dunnart Survey Sites - Wind Farm Site

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

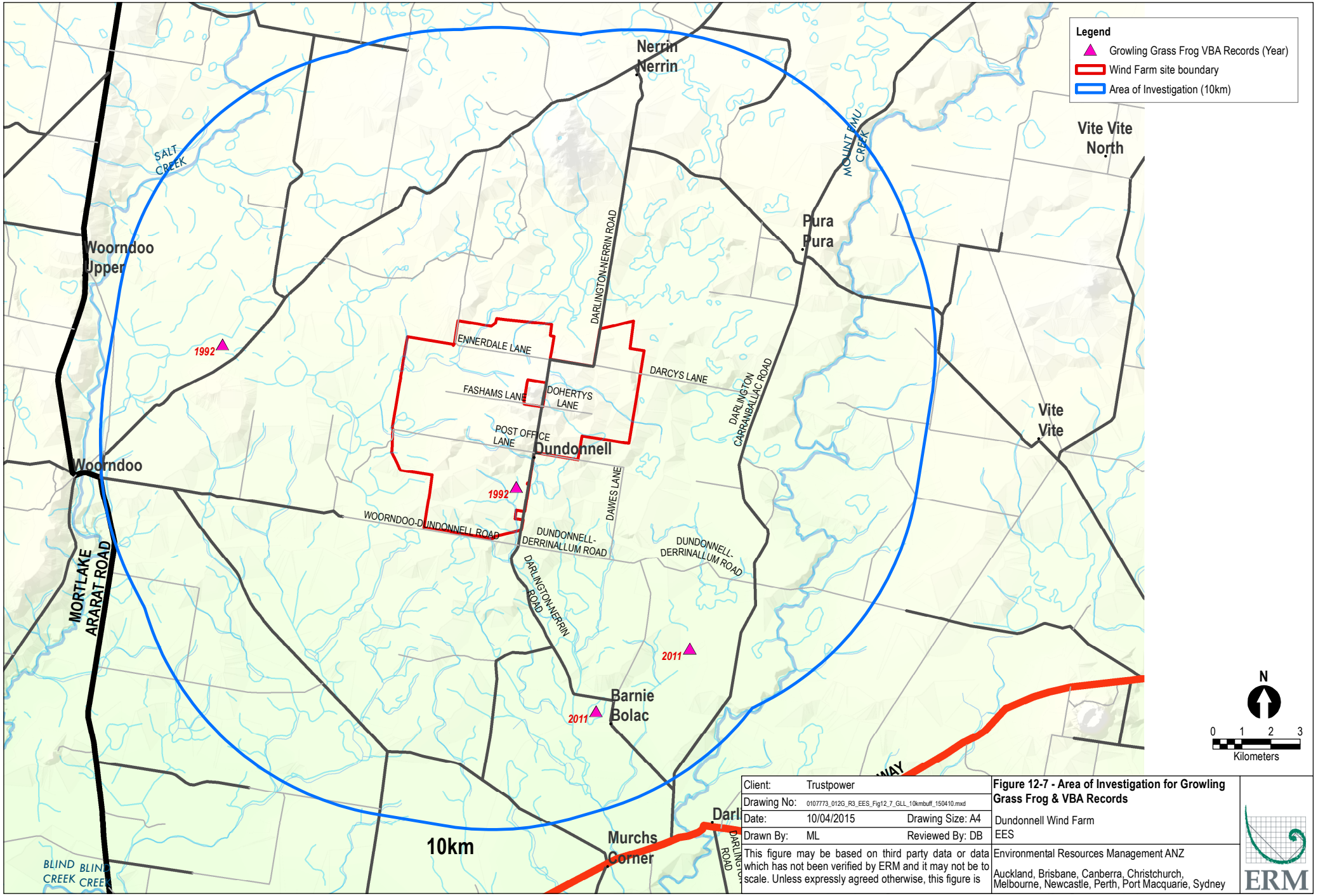
ERM

Growling Grass Frog

The Growling Grass Frog (*Litoria raniformis*) is listed as vulnerable under the EPBC Act, threatened under the FFG Act, endangered under the DELWP threatened species advisory list and vulnerable under the Commonwealth Frog Action Plan. Some of the aquatic habitats within the wind farm site were considered to have potential to support the Growing Grass Frog. Furthermore, four records of the Growling Grass Frog have been recorded within 10km radius of the wind farm site, with one record (1992) located within the south-east section wind farm site, refer to *Figure 12-7*.

A targeted survey was undertaken over three nights (6 November, 18 and 19 December, 2013), in five locations considered suitable for Growling Grass Frog habitat using best practice methods in accordance with the federal survey guidelines (DEWHA 2009) and the Victorian Biodiversity Precinct Planning Kit (DSE 2010). Each suitable site was surveyed twice at a temperature not lower than 14°C by two zoologists for 45 minutes (90 person-minutes) using call playback and spotlight searches. Details of the survey are contained in *Section 8* of the *Flora and Fauna Assessment* in Volume 2 and locations are illustrated in *Figure 12-8.*

No Growling Grass Frogs were observed, nor calls heard during the surveys and are considered unlikely to occur within the wind farm site. Furthermore, the proposed infrastructure is located to avoid dams and waterways. For these reasons, the Project is unlikely to impact this species.



Client:	Trustpower		
Drawing No:	0107773_012G_R3_EES_Fig12_7_GLL_10kmbuff_150410.mxd		
Date:	10/04/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is

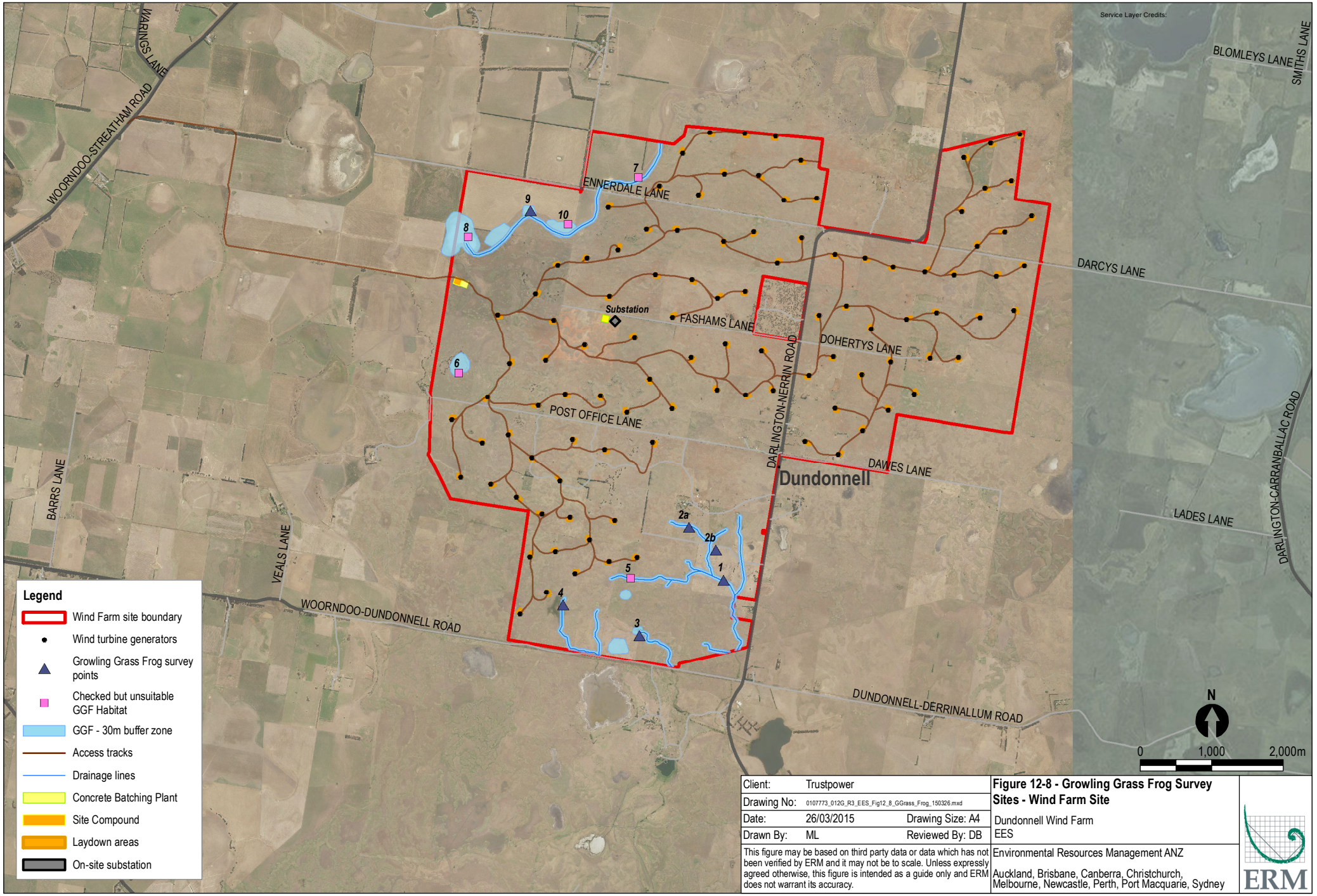
Figure 12-7 - Area of Investigation for Growling Grass Frog & VBA Records

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Trustpower		
Drawing No:	0107773_012G_R3_EES_Fig12_8_GGrass_Frog_150326.mxd		
Date:	26/03/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 12-8 - Growling Grass Frog Survey Sites - Wind Farm Site

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

Corangamite Water Skink

The Corangamite Water Skink (*Eulamprus tympanum marnieae*) is listed as endangered under the EPBC Act and threatened under the FFG Act and critically endangered under the DELWP threatened species advisory list. The Victorian Biodiversity Atlas (DEPI 2013) holds ten records of Corangamite Water Skink documented within the radius of investigation (10km radius of the wind farm site). The locations of these records are detailed in *Figure 12-9.*

Detailed mapping of each potential habitat at the wind farm site was undertaken in November and December 2013. Details of the surveys are contained in *Section 9* of the *Flora and Fauna Assessment* in Volume 2. The quality of each potential habitat was assessed against the habitat assessment criteria. Habitat includes wetlands, lakes, freshwater springs, swamps, wet depressions in undulating basalt rocky areas, drainage lines and small streams as well as dry stone walls close to wetlands.

Potential habitat for the Corangamite Water Skink was found in the south-eastern and north-western part of the wind farm site, however the vast majority (97%) of the site does not provide habitat for the Corangamite Water Skink, as it is mostly free of waterways and wetlands, refer to *Figure 12-10*.

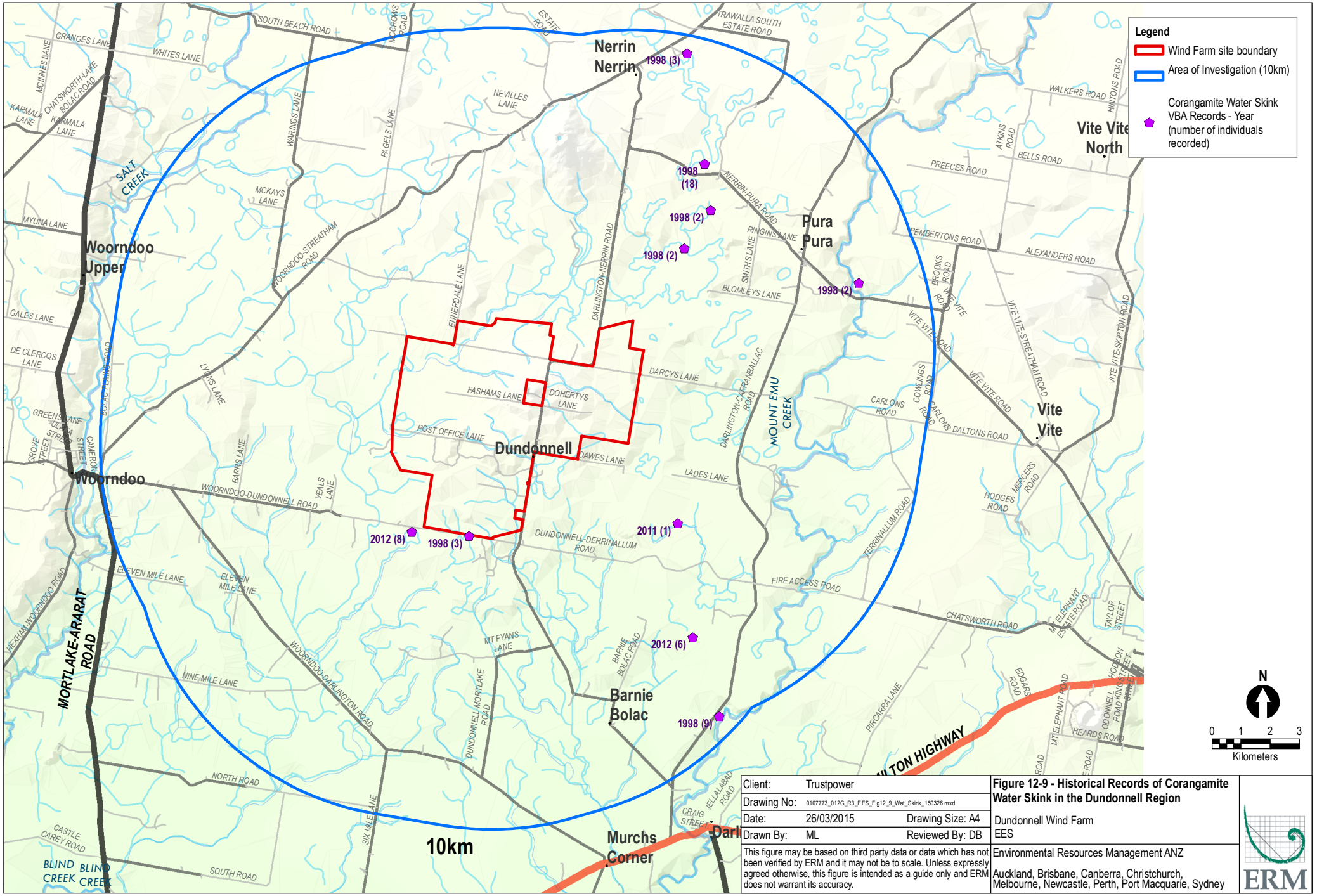
The majority (85%) of potential habitat that is present at the wind farm site is considered to be of low quality, with the exception of one small wetland, which is considered to be of moderate quality for the Corangamite Water Skink.

The wetland of moderate quality habitat is not affected by WTG shadows nor construction works, and the closest WTG is approximately 1km away from this wetland.

To avoid impacts on Corangamite Water Skink, the initial WTG layout has been revised to locate WTGs as far away from wetlands as possible. Most of the potential habitat areas are also located within a WTG-free buffer zone, which was introduced to minimise impacts on Brolgas. Remaining wetland habitats that lie outside the Brolga buffer will be preserved and buffered from works with a minimum 55m buffer area implemented. This buffer has been derived from combining the 25m home range of Corangamite Water Skinks in optimal habitat conditions, with an additional 30m buffer to account for wider home ranges exhibited during less optimal habitat conditions. No WTGs or associated infrastructure are located within the proposed 55m buffer area.

A shadow flicker analysis was undertaken in May/June 2014 to assess the impacts of overshadowing on the basking habitat of the Corangamite Water Skink. This concluded that the majority (over 80%) of habitat will be affected by overshadowing for less than 4% of available annual daylight hours. Given this low percentage and the fact that the potential habitat affected by overshadowing at the wind farm site is considered to be of low quality, no significant impact on this species' basking behaviour is expected as a result of shadows from the proposed WTGs.

Outside the wind farm site, 20% of the shoreline of a wetland to the south–west where Corangamite Water Skink has been previously recorded would be affected by shadow flicker for no more than 2% of annual daylight hours. This level of shadow-flicker is minor and not expected to lead to a significant impact on this species' basking behaviour.



Client:	Trustpower		
Drawing No:	0107773_012G_R3_EES_Fig12_9_Wat_Skink_150326.mxd		
Date:	26/03/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

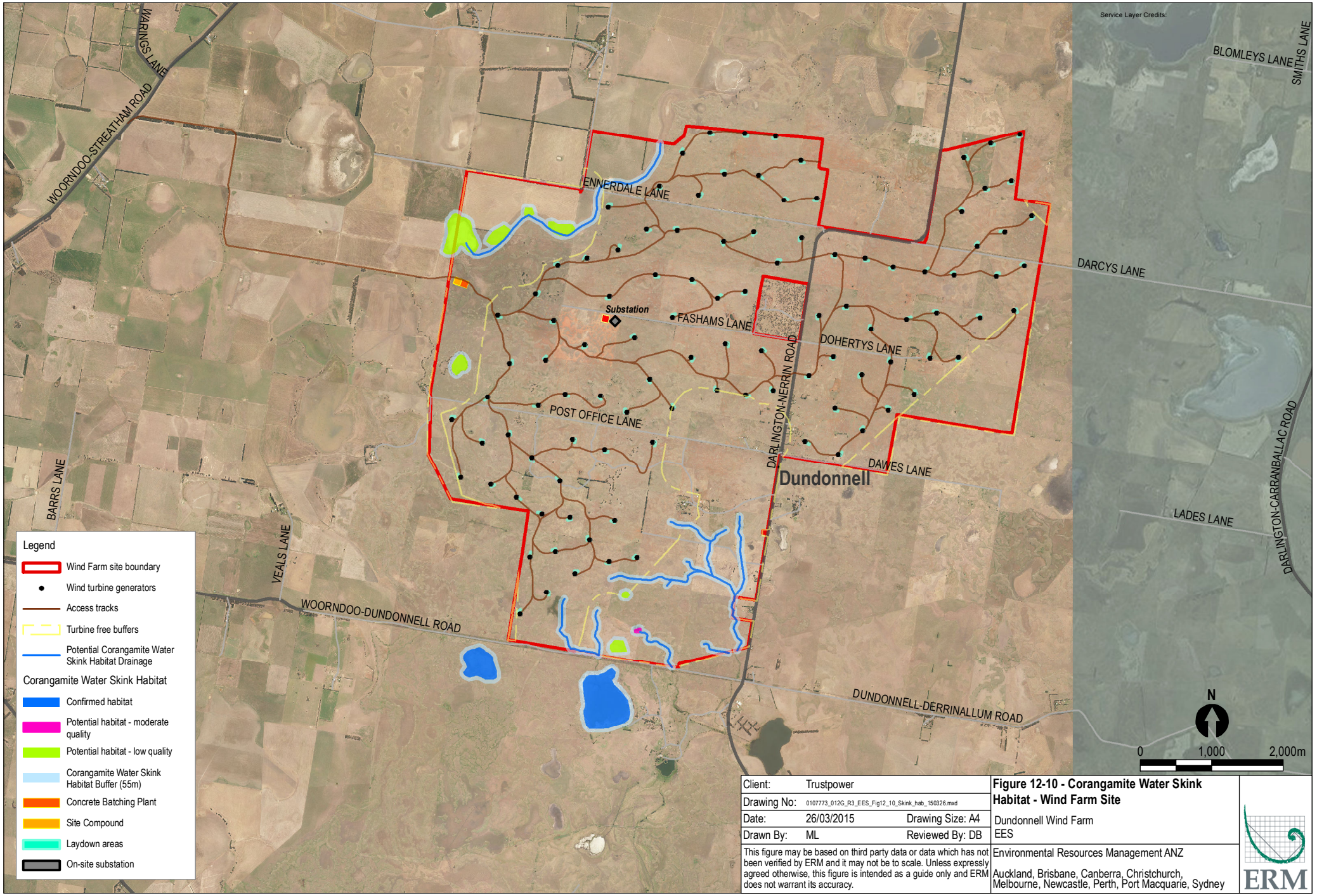
Figure 12-9 - Historical Records of Corangamite Water Skink in the Dundonnell Region

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Trustpower		
Drawing No:	0107773_012G_R3_EES_Fig12_10_Skink_hab_150326.mxd		
Date:	26/03/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 12-10 - Corangamite Water Skink Habitat - Wind Farm Site

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

Golden Sun Moth

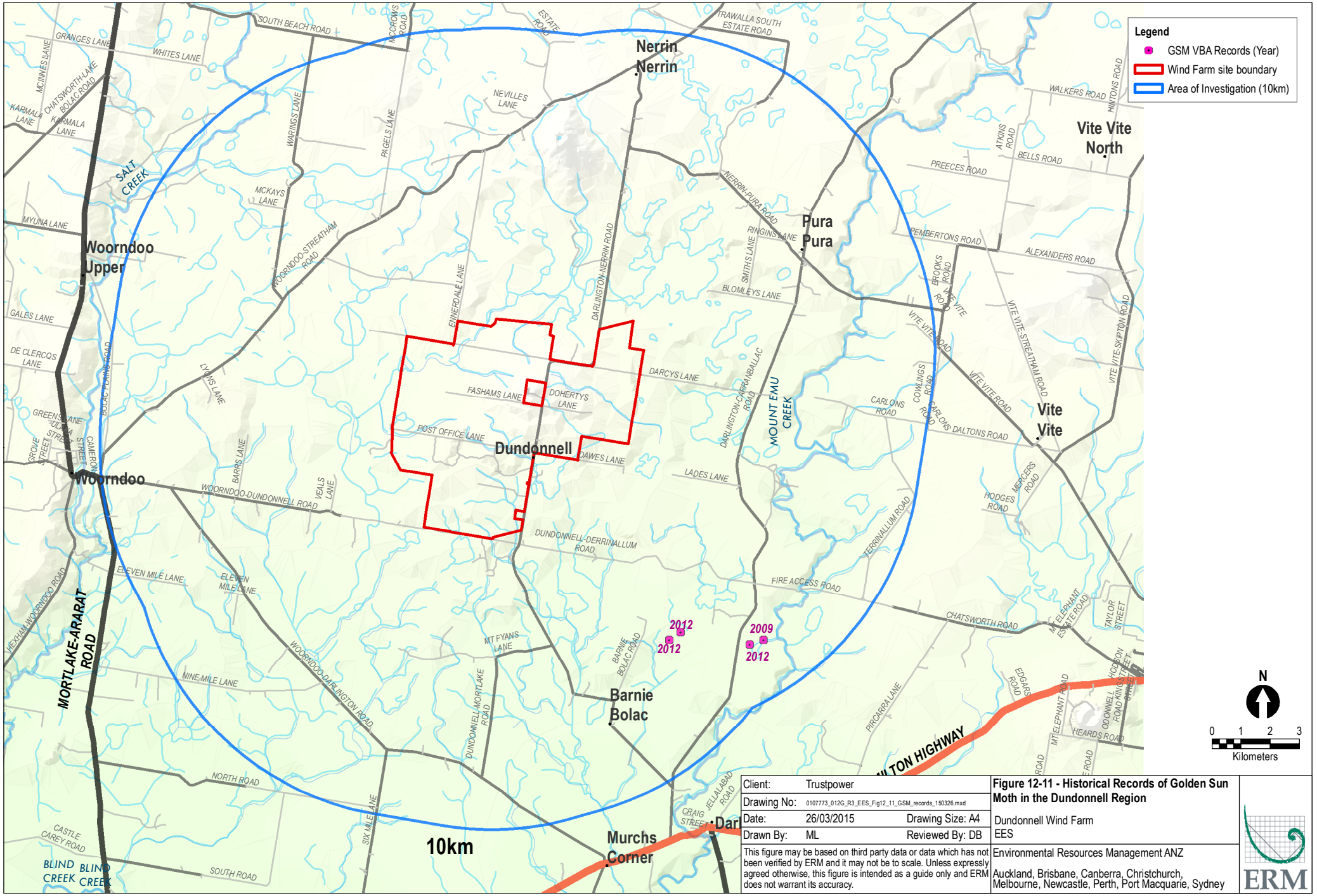
The Golden Sun Moth (*Synemon plana*) is critically endangered under the EPBC Act, threatened under the Victorian FFG Act and critically endangered under the DELWP threatened species advisory list. Five records of Golden Sun Moth have been documented in four sites located approximately 7km south-east of the wind farm site, refer to *Figure 12-11*.

The wind farm site and major access track were surveyed for areas of habitat that have the potential to support the Golden Sun Moth during the detailed vegetation survey undertaken in November 2012 and detailed mapping was undertaken to define suitable habitat where the Golden Sun Moth is likely to occur. The assessment is detailed in *Section 10* of the *Flora and Fauna Assessment* at Volume 2.

Suitable habitat includes native grassland areas with high abundance of Wallaby Grass as well as exotic pastures including Chilean Needlegrass. The majority of the wind farm site comprises improved pasture, including introduced grass species, but no Chilean Needlegrass. A typical Golden Sun Moth habitat (not at Dundonnell) is shown in *Figure 12-13,* in contrast to the exotic grassland found at Dundonnell shown in *Figure 12-14*.

Suitable habitat was only recognised in one discrete section of the wind farm site, a paddock west of Darlington-Nerrin Road in the eastern part of the wind farm site, refer to *Figure 12-12.* Other areas supporting low coverage of wallaby grass were located in areas intermittently inundated by water and were considered unsuitable habitat for the Golden Sun Moth.

Targeted surveys for Golden Sun Moth were not required at the wind farm site, as the only potential habitat identified will be avoided. Therefore, no significant impacts on this species are likely to occur.



Client:	Trustpower		
Drawing No:	0107773_012G_R3_EES_Fig12_11_GSM_records_150326.mxd		
Date:	26/03/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

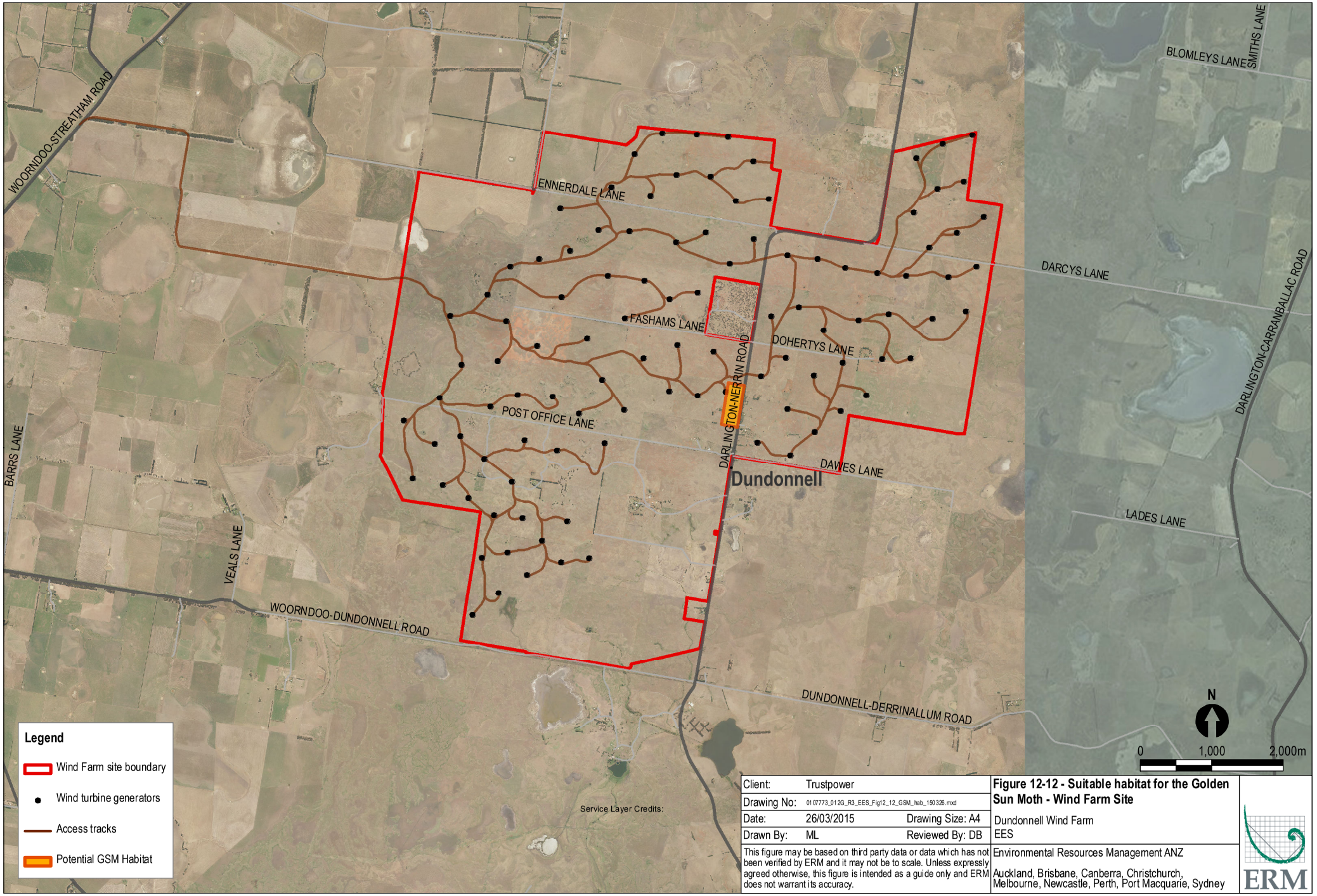
Figure 12-11 - Historical Records of Golden Sun Moth in the Dundonnell Region

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Trustpower		
Drawing No:	0107773_012G_R3_EES_Fig12_12_GSM_hab_150326.mxd		
Date:	26/03/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 12-12 - Suitable habitat for the Golden Sun Moth - Wind Farm Site

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

Figure 12-13 Example of typical Golden Sun Moth habitat (not at Dundonnell)

Source: BL&A, 2015

Figure 12-14 Typical exotic grassland at Dundonnell

Source: BL&A, 2015

12.5.2 Woorndoo-Streatham Road

A flora and fauna assessment of Woorndoo–Streatham Road was commissioned as a precaution to determine if widening of some of the road sections (if required), may potentially impact regional flora and fauna. The area referred to as 'Woorndoo–Streatham Road' within this assessment also includes sections of the Bolac Plains Road and Woorndoo-Ararat Road.

Flora

Background information was sourced from Commonwealth and State databases which list flora that may occur, or had been recorded, within 10km of the proposed road route.

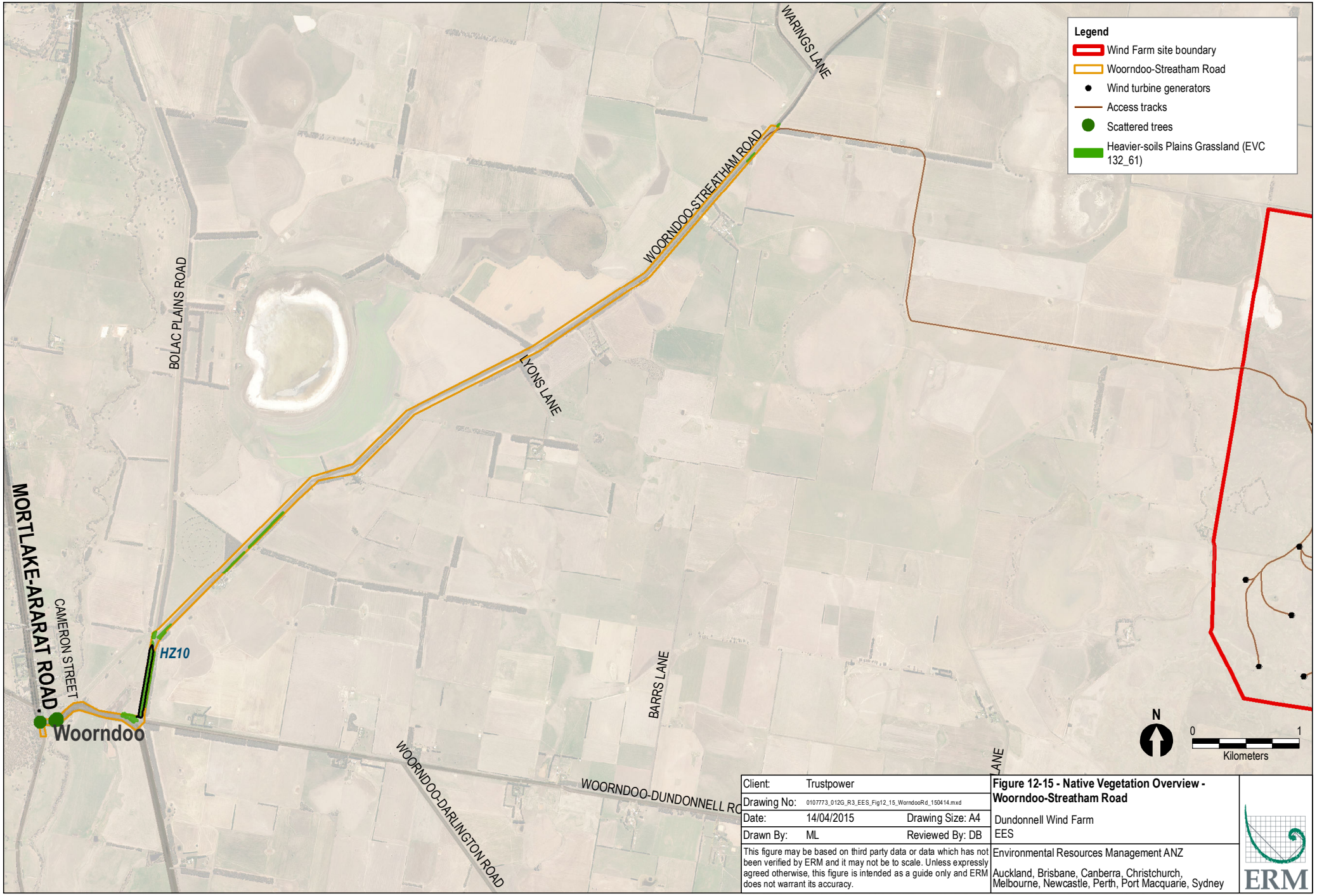
An overview vegetation assessment was undertaken from the 7th to 9th November 2012 and a detailed vegetation assessment from the 9th to 10th August 2013. A habitat hectare assessment was undertaken together with targeted flora surveys in December 2012. These assessments and surveys are detailed in *Section 11* of the *Flora and Fauna Assessment*.

Native Vegetation

Thirteen scattered trees were recorded in the study area. These would have once comprised the canopy component of Plains Grassy woodland (EVC 55). None of these will be removed as a result of the Project.

The Heavier-soils Plains Grassland (EVC 132_61) was present in small scattered remnant patches in the proposed access road area. A total of 11 remnant patches comprising this EVC were identified along the road route, refer to *Figure 12-15.*

No significant impact on these threatened communities is anticipated as no native vegetation is proposed to be removed along the assessed road sections.



Client:	Trustpower		
Drawing No:	0107773_012G_R3_EES_Fig12_15_WorndooRd_150414.mxd		
Date:	14/04/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 12-15 - Native Vegetation Overview - Woorndoo-Streatham Road

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

EPBC Act and FFG act Flora

Targeted surveys for potential threatened flora species were undertaken to assess their occurrence within the road reserves in November 2012, December 2012 and August 2013, which corresponded with the flowering period for the targeted species.

During the targeted surveys eleven patches of Plains Grassland were surveyed within the road reserves of Woorndoo–Streatham Road, Bolac Plains Road and Woorndoo-Ararat Road between Woorndoo and the proposed wind farm site entrance.

Existing data indicated that within the radius of investigation there were records of, or potential suitable habitat for 22 EPBC and/or FFG Act listed flora species. Based on field surveys, suitable habitat was found to occur on-site for 14 EPBC and/or FFG listed flora species. Five of these species were recorded during targeted surveys, all within Habitat Zone 10, within a road reserve west of Bolac Plains Road (refer to Figure 12-15). These are:

- Basalt Sun-Orchid (*Thelymitra gregaria)*;
- Clumping Golden Moths (*Diuris gregaria)*;
- Fragrant Leek-orchid (*Prasophyllum suaveolens)*;
- Small Milkwort (*Comesperma polygaloides*); and
- White Sunray (*Leucochrysum albicans var. tricolor)*.

The proposed access route will not require any vegetation removal from habitat zones and therefore, no EPBC or FFG Act listed flora species will be removed for the proposed wind farm project.

Fauna

EPBC Act and FFG Act Fauna

Habitat within the study area of the road sections were of a medium to low quality for threatened species, except for one area (Habitat Zone 10) at the southern end of Woorndoo-Streatham Road. This section provides good quality native grassland.

No wetlands or potentially wet areas that would provide suitable habitat for threatened frogs or wetland birds were located along the road reserves. Some stands of planted trees line the road sections, but do not provide suitable habitat for any threatened species. Threatened birds and arboreal mammals require higher quality habitat and connectivity to other regional quality habitat and neither of these conditions were met.

The review of background database information indicate that 36 fauna species (22 birds, six mammals, two reptiles, two frogs, three fish and one invertebrate) listed on the EPBC Act and/or FFG Act, occur or potentially occur within the radius of investigation (within 10 km of assessed road section).

The study area potentially supports four EPBC and/or FFG Act listed fauna species. These are:

- Yellow-bellied Sheathtail Bat (*Saccolaimus flaviventris*);
- Southern Bent-wing Bat (*Miniopterus schreibersii bassanii*);
- Striped Legless Lizard (*Delma impar*); and
- Golden Sun Moth (*Synemon plana*).

No native vegetation is proposed to be removed from the road reserves and therefore, no significant impact to EPBC or FFG Act listed species is anticipated as a result of the proposed wind farm.

EPBC Act and FFG Act Listed Ecological Communities

One critically endangered ecological community listed under the EPBC Act occurs in the proposed access road location; Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP). During field investigations, all patches of remnant native vegetation were found to potentially constitute this ecological community.

One ecological community listed as threatened under the FFG Act was identified in the study area; Western (Basalt) Plains Grassland Community. This community was found to exist in all habitat zones of Heavier-soils Plains Grassland (EVC 132_61).

Significant impacts on these threatened communities are not anticipated since no native vegetation is proposed to be removed along the assessed road sections.

12.5.3 Transmission Line Assessment

The proposed 38km transmission line route has been assessed from the wind farm site, to the Mortlake Power Station. Flora and fauna overview assessments of the route were undertaken to determine the potential impacts of the transmission line on regional flora and fauna. The relevant assessments undertaken to date include:

- A desktop review of flora and fauna information along the proposed transmission line route;
- preparation of maps of any threatened species and communities and native vegetation, including identification of EVCs, recorded along the route; and
- an overview field assessment of remnant native vegetation along the corridor, including mapping of scattered trees.

Details of the assessment are contained in *Section 12* of the *Flora and Fauna Assessment* at Volume 2. The detailed design of the transmission line and the final location of the power poles are yet to be determined. As such, targeted surveys for this element of the Project have not yet been undertaken. Further assessments will be undertaken prior to construction, once the locations of poles are determined. These assessments will include:

- Detailed habitat hectare assessments of areas proposed to be impacted by powerpoles and associated infrastructure;
- a fauna field assessment;
- targeted surveys for threatened flora species in areas of suitable habitat proposed to be impacted; and
- targeted surveys for the Striped Legless Lizard and Golden Sun Moth in areas of suitable habitat proposed to be impacted.

These assessments will inform mitigation measures to be implemented, such as the micro-siting of poles and access tracks if required. The final details of the transmission line construction and operational specifications (including footing dimensions and associated works area, span length and operational electrical clearance zones) will take into account the results of these surveys.

The flora and fauna assessments undertaken utilised a conservative layout for the transmission line. The layout was based on the following dimensions of the disturbance footprint considered likely:

- Power pole disturbance area: 100m^2 per pole;
- Power pole location: 200m apart; and
- Access/construction track: 5m wide track underneath the transmission line except in sections with an adjacent road (road reserves).

Flora

Following a background assessment of relevant databases, an overview assessment of the habitats and of the potential presence of threatened species was conducted on the 31 May and 1 June 2012 with a 50m buffer on either side of the transmission line. A further field survey was undertaken on 20 May 2014 increasing the buffer distance to 80m at the southern end of the transmission line, where it would be located next to an existing transmission line to

enable greater flexibility in the final transmission line siting. The proposed transmission line route contained a mixture of indigenous and exotic vegetation, with three categories of indigenous vegetation recorded, as detailed following.

Native Vegetation

Evidence on-site, including floristic composition and soil characteristics, suggested that Plains Grassland (EVC 132), Plains Grassy Wetland (EVC 125), and Stony Knoll Shrubland (EVC 649) were present mostly within the roadside reserves along the proposed transmission line route.

Scattered trees recorded in the study area would have once comprised the canopy component of Plains Grassy Woodland (EVC 55). A total of 83 scattered trees occurred within the transmission line corridor.

The assessment to date of the transmission line, power poles and access tracks indicate that in the worst case a maximum of approximately 5ha of native vegetation will be removed including areas of Plains Grassland, Plains Grassy Wetland and Stony Knoll Shrubland. Fourteen EPBC and/or FFG Act listed flora species have been identified as potentially occurring within areas of indigenous vegetation along the transmission line route. These are Adamson's Blown-grass, Basalt Rustyhood, Basalt Sun-orchid, Button Wrinklewort, Clover Glycine, Clumping Golden Moths, Dense Greenhood, Fragrant Leek-orchid, Hairy Tails, Hoary Sunray, Leprechaun Greenhood, Purple Blown-grass, Small Milkwort and Spiny Rice-flower (EPBC, FFG). Targeted surveys will confirm whether these occur within the proposed impact areas. In addition, 14 scattered trees are likely to be impacted by the proposal, refer to *Figures 12-16, 12-17, 12-18, 12-19 and 12-20.* Any trees to be impacted by the transmission line have been deemed as being removed. Given the majority of the transmission line crosses paddocks, minimal maintenance will be required of vegetation once the transmission line is constructed.

The transmission line assessment concludes that 0.594 biodiversity equivalence units (with a weighted biodiversity equivalence of 0.427) will be lost for remnant patches. Based on the NVIM, a further 0.026 biodiversity equivalence units will be lost for the 14 scattered trees. The current proposal requires a referral to DELWP as it meets the criteria of more than 0.5ha of native vegetation being removed.

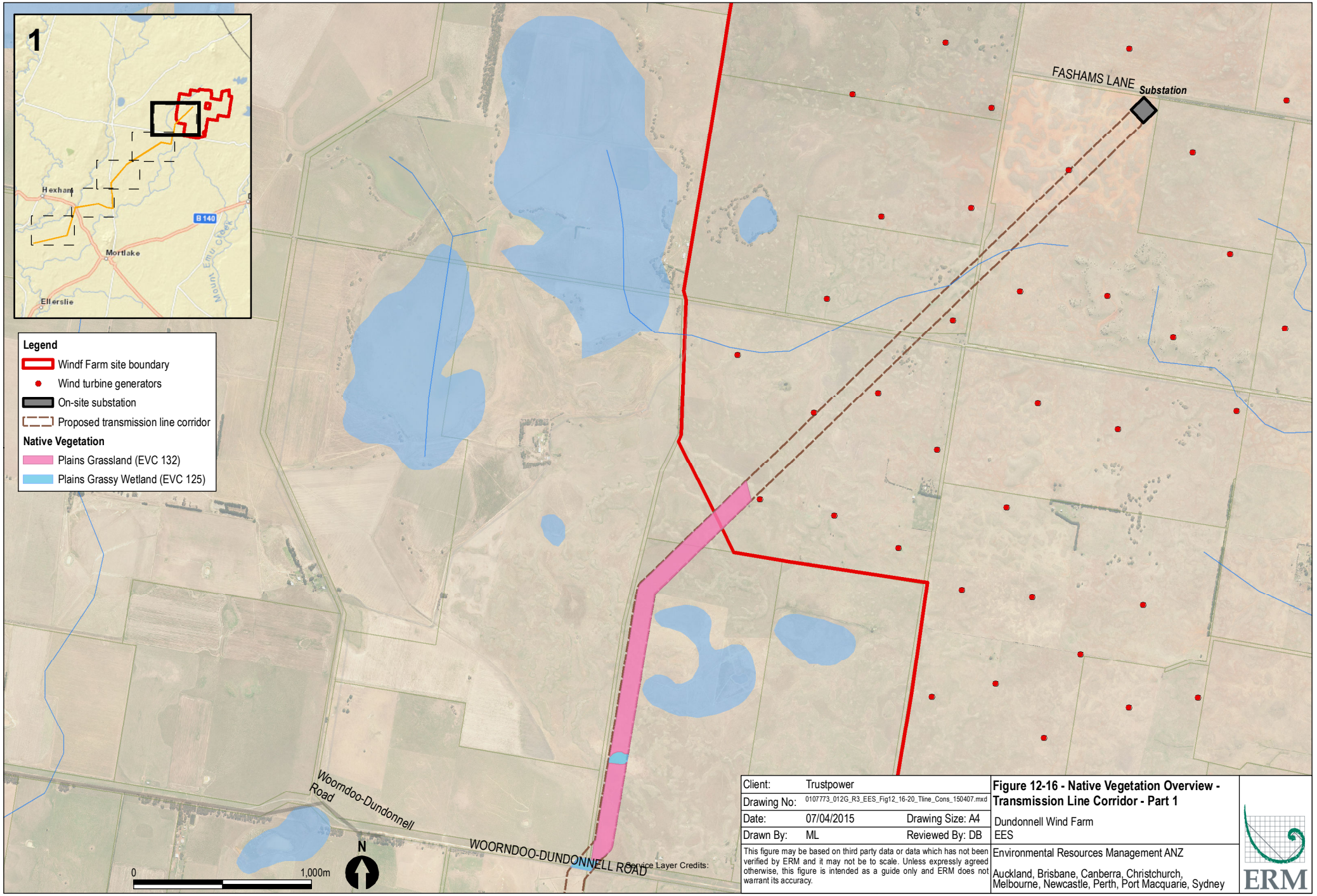
A general offset of 0.933 BEU with a minimum strategic biodiversity score of 0.414 is required as a general offset for the native vegetation and scattered tree removal along the transmission line.

In addition, the following specific offset is required for the removal of habitat for the following threatened flora species:

- 1.571 BEU of habitat for Salt-lake Tussock-grass;
- 1.262 BEU of habitat for Derrinallum Billy-buttons; and
- 1.041 BEU specific units of habitat for Drunken Tussock-grass.

The proposal will be assessed under the high risk assessment pathway in accordance with the *Permitted clearing of native vegetation – Biodiversity assessment guidelines*, as required under the Planning Scheme and subsequent planning permit applications.

As discussed previously, detailed habitat hectare assessments of areas proposed to be impacted by powerpoles and associated infrastructure (e.g. access tracks) will be undertaken prior to construction. These assessments will inform the final layout of the transmission line with the aim to avoid native vegetation and habitat for threatened flora and fauna species, through micro-siting of poles and access tracks, where possible.



Client:	Trustpower		
Drawing No:	0107773_012G_R3_EES_Fig12_16-20_Tline_Cons_150407.mxd		
Date:	07/04/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

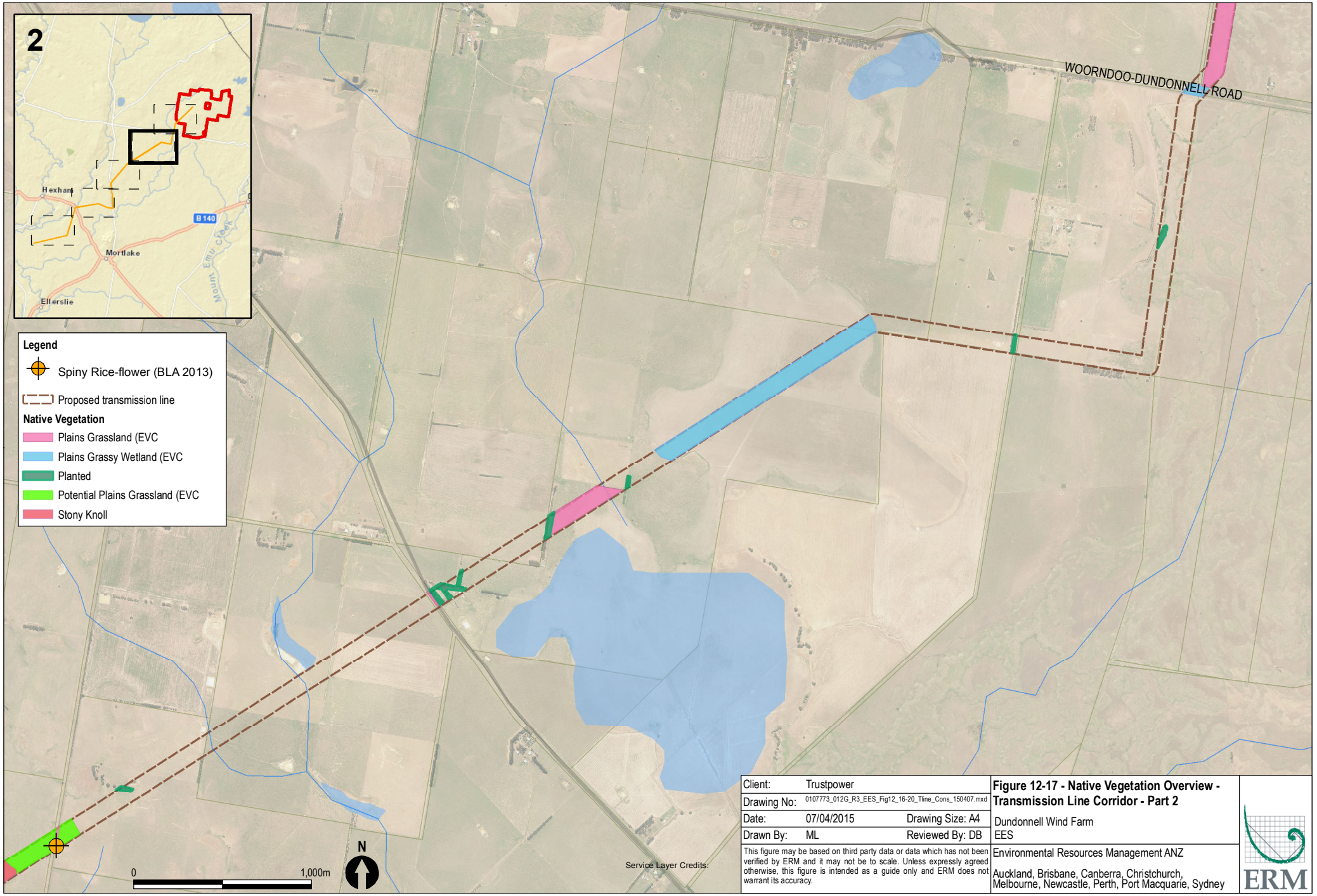
Figure 12-16 - Native Vegetation Overview - Transmission Line Corridor - Part 1

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Trustpower	
Drawing No:	0107773_012G_R3_EES_Fig12_16-20_Tline_Cons_150407.mxd	
Date:	07/04/2015	Drawing Size: A4
Drawn By:	ML	Reviewed By: DB

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

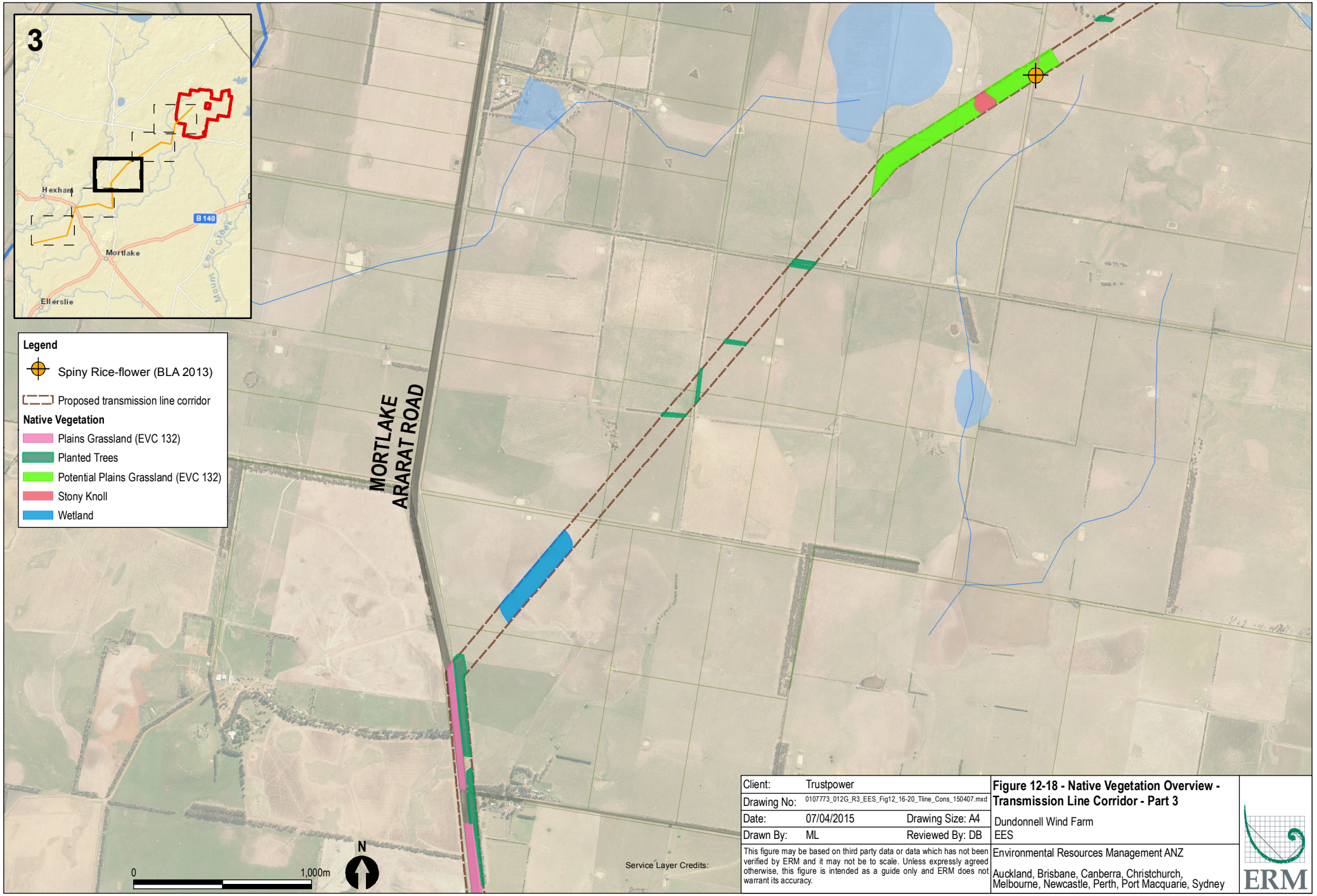
Figure 12-17 - Native Vegetation Overview - Transmission Line Corridor - Part 2

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Trustpower		
Drawing No:	0107773_012G_R3_EES_Fig12_16-20_Tline_Cons_150407.mxd		
Date:	07/04/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

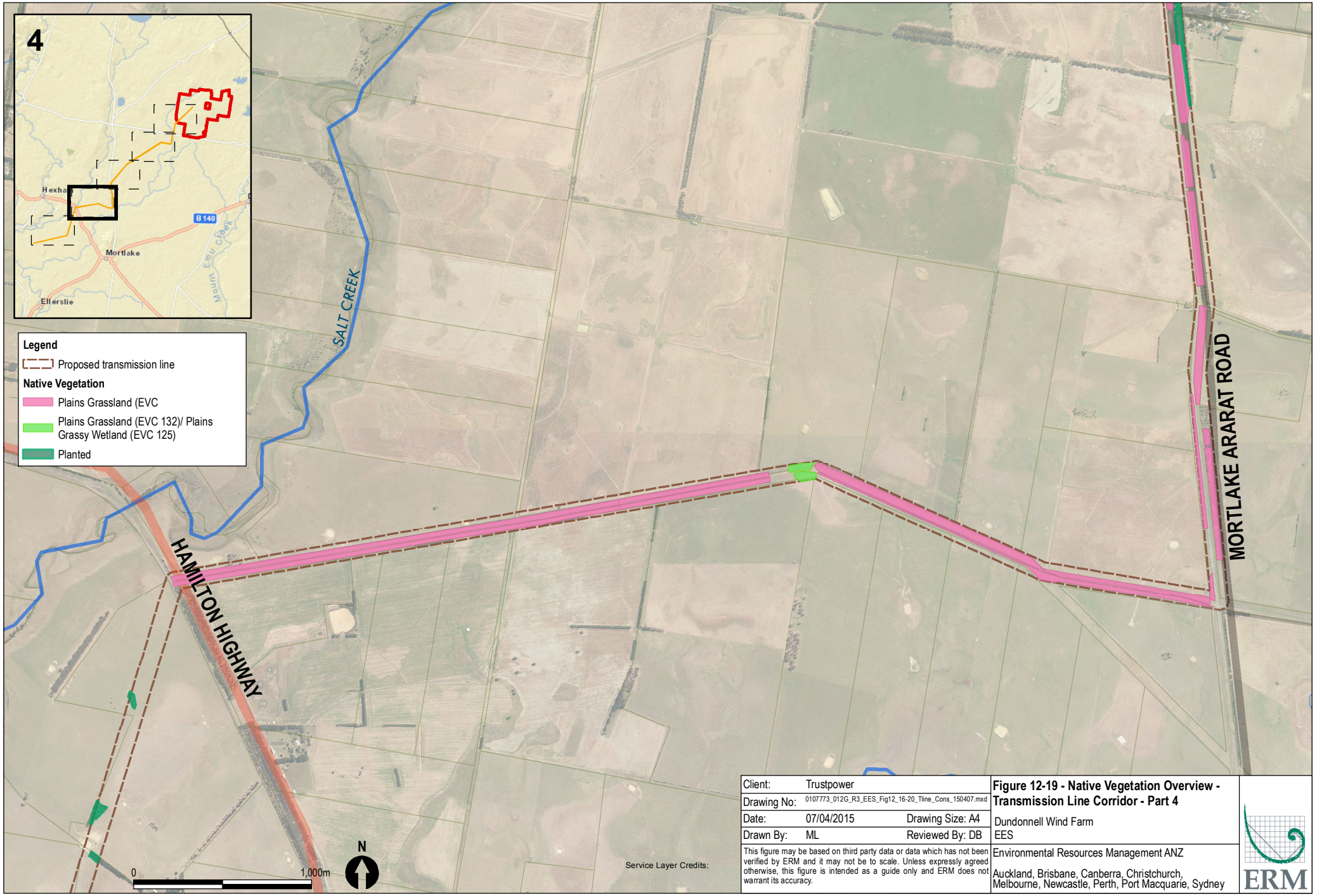
Figure 12-18 - Native Vegetation Overview - Transmission Line Corridor - Part 3

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Trustpower		
Drawing No:	0107773_012G_R3_EES_Fig12_16-20_Tline_Cons_150407.mxd		
Date:	07/04/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

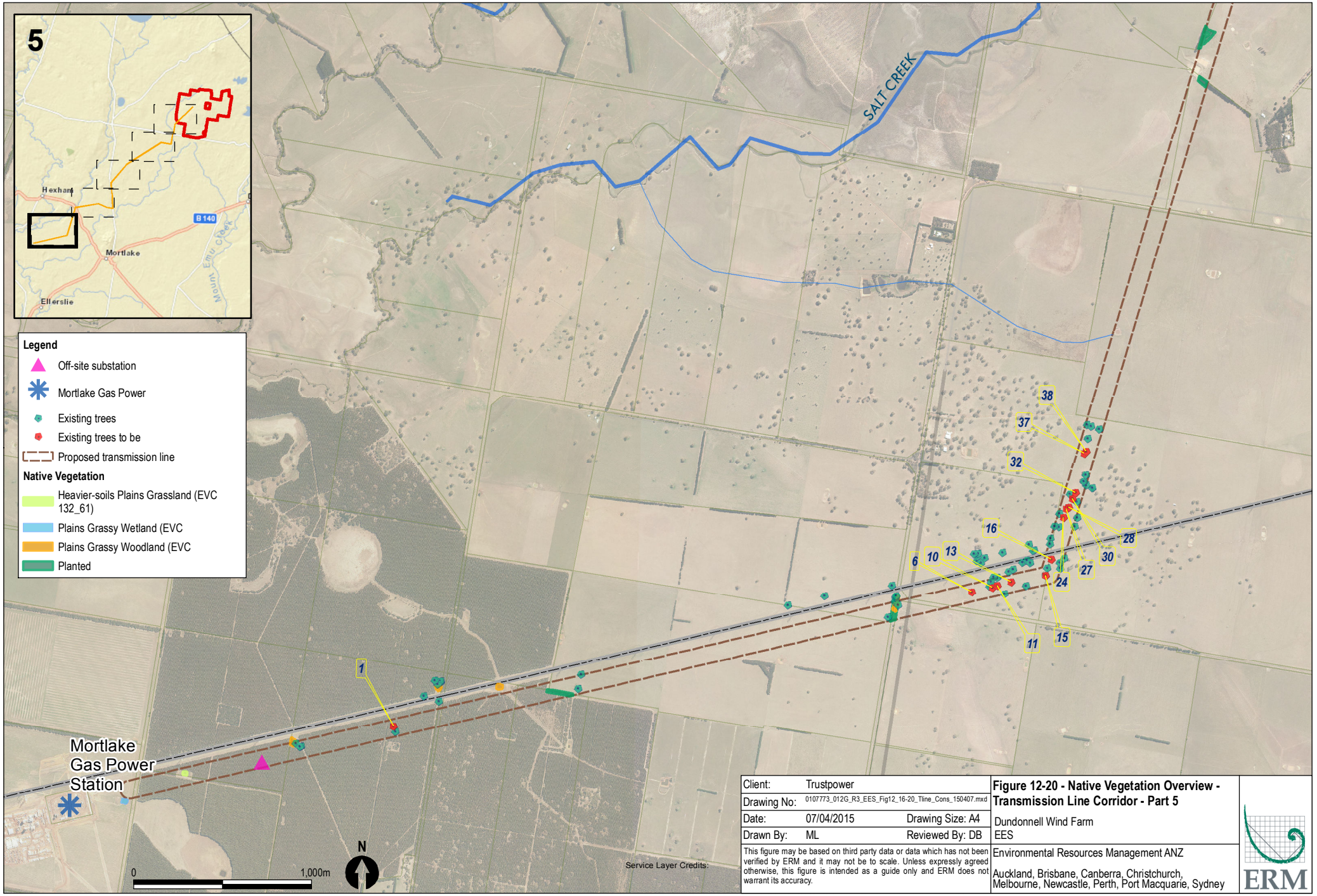
Figure 12-19 - Native Vegetation Overview - Transmission Line Corridor - Part 4

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Trustpower		
Drawing No:	0107773_012G_R3_EES_Fig12_16-20_Tline_Cons_150407.mxd		
Date:	07/04/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 12-20 - Native Vegetation Overview - Transmission Line Corridor - Part 5

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

EPBC Act and FFG Act Listed Ecological Communities

Two critically endangered ecological communities listed under the EPBC Act are highly likely to occur in areas of remnant vegetation within the proposed transmission line route; Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP), and Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (SHWTLP). As detailed in *Chapter 24*, as a 'worst case' scenario, 2.38ha of NTGVVP and 1.12ha of SHWTLP could be impacted by access tracks and power poles. This extent of impact however, is extremely unlikely as the micro-siting of poles and access tracks will be utilised where possible to avoid these areas and ensure impacts are minimised to these communities.

One ecological community listed as threatened under the FFG Act has potential to occur within the transmission line route; Western (Basalt) Plains Grassland Community. Further assessment of this vegetation will be undertaken prior to construction to determine the locations of vegetation meeting the criteria for this community and inform mitigation measures to ensure no undue impact results to the significance of this community.

EPBC Act and FFG Act Flora

Fourteen EPBC Act and 22 FFG Act listed flora species were determined to have potential to occur in remnant vegetation in the transmission line route. Only one species however was recorded during the overview vegetation field assessment. Three individuals of the Spiny Rice-flower (*Pimelea spinescens subsp. Spinescens*) (EPBC Act critically endangered, FFG Act threatened) were incidentally recorded during the assessment.

Once transmission line pole sites are determined, targeted surveys will be undertaken to confirm whether threatened flora species are present within areas impacted by the transmission line infrastructure. These assessments will inform mitigation measures to be implemented, such as the micro-siting of poles and access tracks, if required, to avoid and minimise impact on these species where possible.

Fauna

EPBC Act and FFG Act Fauna

A desktop review of the proposed transmission line corridor was commissioned to determine if the construction of this component of the Project may potentially impact fauna.

A total of 16 EPBC Act listed fauna species were considered potentially to occur in the study area, including ten birds, two mammals, two reptiles, one frog and one invertebrate species.

The majority of threatened birds that have been recorded, or are likely to occur along the transmission line corridor, are waterbirds. Waterbird species have the potential to occur in aquatic habitats in and near the wind farm site, but it is considered unlikely they would occur in significant numbers on a regular basis along the transmission line as individual habitats are limited in extent; many are ephemeral and vary in quality. Consequently, the likely very low number of birds colliding with power lines would not represent a significant impact on the populations of these species.

Overall impacts to the Southern Bent-wing Bat (EPBC Act critically endangered, FFG Act listed) and the Yellow-belied Sheath-tail Bat (FFG Act listed) are considered to be low. The southern part of the transmission line corridor passes through a blue gum plantation and across some wetlands. While bat activity in these areas could be slightly higher, overall impacts are considered to be low given the very low numbers of these species recorded in the dominant habitat along the line route. Therefore the proposed transmission line is not considered likely to have a significant impact on threatened bat species.

Potential impacts on ground-dwelling mammals, lizards and frogs from the proposed development are considered to be minor due to the small size of the development footprint. The study area does not represent key habitat for EPBC

Act or FFG Act species. Potential impacts may occur due to habitat removal for the EPBC Act listed Corangamite Water Skink, Striped Legless Lizard and Golden Sun Moth.

There may be an impact upon the Corangamite Water Skink if any wetlands or parts of these that are removed within the transmission line corridor. The extent of wetland affected however is very limited based on the vegetation mapping undertaken and therefore, impacts are not expected to lead to a significant effect on this species' population. In addition, the spacing between power poles will permit wetland shorelines to be avoided during construction altogether apart from a brief temporary disturbance when the transmission line is laid out prior to tensioning. For these reasons, impacts are not expected to lead to a significant effect on the species' population. It is expected that the current proposal will require a specific offset of 1.587 BEU for Corangamite Water Skink habitat.

The Striped Legless Lizard may occur along the transmission line corridor in remnant Plains Grassland habitat. Therefore, there may be a small impact on this species if the access road or proposed transmission poles remove existing habitat.

The Golden Sun Moth was identified as likely to occur in the 10km radius from the transmission line corridor due to the presence of suitable habitat (Plains Grassland). Since the species may be impacted by small habitat removal, a targeted survey will be undertaken to confirm whether it is present within the transmission line and to detail potential management and mitigation measures (if present).

The targeted surveys will inform mitigation measures to be implemented, such as the micro-siting of poles and access tracks if required. The final details of the transmission line will take into account the results of these surveys in order to minimise impacts to threatened species.

12.6 Impacts and Mitigation Measures

The impacts of the Project on flora and fauna and an initial impact rating are summarised in *Table 12-3*. Mitigation measures and the residual impact rating after environmental mitigation measures are applied are also provided in *Table 12-3*.

Table 12-3 Flora and Fauna Impacts, Mitigation Measures and Residual Impact

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
12-01	Removal of native vegetation - wind farm	Minor	The location of the proposed wind farm and associated infrastructure (WTGs, access tracks, underground cabling, batching plant, temporary site office, quarry pits and substation) has been designed to avoid most of the native vegetation on-site. Offsets will be implemented in accordance with the *Biodiversity Assessment Guidelines*.	Minor
12-02	Removal of native vegetation - transmission line	Moderate/ Major	Once transmission line pole and access track sites are determined, targeted surveys will be undertaken to determine the presence of significant vegetation within areas to be impacted. These surveys will inform mitigation measures to be implemented, such as the micro-siting of poles and access tracks if required. The final details of the transmission line will take into account the results of these surveys in order to minimise impacts. Offsets will be implemented in accordance with the *Biodiversity Assessment Guidelines*.	Minor/ Moderate
12-03	Disturbance during the construction of the wind farm	Moderate	Works will be undertaken in accordance with a Construction Environment Management Plan. This will include, but not be limited to, the following requirements. • All machinery will enter and exit works sites along defined routes, thereby avoiding impact on native vegetation, waterways or cause soil disturbance and weed spread. • All machinery brought on site will be weed and pathogen free and will be checked regularly for mechanical leaks. • All machinery wash down, lay down and personnel rest areas will be defined (fenced) and located in disturbed areas. • The provision of bunding and sedimentation basins at the quarry sites. • Groundwater management and erosion protection measures will be implemented at the quarry sites to minimise changes to the hydrology and ground water quality.	Minor

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
12-04	Impact to birds (waterbirds and migratory, excluding Brolga) in relation to the construction and operation of the wind farm	Moderate	Project activities will be undertaken in accordance with a Bat and Avifauna Management Plan and a Construction Environmental Management Plan. The wetlands within the wind farm site are often dry and generally comprise sub-optimal habitat for waterbirds. With no important wetlands located within the wind farm site, little impact is anticipated in relation to waterbirds. For migratory birds, as collision risk is considered low, only pre-construction and construction phase mitigation measures will be required. These measures include the avoidance of habitat in the siting and layout of the wind farm and the implementation of hygiene measures in relation to the Project as identified. Project activities, including the monitoring and reporting of casualties as part of a salvage protocol will be undertaken in accordance with a Bat and Avifauna Management Plan. Construction phase mitigation measures will be included in an Environmental Management Plan.	Minor
12-05	Impact to bats in relation to the construction and operation of the wind farm	Moderate	Project activities will be undertaken in accordance with a Bat and Avifauna Management Plan and a Construction Environmental Management Plan. A buffer area of 120m will be implemented in relation to the rotor swept area of the WTGs and favoured habitats (woodlands, large hollow trees, isolated paddock trees and water bodies) to reduce flying bats interacting with operating WTGs.	Minor

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
12-06	Impacts to the Striped Legless Lizard and the Fat-tailed Dunnart in relation to the construction and operation of the wind farm	Moderate	Project activities will be undertaken in accordance with a Construction and Operational Environmental Management Plan and a Fauna Management Plan, which will include, but are not limited to, the following requirements: • Native vegetation removal will be avoided and minimised through micro-siting of WTGs and associated structures where possible. • Construction personnel will be trained in the identification of Striped Legless Lizard and Fat-tailed Dunnart. • If species are found, works will stop within a 30m buffer area around the affected area and DELWP will be notified. • A salvage protocol will be implemented on-site and construction and operational personnel will be inducted. Protocol will be included as part of the EMPs. • Translocation protocol will be developed for the Striped Legless Lizard and implemented if located.	Minor
12-07	Impacts to the Growling Grass Frog in relation to the construction and operation of the wind farm	Moderate	Project activities will be undertaken in accordance with a Construction and Operational Environmental Management Plan and a Fauna Management Plan, which will include, but are not limited to, the following requirements: • Hydrological, sedimentation and groundwater and erosion protection measures will be identified and implemented. • Sediment and contamination traps will be implemented to protect areas of habitat during construction. • Implementation of crossings where development intersects with Growling Grass Frog habitats. • No basalt rocks/boulders larger than 20cm in diameter are to be moved from waterway channel or banks. • Hygiene controls (vehicle and footwear) to avoid the introduction of Chytrid fungus on-site. • A minimum 55 metre buffer will be applied to all dams, waterways and minor tributaries to minimise impacts to habitat and on the species during the construction and operation of the wind farm. • Temporary drift fences beside roadways/ access tracks will be installed when in regular use for construction, to minimise the risk of injury to animals caused by traffic. • Any excavations left open overnight will be inspected regularly.	Minor

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
12-08	Impacts to the Corangamite Water Skink in relation to the construction and operation of the wind farm	Moderate	Project activities will be undertaken in accordance with a Construction and Operational Environmental Management Plan and a Fauna Management Plan. Mitigation measures will be consistent with those detailed for the Growling Grass Frog and will include: • Hydrological, sedimentation and groundwater and erosion protection measures. • Implementation of sediment and contamination traps. • Implementation of crossings where development intersects with suitable habitat. • No basalt rocks/boulders larger than 20cm in diameter are to be moved from waterway channel or banks. • Hygiene controls (vehicle and footwear) to avoid the introduction of Chytrid fungus on-site. • A minimum 55 metre buffer applied to all dams, waterways and minor tributaries to minimise impacts to habitat and on the species during the construction and operation of the wind farm. • Temporary drift fences beside roadways/ access tracks will be installed when in regular use for construction, to minimise the risk of injury to animals caused by traffic. • Regular inspection of excavations left open overnight. Further, dry stone walls in close proximity to wetlands and drainage lines will be avoided. If dry stone walls are to be removed within 55m of a wetland a zoologist is to be present to salvage and relocate lizards (if present).	Minor
12-09	Impacts to the Golden Sun Moth in relation to the construction and operation of the wind farm	Moderate	Project activities will be undertaken in accordance with a Construction and Operational Environmental Management Plan and a Fauna Management Plan. The area identified as potentially suitable habitat for the Golden Sun Moth will be retained where possible and excluded from access by both personnel and vehicles during construction and operation. WTGs and associated infrastructure will be micro-sited, if required, to avoid GSM habitat.	Minor

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
12-10	Impacts to listed Flora and Fauna (specifically the Spiny Rice-flower, Striped Legless Lizard, Corangamite Water Skink and Golden Sun Moth) in relation to the construction and operation of the Transmission line	Moderate/ Major	Project activities will be undertaken in accordance with a Construction and Operational Environmental Management Plan and a Vegetation Management Plan. With regards to vegetation, Project activities will be undertaken in accordance with a Vegetation Management Plan, which will include, but not be limited to, the following requirements: • Removal of indigenous remnant patch vegetation will be avoided. • Removal of scattered trees will be avoided. • In areas where removal of indigenous vegetation cannot be avoided, the area to be removed will be minimised. • Where practicable, transmission line works will be sited at least 30m away from wetlands, lakes, creeks and significant drainage lines. Where this is not practicable and ephemeral wetlands may be unavoidably impacted, works will be undertaken when the wetlands are dry and the risk of altering the ground surface is lowest (i.e. when the ground is hard and dry). In relation to fauna, project activities will be undertaken in accordance with a Fauna Management Plan and a Bat and Avifauna Management Plan. Specific mitigation measures will be undertaken in accordance with those outlined in *Impacts 12-06, 12-07, 12-08* and *12-09*. In relation to avifauna and migratory birds, markers will be utilised on the wire to increase visibility if required and where necessary (i.e. if collision 'hot-spots' are identified). Once transmission line pole and access track sites are determined, targeted surveys will be undertaken to confirm whether these species are present within the transmission line. These surveys will inform mitigation measures to be implemented, such as the micro-siting of poles and access tracks if required. The final details of the transmission line will take into account the results of these surveys in order to minimise impacts to flora and fauna.	Minor/ Moderate

12.7 Impact Assessment Conclusions

In assessing the impacts of the Project in relation to flora and fauna, the potential impacts were initially assigned either moderate or moderate to major risk rating.

These risks are associated with the presence, or potential presence, of EPBC Act and FFG Act listed species and native vegetation removal. Potential impacts will be addressed through a combination of avoidance, mitigation and offset measures, as detailed as part of a robust Environmental Management Plan.

The removal of native vegetation will be required in small areas of the wind farm site and along the major site access track. This will be appropriately offset to ensure no net loss results to Victoria's biodiversity. No significant impacts are expected for threatened flora and fauna species at the wind farm site and major site access track. The Project has been designed to minimise both direct and indirect impacts to flora and fauna and mitigation measures will be implemented to ensure no significant impact results to threatened species or communities. It is therefore concluded that the overall residual impact on flora and fauna species as a result of the Project will be minor for the wind farm site.

In relation to the assessed road sections of Woorndoo–Streatham Road, no significant impacts are expected in relation to threatened flora and fauna species, as no native vegetation is proposed to be removed.

In relation to the transmission line, approximately 5ha of native vegetation are estimated to be removed for the construction of the transmission line as a maximum. The overview vegetation assessment estimated in a worst case that 2.38ha of Plains Grassland potentially qualifying as NTGVVP, Golden Sun Moth and Striped Legless Lizard habitat could be removed and 1.12ha of wetland EVCs potentially qualifying SHWTLP. Native vegetation removal will be required, and as above, will be appropriately offset. Further targeted assessments will be undertaken when pole and access track locations are determined to refine and reduce potential impacts in relation to this component of the Project. These assessments will inform the final layout of the transmission line, which will be designed to avoid native vegetation and habitat for threatened flora and fauna species where possible. The targeted surveys will inform mitigation measures to be implemented and will ultimately ensure any impacts to flora and fauna are appropriately managed and reduced to an acceptable level so not to significantly impact threatened species or communities.

A more detailed discussion of potential impacts associated with EPBC Act related flora and fauna matters, including mitigation measures and residual impacts, are discussed in *Chapter 24*.

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 13 - BROLGA

This page is intentionally blank

Contents

Figures

Tables

This page is intentionally blank

13 BROLGA ASSESSMENT

This Chapter describes the potential impacts of the Project on the Victorian Brolga population and the proposed mitigation measures that are designed to ensure that the Project represents a zero net impact on the Brolga population over the life of the Project.

A Brolga Assessment has been undertaken consistent with the requirements of the *Interim Guidelines for the Assessment, Avoidance, Mitigation and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population* (the Brolga Guidelines) (DSE, 2012).

The investigations indicate that the region supports a small number of breeding pairs of Brolga that use a variety of wetland sites. A small proportion occurred within a sensitive distance of the wind farm (3.2km) and was taken into account in defining WTG-free buffers.

Flocking activity in the region was more consistent and involved larger numbers of birds. The investigations were able to document the movements and habitat choices of the Brolga during the investigation period. WTG-free buffers were defined to avoid significant risk to the species from collision and disturbance.

The application of the Brolga Guidelines to inform the layout of the Project provides assurance that the Project will have a zero net impact on the Victorian Brolga population over the 25-year life of the Project. The assessment has reduced the possible impacts of the Project on Brolgas to acceptable and manageable levels as it has:

- resulted in significant reductions in extent and refinements to the layout of the wind farm by the adoption of well-researched WTG-free buffers around all known nearby Brolga breeding and flocking sites;
- provided estimates of residual population impacts through collision risk modelling and population viability assessment; and
- identified a corresponding scale of residual impact compensation, through enhancing the breeding success of the species for the life of the Project that is readily achievable.

13.1 EES Objectives

The EES evaluation objective that is most relevant to the Brolga Assessment is as follows:

Biodiversity - To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, including those listed under the FFG Act or EPBC Act, and address opportunities for offsetting potential losses consistent with relevant policy.

This Chapter is based on the *Brolga Assessment* undertaken by Brett Lane and Associates Pty Ltd (BL&A), dated September 2014 and should be read in conjunction with the *Flora and Fauna Assessment* undertaken by BL&A, dated February 2015. The *Brolga Assessment* has been peer reviewed by Biosis Pty Ltd. These reports are contained at Volume 2. This Chapter and the *Brolga Assessment* address the following EES Scoping Requirements relating specifically to the Brolga:

- identifying the existence or likely existence of the Brolga (*Grus rubicunda*), which is listed as a threatened species under the FFG Act;
- characterising (via relevant databases, literature and appropriate targeted and/or seasonal surveys and modelling, where appropriate) the distribution of the Brolga population that could be affected by the Project;
- describing the loss of, or degradation to, habitat for the Brolga;
- assessing the direct and indirect effects of the Project on the Brolga and its habitats;
- identifying and describing the potential and proposed design and mitigation measures, which could avoid or minimise significant effects on the Brolga;

- describing the cumulative effects on Brolga, from the Project in combination with other wind energy facilities; and
- outlining and evaluating proposed measures or performance requirements, as appropriate, to further mitigate or manage residual effects of the Project on the Brolga and provide an estimation of likely residual effects.

13.2 Study Area

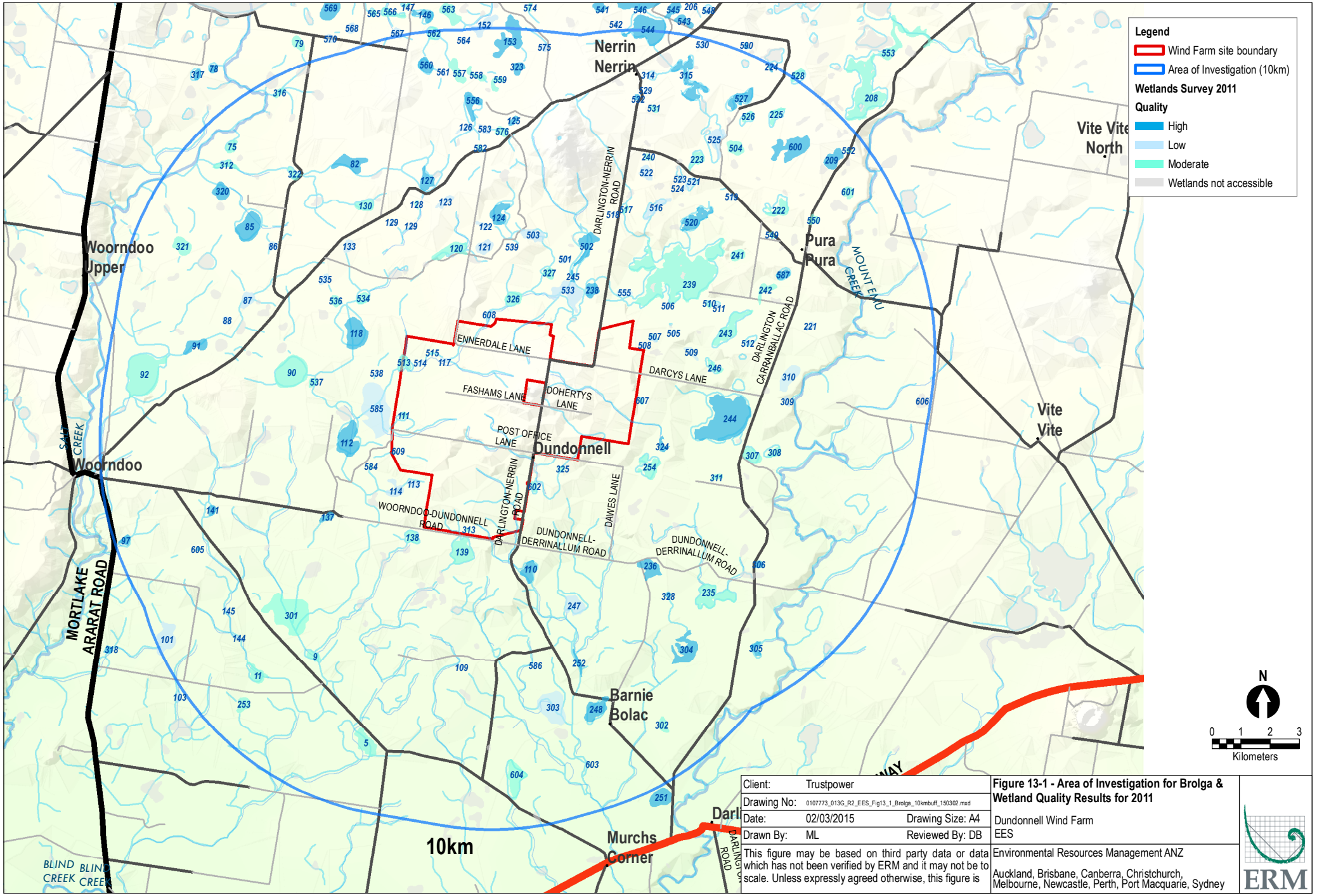
The *Brolga Assessment* study area encompassed the proposed wind farm site and transmission line corridor as well as a 10km zone around these areas referred to as the 'radius of investigation' (RoI), as defined in the *Interim Guidelines for the Assessment, Avoidance, Mitigation and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population* (DSE, 2012) (the Brolga Guidelines). As required by these Guidelines, site-specific investigations of Brolga breeding and flocking behaviour were undertaken for any breeding or flocking events over the four-year study period within 3.2km and 5km respectively of the proposed WTGs. The study area is identified in *Figure 13-1*.

13.3 Assessment Methodology

During over four years of detailed Brolga studies in the area, a combination of accepted methods were used to gather information on the occurrence of the Brolga on and around the proposed wind farm site to a distance of up to 10km. This information covered both breeding and flocking seasons and was combined with historical information from a range of sources, including extensive consultation with local landholders.

The results of the *Brolga Assessment*, combined with extensive historical information, are presented in accordance with the three-step approach prescribed by the Brolga Guidelines. The methodology used for each level of the *Brolga Assessment* can be broadly described as follows:

- Level 1 Assessment - Initial Risk Assessment:
  - desktop review and analysis of historical records of the Brolga in the RoI;
  - specialised analytical support provided by Dr Elizabeth Stark from Symbolix Pty Ltd to assess the likelihood of interaction between local Brolgas and the wind farm site; and
  - initial field inspection and local community consultation.
- Level 2 Assessment - Impact Assessment:
  - comprehensive field assessment of the location, nature and extent of Brolga habitats and Brolga behaviour within the RoI comprising targeted surveys over the period of 2009 to 2014, with more intensive investigations being initiated in 2011.
- Level 3 Assessment - Design, Mitigation and Offset:
  - four step approach to identifying suitable mitigation measures to achieve a zero net impact on the Victorian Brolga population;
    1. avoiding or mitigating potential impacts through the identification of WTG-free buffers around Brolga breeding and flocking sites;
    2. developing collision risk modelling (CRM) to quantify residual impacts and risks;
    3. applying the Victorian Brolga population viability assessment (PVA) model to identify population-wide consequences of residual impacts; and
    4. definition of compensation and offset options to cancel out residual impacts and ensure a zero net impact outcome for the 25-year life of the project, as required by the Brolga Guidelines.



Client:	Trustpower		
Drawing No:	0107773_013G_R2_EES_Fig13_1_Brolga_10kmbuff_150302.mxd		
Date:	02/03/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is

Figure 13-1 - Area of Investigation for Brolga & Wetland Quality Results for 2011

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

13.4 Legislation and Policy

The relevant legislation and government policies for the Brolga are shown in *Table 13-1*. The key documentation relied upon in the preparation of the *Brolga Assessment* is the *Interim Guidelines for the Assessment, Avoidance, Mitigation and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population* (DSE, 2012).

Table 13-1 Relevant Brolga Legislation and Policies

Legislation / Policy	Description
State	
Flora and Fauna Guarantee Act 1988	The FFG Act is designed to protect flora and fauna by requiring a license to remove listed threatened species or communities or protected flora from public land (e.g. road reserves). The license must be obtained from the DELWP. The Brolga (*Grus rubicunda*) is listed as a threatened species under the FFG Act.
Wildlife Act 1975	The Wildlife Act defines certain wildlife and 'protected wildlife' and its purposes are: *'To establish procedures in order to promote the protection and conservation of wildlife; and* • the prevention of taxa of wildlife from being extinct; and • the prevention of taxa of wildlife from being extinct; and • the sustainable use of and access to wild life; and • to prohibit and regulate the conduct of persons engaged in activities concerning or in relation to wildlife'. A permit may be needed pursuant to the Wildlife Act if the removal or relocation of native fauna species is required.
Interim Guidelines for the Assessment, Avoidance, Mitigation and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population (DSE, 2012)	The objectives of the Brolga Guidelines are to ensure that each wind farm development has a zero net impact on the size of the Victorian Brolga population. The Brolga Guidelines are designed to inform a three-step approach to assessing, avoiding, mitigating and offsetting impacts from wind farm developments in Victoria. The three steps as detailed in the Brolga Guidelines are presented below. 1. *'To the extent that is practicable, design the wind farm including all infrastructure to avoid and mitigate potential effects consistent with these guidelines;* 2. *estimate any remaining and unavoidable risk using tools such as collision risk modelling (CRM) and population viability analysis, to ascertain likely effects on the population.* 3. *determine appropriate compensatory measures to, at a minimum, completely offset unavoidable effects.' (DSE, 2012)*
Policy and planning guidelines for development of wind energy facilities in Victoria (DPCD, 2012)	The Wind Energy Guidelines are for responsible authorities, proponents and the community to provide guidance about wind farms and inform planning decisions about wind energy facility proposals. The Guidelines set out information requirements for wind energy developments, including the preparation of a Bat and Avifauna Management Plan and require an assessment of the impact of a proposal on any species listed under the EPBC Act and the FFG Act.

Legislation / Policy	Description
Local	
Moyne Planning Scheme	The Moyne Planning Scheme is implemented via the P&E Act. Clause 12.01 'Biodiversity' requires the protection and conservation of Victoria's biodiversity, including important habitat for Victoria's flora and fauna. Clause 21.06 'Environment' of the Municipal Strategic Statement (MSS) seeks, among other objectives, to maintain the municipalities' biodiversity by protecting and enhancing the habitat of rare and threatened species. Clause 22.02 'Environment' reiterates the objectives of the MSS and seeks to maintain and enhance the habitat, particularly the critical habitat, of Victorian Rare and Threatened Flora and Fauna species. Clause 52.32 of the Planning Scheme sets out the matters to be considered prior to the determination of an application for a wind energy facility, which includes the consideration of the Wind Energy Guidelines.

13.5 Existing Conditions

13.5.1 Brolga Activity and Land Use/Type

Landholder questionnaire surveys were used to compile historical data and determine if there was a general spatial use pattern across the RoI and the wind farm site, and whether Brolga activity correlated with historic and current land use patterns.

Brolgas were noted by landholders more frequently in aquatic/wetland or arable (cultivated) areas than on stony ground. In addition, infrequent or no Brolga use was consistently reported from stony land used for grazing. This pattern is consistent with the historic data showing that Brolgas prefer aquatic/wetland habitat. Drier, stony areas, which form the majority of the proposed wind farm site, are not preferred Brolga habitat.

13.5.2 Wind Farm Site

Breeding Sites

The historical databases, landholder records and observations undertaken prior to 2009, when the investigations by BL&A commenced, indicated that 39 wetlands have been used by Brolgas for breeding within the RoI. Three of these wetlands are unlikely to be used in the future due to permanent draining.

During the Level 2 Assessment, eight additional breeding sites were located. This increased the total number of known breeding sites within the RoI to 47. Ten breeding sites are located within 3km of the proposed transmission line corridor. In addition, five breeding sites within 3.2km of the wind farm (wetlands 118, 137, 254, 533 and 602) were used for breeding during the investigation period, two of which continued for a full breeding season and were completed successfully with young chicks raised. The historical and recent Brolga breeding sites within the RoI for the wind farm site are identified in *Figure 13-2.*

The number of active nests at breeding sites within the RoI is likely to vary between years depending on the condition of wetlands, within both the RoI and elsewhere. Although numerous pairs attempted to build nests and incubate, it was observed over the duration of investigations that no more than five pairs laid eggs and undertook incubation at any one time within the RoI. No breeding sites have historically been recorded within the proposed wind farm WTG layout.

One successful breeding attempt within 3.2km of the wind farm site was monitored in detail, in wetland 602. The flight path mapping undertaken by BL&A provided information on the extent of movements of breeding birds when present, however the short duration of most (unsuccessful) breeding attempts limited the amount of site-specific data that could be collected. The five breeding sites surveyed between 2011 and 2013 (for over 150 hours) indicated that less than 20 flights away from these wetlands were recorded during the investigations.

During investigations, no more than two breeding pairs of Brolga were found at any time using breeding sites within 3.2km of the proposed wind farm. In addition, the frequency of breeding reported by landholders in the wind farm site indicated that the proposed wind farm site is not used by nesting Brolgas and no breeding was reported within the wind farm boundary.

Flocking Season Surveys

The desktop review and landholder information obtained during the Level 1 Assessment and the fieldwork undertaken as part of the Level 2 Assessment indicated that 20 traditional flocking sites were located within or near the RoI. In addition, historical one-off flocking events occurred at an additional 24 wetland sites. Flocks have also been observed at a further eight non-wetland sites, either once or more regularly, however overnight roosting by these birds did not occur and they would return to a traditional flocking wetland site to roost for the night. There is one unconfirmed traditional flocking site from the 1980s and early 1990s located within 3km of the transmission line (wetland 301).

Flocking season surveys were undertaken each year from 2011 to 2014 and the results of these surveys are summarised below:

- The RoI was found to support two distinct flocking areas (eastern and western) during the 2011 survey, with behaviour consistent with both traditional and one-off flocking activities. Birds from the western flocking site used habitats situated immediately west of the wind farm site, whilst birds from the eastern flocking site used habitat around 3.3km from the wind farm site. At any one time, the total surveyed numbers at all nearby flocking sites ranged between 10 and 52 individual Brolgas, while the most frequently sighted number of individuals was 29.
- During the 2012 flocking season, two flocking events (northern and southern) were observed. The northern flock comprised a maximum number of 47 adults and was found over 6km from the wind farm site. The lack of frequent or prolonged records during the flocking season, and the lack of historical flocking records at these wetlands indicated that this was most likely a one-off flocking event. The southern flock of 32 birds consistently used wetlands between 4km and 7km from the nearest WTG.
- Detailed observations of flocking Brolgas were undertaken during the 2013 season (April to August), with the flock concentrated in and around Lake Sheepwash (wetland 110), approximately 2.9km to the south-east of the nearest WTG. A maximum of 46 birds were observed.
- During the March 2014 survey, a flock of 12 Brolgas was observed roosting to the south-east of the wind farm site at wetland 139 (located along Woorndoo-Dundonnell Road). The birds were feeding on grain trails (stock feed) near wetlands 313 and 602, to the south-east and east of the current wind farm layout, and for a period within the proposed wind farm layout on grain put out as stock feed. Grain feeding of stock in this area will cease once wind farm construction commences.

Utilisation Survey

Brolga utilisation surveys were undertaken during the 2012 and 2013 flocking seasons to characterise Brolga activity across the project area during periods of higher Brolga numbers in the RoI. The purpose of these surveys was to generate movement rate information for input to the collision risk model, as discussed in more detail later in this Chapter.

A total of 17 Brolga observations were made during the 2012 utilisation survey, with 14 occurring during the 40 hours of formal counts. Over 10 of these sightings were observed in arable (cropping) land. The sightings involved birds that were neither breeding nor flocking and flight observations were generally distributed in the north-west corner of the wind farm site. This area comprises arable land near Chinaman's Swamp and forms part of a WTG-free buffer area.

During the 2013 survey, 11 Brolga observations were recorded during the 40 hours of formal counts, with six comprising flight observations. Over half of Brolga observations were observed in arable land and the remainder of observations were in stony outcrops, on a spring or in unknown habitat. The majority of flight observations were distributed in the southern section of the RoI, mostly in arable land or in a spring fed drainage line.

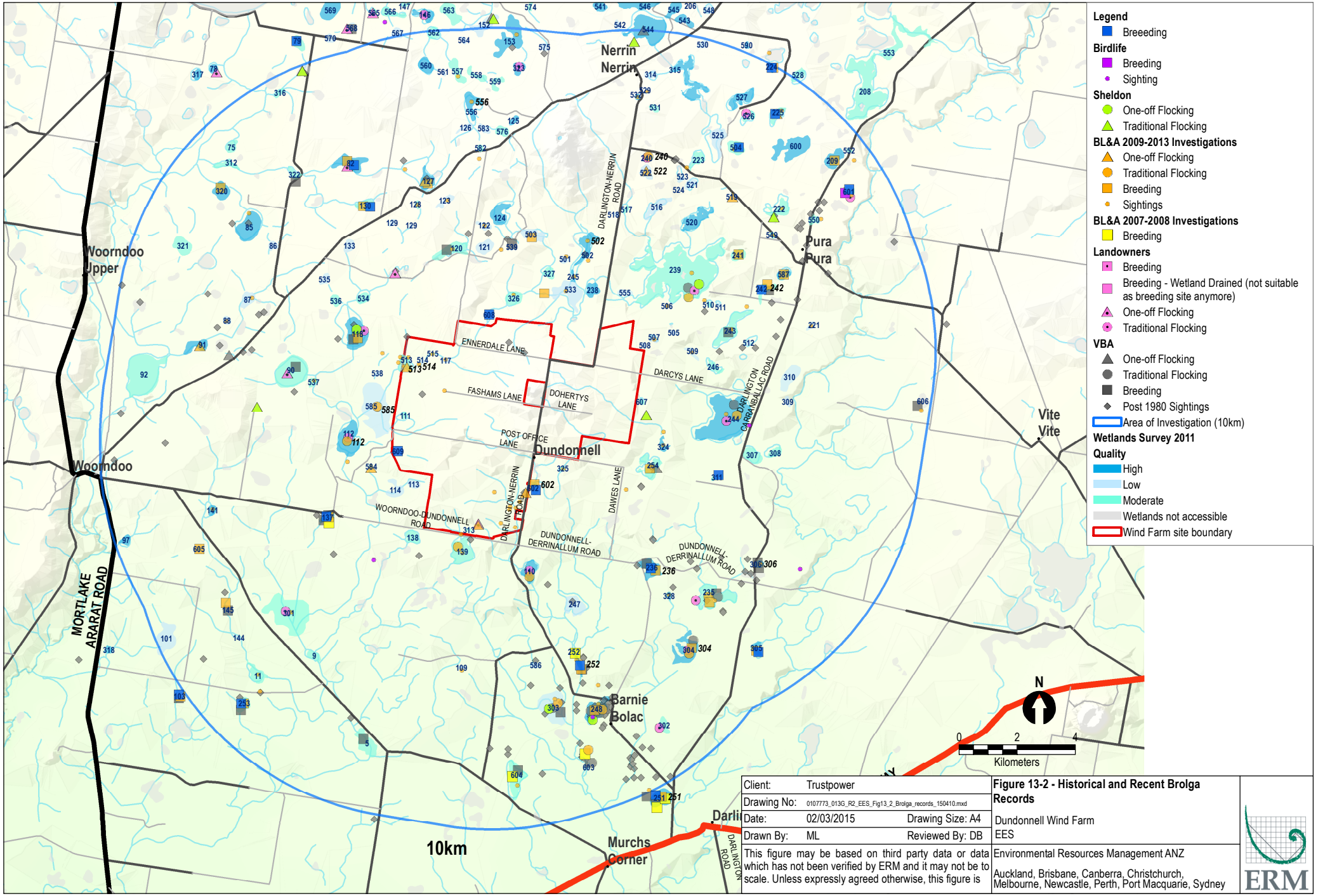
13.5.3 Transmission Line

The *Victorian Biodiversity Atlas*, *Birds Australia Atlas*, BL&A records and landowner records contain a number of Brolga occurrences along the proposed transmission line route between the wind farm site and MOPS.

The majority of the historical records are situated in close proximity to the northern section of the transmission line corridor. This includes breeding sites along Nine Mile Lane, Veals Lane, and other ephemeral wetlands within the RoI. Breeding sites near the southern end of the transmission line corridor towards the MOPS exist at Mortlake Common and along Connewarren Lane. The locations of the records within 10km of the transmission line corridor are shown in *Figure 13-3*.

Historical flocking records exist along Darlington-Nerrin Road, Lake Sheepwash, Chinaman's Swamp and around Lake Barnie Bolac. One reported traditional flocking site is located along Woorndoo-Darlington Road (wetland 301), within 1km of the transmission line corridor. The landowner in this location reported flocks of 30 to 50 Brolgas in the late 1980s and early 1990s. It is not known if the birds roosted in this wetland overnight, so it is designated as a potential traditional flocking site and has been treated as such for the assessment. A second traditional flocking site was located at Chinaman's Swamp (wetland 118), within 5km of the transmission line corridor. The remaining seven traditional flocking sites are located between 5km and 10km from the transmission line corridor.

An additional breeding season survey (within 3.2km of the alignment) along that portion of the transmission line located further than 10km from the wind farm site (and therefore not covered in earlier work) was conducted during the 2014 breeding season and the results will be available for the forthcoming Inquiry.



Client:	Trustpower		
Drawing No:	0107773_013G_R2_EES_Fig13_2_Brolga_records_150410.mxd		
Date:	02/03/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is

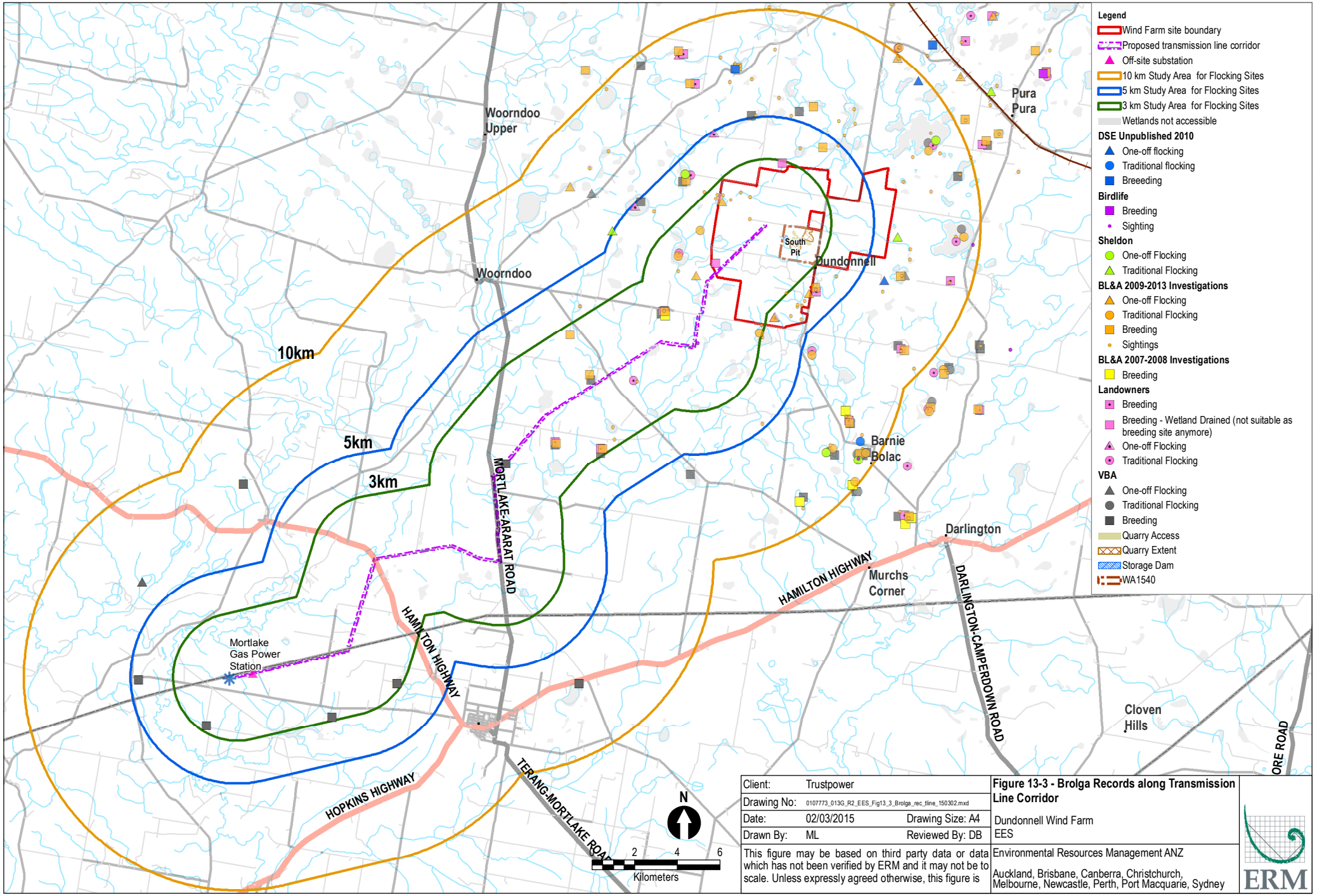
Figure 13-2 - Historical and Recent Brolga Records

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Trustpower		**Figure 13-3 - Brolga Records along Transmission Line Corridor**
Drawing No:	0107773_013G_R2_EES_Fig13_3_Brolga_rec_tline_150302.mxd		
Date:	02/03/2015	Drawing Size: A4	Dundonnell Wind Farm
Drawn By:	ML	Reviewed By: DB	EES

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

13.6 Assessment of Impacts

The information gathered from historical databases, landholder information and detailed breeding and flocking season surveys over a four-year period provide a comprehensive and robust set of data to inform the assessment of potential Project impacts, the development of mitigation measures and the assessment of residual impacts and associated compensation and offset measures. The information is sufficient to inform the application of the Brolga Guidelines and to achieve an outcome for the project that results in a zero net impact on the Victorian Brolga population over the Project life.

The Level 3 Assessment involved four steps, described below, to identify suitable mitigation and compensation measures for the Project to achieve this end.

Step 1: Avoidance and Minimisation of Impacts

The principal means of avoiding and mitigating impacts of wind farms on Brolgas is the establishment of WTG-free buffers. WTGs have been excluded from the buffers, which have been defined by combining breeding and flocking site home range buffers and an additional 300m disturbance buffer, consistent with the Brolga Guidelines.

Breeding site home range buffers have been defined based on predicted habitat use around all known breeding sites within 3.2km of the wind farm layout. The limited Brolga breeding activity within 3.2km of the wind farm site limited the number of observations of Brolga movements around active nests at breeding sites. A habitat-modelling approach was therefore adopted based on observations of the movements of Brolgas around breeding sites in the past.

The validity of the modelling approach was tested on the flight path mapping of breeding Brolgas at the proposed wind farm site and by comparison with detailed home range mapping results at the Penshurst Wind Farm. This indicated that WTG-free buffers based on the habitat modelling approach would be effective in avoiding *"any significant reduction in breeding success"* as required by the Brolga Guidelines for the protection of breeding sites from wind farm impacts.

Suitable flocking site home range buffers were established for this Project in a manner that avoids disrupting Brolgas moving from flocking sites to surrounding foraging habitats, and indirect effects on them, such as disturbance. WTG-free buffers for flocking sites have been identified based on the site-specific field observations of Brolga behaviour while using flocking sites together with information on distribution and habitat choice from historical databases and from landholder information. The buffers for flocking sites were defined by:

- excluding development from any area where flocking Brolgas were observed foraging, except where it was clearly and directly related to an on-site land use (i.e. grain feeding of stock) that can be avoided in the future;
- excluding any area where regular flights by flocking Brolgas were observed, except where it was clearly and directly related to an on-site land use which can be avoided in the future;
- excluding any area where the land type was wetland or arable, and where there had been previous sightings of Brolgas; and
- the associated 300m disturbance buffer to these areas as required in the Brolga Guidelines.

The WTG-free buffers based on the home range buffers for the Brolga breeding and flocking sites within 3.2km and 5km respectively of the wind farm site are shown in *Figure 13-4*.

Step 2: Collision Risk Model

A collision risk model (CRM) was established to estimate the residual number of Brolga movements, which have the potential to interact with the proposed WTGs and transmission line and estimate the annual collision risk. A detailed description of the CRM model adopted by BL&A is provided in the *Brolga Assessment* at Volume 2.

The CRM established by BL&A predicts that the proposed wind farm layout will result in a long term, annual average collision rate of between 0.09 and 0.91 Brolga with WTGs and 0.04 Brolga with the proposed transmission line. An avoidance rate of 98% is considered to represent the rate most likely to occur in nature based on current literature, however a conservative rate of 95% was considered as has been used in the past to inform other wind farm developments in Victoria. Adopting the 95% avoidance rate, on average, the proposed wind farm would result in one bird being lost from the Victorian Brolga population every two years.

Step 3: Population Viability Assessment

The Population Viability Assessment (PVA) is a widely accepted modelling method that attempts to predict the trajectory of the population of a plant or animal and calculates the quasi-extinction probability. The Victorian Brolga PVA, prepared by Melbourne University for DEPI (now DELWP), models population scenarios given impacts on Brolga survival rates from wind farm development (using CRM results) and to set targets for compensation measures to ensure zero net impact on the Victorian Brolga population over the 25-year life of the Project. A detailed description of the PVA for the Project is provided in the *Brolga Assessment* at Volume 2.

Based on an expected minimum population of 809 birds (the expected population without the impacts of the Project), the PVA predicts that after 25 years, the population size will be between 808 (99% avoidance rate) and 795 birds (90% avoidance rate), a reduction of between one and 13 birds compared with baseline conditions. The predicted result for 95% avoidance rate, which is considered the most realistic conservative collision rate, is a population size of 805 birds, representing a reduction of four birds in the population.

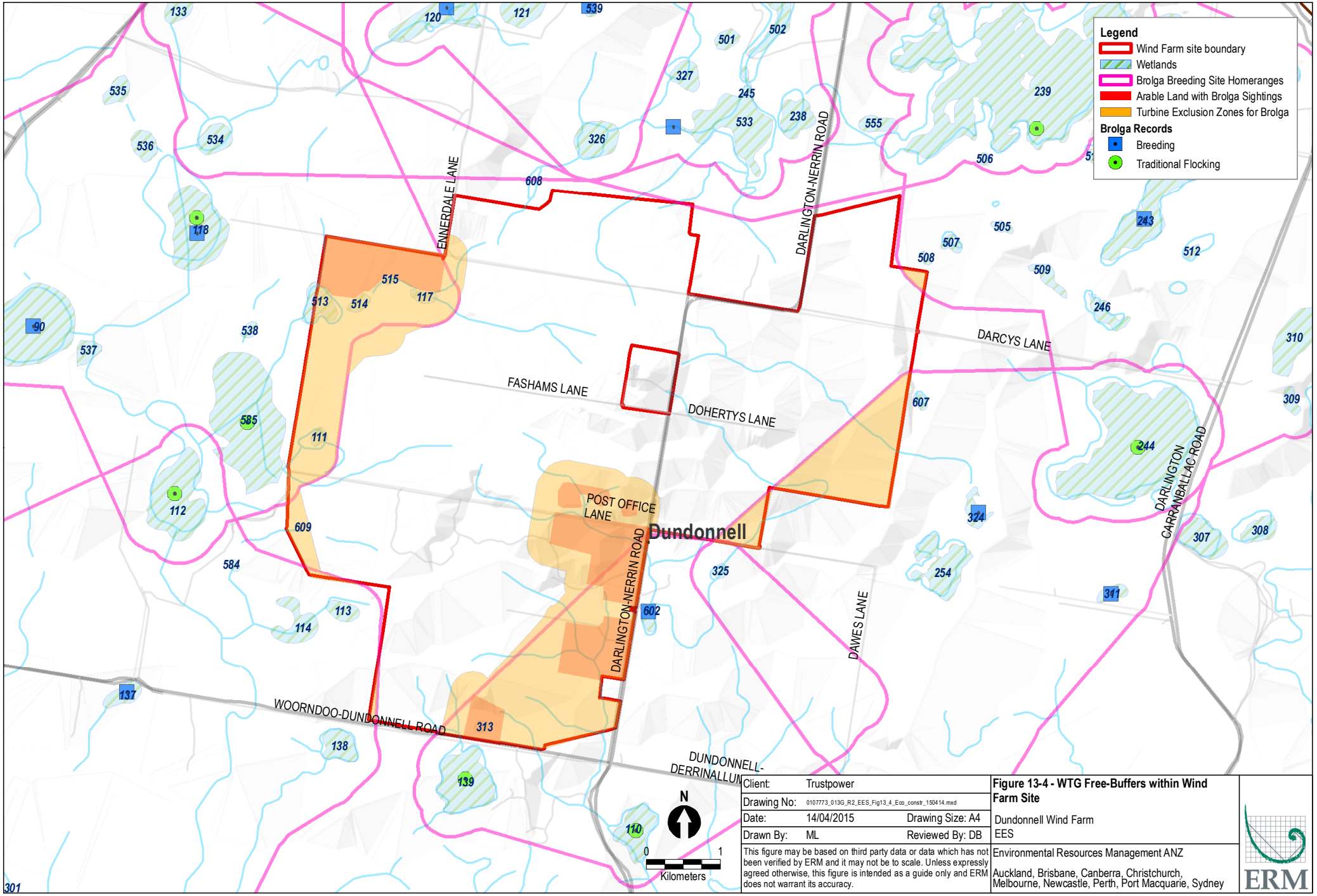
Step 4: Compensation and Offset Strategies

As required by the Brolga Guidelines, the Victorian Brolga population predicted by the PVA must be 'fully offset' to ensure a zero net impact. Applying this to the Project, mitigating the estimated loss would require an extra 13 birds being raised to adulthood over the 25-year period, thereby preventing the net decline of four birds. The difference is due to both natural and wind farm related mortality over the 25-year project life among these 13 birds.

Managing Brolga breeding sites to boost the production of young, thereby adding more birds to the State's population is considered feasible for the Project as it has been achieved before and it has occurred naturally during wetter years when breeding habitat quality and availability has improved. Given that not all breeding sites produce young every year, a number of breeding sites will have to be managed to meet the required target. Trustpower has committed to implementing, for the life of the Project, a program of Brolga breeding site enhancement and management to boost the production of fledged young to the extent required, for example excluding suitable wetlands from grazing and restoration of their natural flooding regimes, in cooperation with willing private landowners.

In addition, consideration has been given to marking of the transmission line to improve visibility to birds and reduce mortality from collisions. While marking transmission lines to reduce mortality has proven effective for other species of Cranes, the effect of collisions on Brolga has not been quantified across its range in Victoria. Relevant modelling to date suggests that the scale of line marking required to compensate for wind farm impacts is unlikely to be practicable, except where there might be particular Brolga flocking 'hot-spots'. No such areas have yet been identified along the proposed transmission line, however marking will be utilised if required, and where necessary if these 'hot-spots' are identified in future.

Mitigation and compensation measures to offset the potential impacts of the Project on Brolga are outlined in *Table 13-2*.



Client:	Trustpower		
Drawing No:	0107773_013G_R2_EES_Fig13_4_Eco_constr_150414.mxd		
Date:	14/04/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 13-4 - WTG Free-Buffers within Wind Farm Site

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

13.6.1 Cumulative Impacts

The Brolga Guidelines state that there is a requirement to avoid cumulative impacts of the wind farm industry on the Victorian Brolga population. The objective of the Brolga Guidelines is to manage each wind farm development to achieve a zero net impact on the Brolga population and hence, avoid cumulative impacts of multiple wind farms operating independently within the Brolga range in Victoria.

The cumulative effects of wind farms may impact on Brolga as follows:

1. direct effects, such as collision with WTGs;
2. indirect effects, such as displacement of disturbance resulting in decreased habitat use; and
3. barrier effects, where WTGs may create barriers to seasonal or local flights.

Having regard to the eight proposed and operating wind farms within approximately 50km of the Project, it is possible that the wind farms could cumulatively lead to an increased risk of collision as an individual Brolga ranges across the area including these wind farms. As each of the wind farms has been assessed for their impacts on the Brolga in different ways, it is not possible to combine quantitative estimates of Brolga impacts and arrive at a definitive number of Brolgas affected.

The Project is the first Victorian wind farm to be assessed under the new Brolga Guidelines and therefore, it has been possible to apply the required approach and achieve a zero net impact on the Victorian Brolga population as a consequence of the following:

- the adoption of well-researched WTG-free buffers to mitigate impacts;
- rigorous estimates of population impacts through CRM and PVA; and
- commitment by Trustpower to a scale of impact offset that compensates the estimated residual effects of the wind farm through enhanced breeding success of the Brolga for the duration of the Project.

Having regard to the above, the Project is not expected to lead to a significant incremental contribution to the cumulative impact of wind farms on the Victorian Brolga population.

13.7 Impacts and Mitigation Measures

The impacts of the Project on the Brolga, and an initial impact rating are summarised in *Table 13-2*. Mitigation measures and the residual impact rating after environmental mitigation measures have been applied are also provided in *Table 13-2*.

Table 13-2 Brolga Impacts, Mitigation Measures and Residual Impact

Impact Number	Impact	Impact rating	Mitigation Measures	Residual Impact Rating
13-01	Disturbance to breeding and flocking birds from construction and operation of the proposed wind farm	Minor/ Moderate	The wind farm layout has been adjusted based on the identification of WTG-free buffers that incorporate historical breeding and flocking records and estimate areas of activity around breeding and flocking sites, together with a 300m disturbance buffer. The location of the WTG-free buffers within the wind farm site is shown in *Figure 13-4*. This measure will avoid any potential for significant impacts from disturbance on nearby breeding and flocking Brolgas. Project activities will be undertaken in accordance with a Bat and Avifauna Management Plan. The following measures to protect or improve breeding sites as compensation for residual Brolgas impacts will be implemented: • restoration of the natural flooding regime of wetlands by closing drains; • increasing inundation frequency of breeding wetlands through artificial flooding; • creating new potential breeding habitat by damming or modifying existing wetlands or dams, including blocking previously installed drains; • management of wetland vegetation condition through controlled grazing (or stock removal) to improve suitability as a breeding site; • addition of nesting material to potential breeding wetlands to facilitate nest building; and • Fox control at key breeding habitats. These measures will be detailed in a compensation plan for zero net impact to be implemented over the 25-year duration of the Project, which will outline the following: • the locations of historical Brolga breeding wetlands that will be enhanced; • evidence of landholder agreements to participate in the breeding site enhancement project for its duration; • methods of enhancement appropriate to each site such as restoration of the natural flooding regime and controlled grazing or stock removal; • where appropriate, a program of appropriate fox baiting leading up to each	Minor

Impact Number	Impact	Impact rating	Mitigation Measures	Residual Impact Rating
			breeding season in areas subject to the plan; and • five-yearly performance targets for each site and the program as a whole, consistent with the outcomes of the PVA and the zero net impact objective (to be amended every five years depending on outcomes); monitoring and reporting requirements, including reporting on whether the number of sites being managed and the way management is proceeding are to meet the 25-year zero net impact objective.	
13-02	Collision by breeding and flocking birds with WTGs and transmission lines, leading to a significant reduction in breeding success and/or the survivorship of Brolgas while using the flocking site	Minor/ Moderate	The wind farm layout has been adjusted based on the identification of WTG-free buffers that incorporate historical breeding and flocking records and estimate areas of activity around breeding and flocking sites, together with a 300m disturbance buffer. The location of the WTG-free buffers within the wind farm site is shown in *Figure 13-4*. This measure will avoid any potential for significant impacts from WTG collision involving birds from nearby breeding and flocking sites. Markers will be utilised if, and where necessary (e.g. if collision 'hot-spots are identified), on the transmission line to increase visibility of the line.	Minor

13.8 Impact Assessment Conclusions

An assessment of the potential impacts of the Project on Brolga was undertaken consistent with the three levels of assessment prescribed in the Brolga Guidelines. The application of the Brolga Guidelines to inform the layout of the wind farm, measure residual impacts on the species and guide compensation measures provides assurance that the Project will have a zero net impact on the Victorian Brolga population. The assessment has reduced the possible impacts of the Project on Brolgas to acceptable levels through significant reductions and refinement of the wind farm layout, adoption of WTG-free buffers, rigorous estimates of population impacts and a commitment by Trustpower to residual impact compensation, such as enhancing the breeding success of the species for the life of the Project.

It is therefore concluded that the overall residual impact on the Victorian Brolga population as a result of the construction and operation of the Project would be minor.

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 14- NOISE AND VIBRATION

This page is intentionally blank

Contents

Figures

Tables

This page is intentionally blank

14 NOISE AND VIBRATION

This Chapter provides a summary of the noise assessment undertaken for the Project, including consideration of potential noise impacts on nearby residential properties. Measures to manage these impacts and achieve compliance with the relevant noise criteria are also provided.

A *Noise Impact Assessment* has been undertaken which considers construction and operational noise impacts of the Project and details impacts on nearby participating and non-participating residential properties.

The construction and operation of a wind farm involves the introduction of a number of new noise sources that includes:

- construction (and associated traffic) noise; and
- operational noise, including the WTGs and ancillary power transmission infrastructure.

The impact of the noise depends on the sensitivity of the surrounding land uses, existing background noise levels, topography and wind speed and direction.

The assessment of construction noise and operational ancillary power transmission infrastructure was based on guidelines routinely used for similar sources associated with other types of developments.

Environmental noise policies, including the standard for wind farm noise, establish objective noise criteria to address potential health considerations. In particular, environmental noise policies define criteria which are chosen to prevent direct physiological risks of sound, and minimise as far as practically possible adverse health considerations such as annoyance and sleep disturbance.

The assessment concludes that the Project has been predicted to comply with the relevant noise standard and criteria for both the construction and operational phases. On this basis, adverse impacts on the amenity of the surrounding area by way of noise and vibration can be acceptably managed.

14.1 EES Objectives

The EES evaluation objective relevant to noise is:

Amenity – To avoid or minimise adverse noise, visual and other amenity effects on nearby residents and local communities, to the extent practicable.

This Chapter is based on the *Dundonnell Wind Farm - EES Noise Impact Assessment* undertaken by Marshall Day Acoustics Pty Ltd (MDA), dated August, 2014, contained in Volume 2. This Chapter and the *Noise Impact Assessment* address the EES Scoping Requirements by:

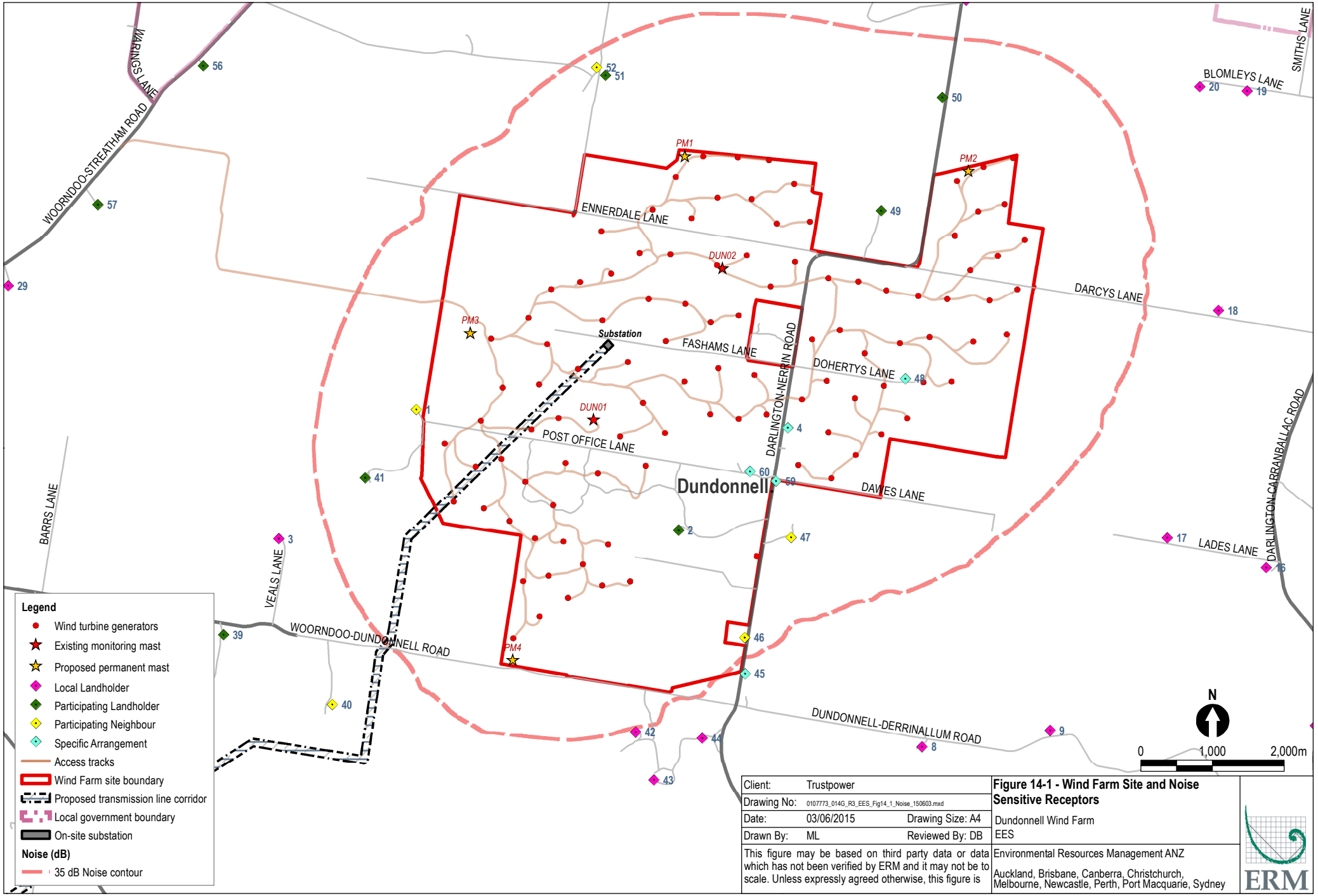
- identifying sensitive receptors that may be subject to the amenity effects related to noise from the Project including, but not limited to, all dwellings within 2km of the WTGs;
- identifying all relevant noise sources associated with the construction and operational phases of the Project;
- outlining predicted noise levels from the Project at nearby sensitive receptors (including traffic noise and vibration during construction);
- characterising existing background noise conditions in the area;
- presenting predicted noise levels for the construction and operation of the Project in the context of existing background noise conditions at sensitive receptors;

- outlining and evaluating mitigation measures (construction equipment, staging and scheduling of works to minimise construction noise and vibration effects on sensitive receptors, including traffic and the proposed on-site quarry;
- demonstrating the proposed wind farm layout and WTG configuration can achieve compliance with relevant standards, based on a candidate WTG with noise emissions that are representative of the size and power of the WTGs proposed for the site; and
- outlining and evaluating measures to monitor noise and vibration levels and ensure compliance with standards, where necessary.

14.2 Study Area

Sensitive receptors for the *Noise Impact Assessment* included all residential dwellings surrounding the wind farm site, which may be owned by landholders involved in the Project (participating landholders), landholders not involved in the Project (local landholders) and landholders who have given consent for WTGs to be located within 2km of their dwelling (participating neighbours).

Trustpower conducted a review of these locations within 5km of proposed wind farm site and identified a total of 26 residential locations within the study area for the assessment. The wind farm site and surrounding sensitive receptors are identified in *Figure 14-1*.



Client:	Trustpower		
Drawing No:	0107773_014G_R3_EES_Fig14_1_Noise_150603.mxd		
Date:	03/06/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is

Figure 14-1 - Wind Farm Site and Noise Sensitive Receptors

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

14.3 Assessment Methodology

The *Noise Impact Assessment* for the Project was undertaken in accordance with the NZS 6808:2010, as required by the Wind Energy Guidelines.

The methodology for the *Noise Impact Assessment* included:

- a preliminary noise model of the Project to identify all residential dwellings where existing conditions needed to be established. Specifically, the preliminary noise model was used to predict the level of noise that could be produced by the proposed operational wind farm. These predicted levels were then used to identify any 'noise sensitive locations' where existing background noise levels may be required as part of the assessment of compliance;
- existing conditions were then established at the locations required for an assessment in accordance with NZS 6808:2010. To do this, a survey was conducted between 25 January and 27 February 2013 to measure the existing background noise levels. In recognition of the particular characteristics of wind farms, the background conditions were assessed to determine how they change under different wind conditions. In order to account for the quiet periods that commonly occur in rural environments, the measurement of existing conditions involved a range of processes to capture and evaluate the quietest periods;
- noise limits for construction and operation of the Project were defined, taking account of existing conditions in the area, and the applicable standards and guidelines;
- appropriate noise criteria was established in accordance with the relevant noise standards and criteria for operational and construction noise (refer to *Section 14.4*) and taking into account with the existing noise levels;
- predicted operational and construction noise levels were compared against the Project-specific noise criteria to determine any exceedances;
- appropriate mitigation measures to manage potential noise and vibration impacts associated with the construction phase of the Project were established; and
- measures to monitor and manage noise associated with the operational phase of the Project were established to ensure compliance with NZS 6808:2010 carries through into the design, operation and commissioning of the Project.

All noise levels in this Chapter are expressed as decibels (dB) which is the standard unit used to describe sound levels). Unless stated otherwise, all levels are "A-Weighted", which follows the average human hearing response and enables comparison of the intensity of noise with different frequency characteristics.

14.4 Legislation and Policy

As mentioned previously, each new noise source associated with the construction or operation of the Project is assessed in accordance with the relevant noise guidelines and criteria having regard to their unique characteristics.

As required by the Victorian Government's Wind Energy Guidelines, the assessment of operational wind farm noise was undertaken in accordance with NZS 6808:2010. To enable an assessment of properties that are financial beneficiaries of the Project and are not addressed by the standard, additional guidance has been sourced from the ETSU-R-97.

Construction noise and ancillary power transmission infrastructure is based on the noise guidelines routinely used for similar sources associated with other types of developments.

These Guidelines seek to establish a 'balance' between amenity impacts as a result of noise and the ability to develop infrastructure, such as wind farms.

The relevant legislation and government policies for noise are shown in *Table 14-1*. The relevant noise guidelines established for the operational and construction phases of the Project are summarised at *Section 14.5* and *Section 14.6* respectively.

Table 14-1 Relevant Noise Legislation and Policies

Legislation / Policy	Description
State	
Policy and planning guidelines for development of wind energy facilities in Victoria (DELWP, 2015)	The Wind Energy Guidelines are for responsible authorities, proponents and the community to provide guidance about wind farms and inform planning decisions about wind energy facility proposals. The Guidelines set out information requirements for wind energy developments, including noise related matters. The Wind Energy Guidelines require an assessment of the noise impact of the proposal prepared in accordance with the *New Zealand Standard (NZS) 6806:2010, Acoustics – Wind Farm Noise.*
Planning and Environment Act 1987	All Victorian municipalities are subject to land use planning controls governed by the P&E Act. The purpose of the Act is to establish a framework for planning the use, development and protection of land in Victoria in the present and long-term interests of all Victorians.
Mineral Resources (Sustainable Development Act) 1990	The MRSD Act encourages extractive industries which *'make the best use of, and extract the value* from*, resources in a way that is compatible with the economic, social and environmental objectives of the State.'* The MRSD Act is of particular relevance to the proposed quarry within the wind farm site, which requires the approval of a work plan and work authority.
Local	
***Moyne Planning* Scheme**	The Moyne Planning Scheme is implemented via the P&E Act. Clause 13.04-1 'Noise Abatement' aims to control noise effects on sensitive land uses through a range of design and land use separation techniques. In addition, Clause 52.32 of the Planning Scheme sets out the matters to be considered prior to the determination of an application for a wind energy facility, which includes consideration of the Wind Energy Guidelines.

14.5 Operational Noise Guidelines

14.5.1 New Zealand Standard 6808:2010, Acoustics – Wind Farm Noise

NZS 6808:2010 aims to achieve an appropriate balance in terms of establishing clear noise criteria for the protection of amenity of neighbouring residences, whilst permitting the development of new wind farm infrastructure. The Standard outlines the methodology for the prediction, measurement and assessment of sound from wind farms in order to provide reasonable protection of health and amenity at noise sensitive locations.

NZS 6808:2010 requires that the noise assessment be undertaken at all noise sensitive locations in the vicinity of a proposed wind farm. Noise sensitive locations are defined by NZS 6808:2010 as *'the location of a noise sensitive activity, associated with a habitable space or education space in a building not on the wind farm site.'* These locations therefore include residential dwellings, schools and hotels located outside the wind farm site.

NZS 6808:2010 was prepared to provide methods of assessment in the statutory context of New Zealand. Specifically, the Standard notes that in the context of the New Zealand *Resource Management Act 1991*, application of the standard will provide reasonable protection of health and amenity at noise sensitive locations.

This is an important point of context, as the *New Zealand Resource Act 1991* states:

(3) (a) (ii): A consent authority must not, when considering an application, have regard to any effect on a person who has given written approval to the application.

Having regard to the statutory context, noise predictions are normally prepared for receptor locations that are either within the wind farm boundary, or where the occupants have entered into a noise agreement with the Trustpower. However, the noise limits specified in NZS 6808:2010 are not applied to these locations given their participation with the Project. Separate consideration is given to alternative guidance values for these locations, having regard to participating land owners both within and outside the wind farm boundary, and participating neighbours outside the wind farm boundary.

Noise Limit

NZS 6808:2010 states that the noise level from a WTG at a noise sensitive location should not exceed the background noise level by more than 5dB or a base limit of 40dB, whichever is greater. This approach means that the wind farm noise must remain within a limited margin above background conditions, except in instances where the WTG noise is predicted to be sufficiently low.

It should be noted that compliance with the NZS 6808:2010 criteria may result in noise from the WTGs being audible at some locations for some of the time.

High Amenity Areas

NZS 6808:2010 also provides details for high amenity noise limits and states that wind farm noise levels during evening and night-time periods should not exceed the background noise level by more than 5dB or a level of 35dB, whichever is greater. High amenity noise limits are not applicable during the daytime period.

Special Audible Characteristics

The Standard also establishes requirements to control the character of the noise associated with the wind farm. This is an important feature of the Standard which accounts for the potential for increased noise impacts when special characteristics are present. These special audible characteristics include tonality (distinct frequencies of sound), impulsive sounds (distinct and very sudden increases in sound) and amplitude modulation (distinct and rhythmic rises and falls in sound).

NZS 6808:2010 requires that wind farms be designed with no special audible characteristics at nearby residential properties. While the Standard emphasises assessment of special audible characteristics during the post-construction measurement phase of a project, an assessment of tonality can be carried our pre-construction, using tonality audibility results that are commonly provided by manufacturers.

In addition to the special audible characteristics considered by the NZS 6808:2010, the Standard notes the following concerning the very lowest frequencies of sound:

'Although wind turbines may produce some sound at (ultrasound and infrasound) frequencies considered to be outside the normal range of human hearing these components will be well below the threshold of human perception'.

Notwithstanding the above, further consideration of low frequency noise and infrasound from the WTGs is included as part of the *Noise Impact Assessment* as required by the EES Scoping Requirements.

14.5.2 The European Working Group on Noise from Wind Turbines (ETSU-R-97)

ETSU-R-97 is the term applied to a UK report that outlines the recommendations of the *Working Group on Noise from Wind Turbines*. This report forms the basis of the policies used to regulate noise from wind farms throughout the UK.

The report describes a framework for the measurement of wind farm noise and further gives indicative noise levels recommended for those that are financial beneficiaries of wind farm projects. In lieu of specific advice within NZS 6808:2010 with respect to participating landholders, the ETSU-R-97 baseline limit of 45dB has been adopted for the assessment of these properties.

14.5.3 EPA Publication 1411: Noise from Industry in Regional Victoria

EPA Publication 1411: Noise From Industry in Regional Victoria (NIRV) provides recommended maximum noise levels for industry in regional Victoria. These Guidelines are relevant for noise generated from ancillary infrastructure, such as the on-site and off-site substations.

As the substations are proposed to operate 24 hours a day, seven days a week, compliance with the NIRV night noise limit of 34dB would allow compliance during all other time periods.

14.6 Construction Noise Guidelines

14.6.1 EPA Publication 1254: Noise Control Guidelines

EPA Publication 1254: Noise Control Guidelines (NCG) provides a schedule of working hours and noise limits for construction sites. These are broken up into normal working hours, weekend/evening work hours and the night period. This guideline makes an allowance for unavoidable construction works that need to occur at night, provided that residents are notified of the intended work, its duration and times of occurrence and provides mitigation measures that need to be considered.

14.6.2 Construction Vibration Guidelines

There is no standard or regulation that specifies criteria for the control of construction vibration levels in Victoria. In this instance, consideration has been given to the NSW *Vibration: A Technical Guideline* (NSW Vibration Guidelines), which presents preferred and maximum vibration criteria for use in assessing human response to vibration (Department of Environment and Conservation NSW, 2006).

14.6.3 Construction Traffic Noise Guidelines

There is no Victorian guidance document in relation to the assessment of construction traffic noise levels on public roads. In this instance, the *NSW Road Noise Policy* (RNP 2011) was used to assess the significance of changes in traffic volumes associated with construction (NSW Government Environment, Climate Change and Water, 2011). The road traffic threshold for existing residences affected by additional traffic on local roads is 55dB during the daytime period (7am-10pm), and 50dB during the night-time (10pm-7am).

14.6.4 Airblast Criteria

The EES Scoping Requirements specifically require that airblast from the quarry operations be assessed. Guidance for assessing the environmental effects of blasting in Victoria are provided in *Environmental guidelines – Ground Vibration and Airblast Limits for Blasting in Mines and Quarries*, prepared by DSDBI (now DEDJTR) (the DEDJTR Guidelines). Additional guidance is provided by *Australian Standard 2187-2:2006 Explosives—Storage, transport and use, Part 2: Use of explosives* (AS 2187-2:2006), although it is noted that the reference criteria presented in AS 2187-2:2006 are less stringent than the DEDJTR Guidelines.

The DEDJTR Guidelines recommend that airblast should not exceed 133dB for 95% of all blasts. The DEDJTR Guidelines also recognise that in situations where this is not possible to achieve, due to the location and nature of the blasting operations, it may be possible to increase the limit subject to approval by DEDJTR and all affected residents being informed.

A limit of 133dB is also recommended as a safe level that will prevent structural or architectural damage to typical residential construction from airblast.

14.7 Existing Conditions

14.7.1 Initial modelling

Initial noise modelling was carried out in accordance with NZS:6808:2010 for a preliminary site layout to identify noise sensitive locations where the predicted noise level may be higher than 35dB. Locations identified within the 35dB contour were then reviewed to determine the need for background monitoring.

Since the initial modelling was undertaken, ongoing design development of the wind farm led to changes to the proposed wind farm layout. As a result, some locations that were originally identified within the 35dB contour are now identified with levels below 35dB.

Based on the current wind farm layout and WTG proposal, nine of the 26 residential properties within 5km of the wind farm site are predicted to experience wind farm noise levels above 35dB, as detailed in *Table 14-2.* These residential locations are categorised as follows:

- One of the nine locations is a participating landholder within the site boundary (H2);
- Four of the nine locations are participating landholders outside the site boundary (H41, H49, H50 and H51);
- Four of the nine locations are participating neighbours located outside the site boundary (H1, H46, H47 and H52).

It is noted that there are four additional dwellings (H4, H48, H59 and H60) within 1km of the proposed WTGs that have not been considered as part of the noise assessment. Owners of these dwellings have entered into agreements with Trustpower on mutually acceptable terms such that, if the wind farm proceeds to construction, these houses will be acquired by Trustpower, removed or modified and uninhabited for the duration of the wind farm's operation. A further house (H45) is located approximately 2km from a WTG, however it is currently owned by DWFPL and has not been included in the assessment.

14.7.2 Base Noise Limits

To assess the compliance of the predicted wind farm noise levels against NZS 6808:2010, it was necessary to establish the base noise limit for the sensitive receptors surrounding the wind farm site. The base noise limit is the lowest noise limit that applies to the Project, irrespective of the background noise level.

The definition given in NZS 6808:2010 of noise sensitive locations specifically excludes dwellings within the wind farm site boundary. As mentioned previously, the statutory context of NZS 6808:2010 also indicates that the method is not intended to be applied to noise sensitive locations outside the wind farm site boundary where a noise agreement exists between the occupants and Trustpower.

It is current practice to use the recommendations outlined in ETSU-R-97, which allows for an increased baseline noise limit of 45dB for those properties with a financial involvement in the Project. A noise agreement has been signed by four participating landholders (H2, H41, H49 and H50) and two participating neighbours (H1 and H47) and therefore the increased baseline noise limit (45dB) has been applied to these properties.

NZS 6808:2010 identifies high amenity areas which require a higher degree of protection of amenity related to the sound environment of a particular area. The area surrounding the wind farm site is contained within the Farming Zone and the Victorian Planning Provisions Practice Note: *Applying the rural zones* (DSE, 2007) states:

> *'The Farming Zone is designated to encourage diverse farming practices, some of which can have significant off-site impacts. For this reason, the level of amenity that can be expected in this zone will usually not be compatible with sensitive uses, particularly housing.'*

Having regard to the above, it is considered that the high amenity noise limit is not applicable for residential properties located within a Farming Zone and is therefore not applicable for properties surrounding the proposed wind farm site.

A base noise limit of 40dB was therefore established for the remaining assessed properties (H46, H51 and H52) in accordance with NZS 6808:2010. In addition, the applicable noise limit for all residential properties, located more than 2km from a proposed WTG is 40dB.

A summary of the base noise limits for all sensitive receptors is provided in *Table 14-2.*

14.8 Assessment of Impacts

14.8.1 Wind Farm Operational Noise

Operational wind farm noise levels were predicted at the eight residential properties which were identified as noise sensitive locations during the preliminary screening process. These levels were then compared with the appropriate base noise limits identified in *Section 14.7.2*.

The results of this assessment are summarised in *Table 14-2*. These indicate that the predicted operational noise from the wind farm complies with the relevant noise limits at sensitive receptors surrounding the wind farm and thus, the risk of impact is expected to be low. The predictions represent the combined total noise of all WTGs operating at their maximum rated output when the wind is blowing directly from the wind farm to each assessment location.

Table 14-2 Sensitive Receptors and Applicable Noise Limits

House	Distance to the nearest WTG (m)	Applicable base noise limit (dB)	Predicted wind farm noise level (dB)*	Compliance with noise limits
H1 (PN)	628	45	42.8	Yes
H2(PL)	988	45	42.6	Yes
H3	2,501	40	32.8	Yes
H6	4,931	40	24.0	Yes
H7	5,015	40	27.9	Yes
H8	3,953	40	28.6	Yes
H9	4,661	40	27.0	Yes
H16	4,868	40	27.8	Yes
H17	3,618	40	30.1	Yes
H18	2,819	40	31.8	Yes
H19	3,398	40	29.5	Yes
H20	2,789	40	30.8	Yes
H21	2,301	40	33.3	Yes

House	Distance to the nearest WTG (m)	Applicable base noise limit (dB)	Predicted wind farm noise level (dB)*	Compliance with noise limits
H22	4,430	40	28.3	Yes
H39(PL)	3,715	40	29.7	Yes
H40 (PN)	2,691	40	30.7	Yes
H41 (PL)	1,214	45	38.3	Yes
H42	2,100	40	34.7	Yes
H43	2,786	40	31.6	Yes
H44	2,406	40	33.0	Yes
H46 (PN)	1,780	40	36.0	Yes
H47 (PN)	1,003	45	40.5	Yes
H49 (PL)	1,011	45	43.6	Yes
H50 (PL)	1,132	45	38.9	Yes
H51 (PL)	1,727	40	36.5	Yes
H52 (PN)	1,887	40	35.9	Yes
H53	2,995	40	30.4	Yes

Effects of Wind Farm Noise

Environmental noise policies, including those applied to wind farms, establish objective noise criteria to address potential health considerations, such as community annoyance and sleep disturbance. In particular, environmental noise policies define criteria which are chosen to prevent direct physiological risks of sound, and minimise as far as practically possible adverse health considerations such as annoyance and sleep disturbance.

This type of approach to noise policy was outlined by the Victorian Government Department of Health (2013) in its publication on wind farm sound and health, which states:

> *'Noise standards are used not only for environmental noise (such as wind farms and traffic noise) but also for industry and even household appliances.*
>
> *Wide individual variation in the response to noise means that it is very difficult to develop an annoyance threshold for sound levels; this is the case not only for wind farms, but for all sources of noise. Noise standards are based on protecting the majority of people.'*

The subject of health effects related to operational wind farms in Australia has been extensively considered by the Commonwealth Government's National Health and Medical Research Council (NHMRC) and the Australian Medical Association (AMA). The public statements (NHMRC, 2014 and AMA, 2014) produced by these peak health bodies identify that, as with any audible sound, wind farm noise can represent a potential source of annoyance or sleep disturbance for some individuals. Their findings did however, indicate that there was no reliable evidence to support a relationship between wind farm noise and direct adverse effects on human health.

These findings lend support to the suitability of the wind farm noise controls applied in Victoria, which are intended to provide reasonable protection of health and amenity at noise sensitive locations.

Low Frequency Noise, Infrasound and Ground Vibration

Low frequency sounds are generally regarded as sounds above 20Hz and extending upwards into the range of 100-200Hz. Infrasound is generally accepted to refer to frequencies of sound which lie below 20Hz. This is commonly

cited as the lower bound of audibility, however, frequencies below 20Hz can still be audible, provided that the level of the sound is sufficiently high to exceed the threshold of audibility at those frequencies.

The limits adopted for the assessment of operational noise from wind farms represent relatively low levels, which have been specified in recognition of the quieter environments where wind farms are normally located. However, consistent with noise policies applied to other forms of development, the criteria are not intended to restrict wind farm noise to inaudible levels. Accordingly, a wind farm which achieves compliance with the criteria may still be audible at surrounding receptor locations on some occasions depending on a range of factors. These factors include the time of day; speed and direction of the wind; proximity to the WTGs; extent of vegetation around the dwelling; and the degree to which the dwelling is sheltered from prevailing wind conditions.

In addition, irrespective of the relatively low levels which operational wind farm noise is restricted to, an individual's judgement of the audible noise from a wind farm is highly subjective and will be influenced by a range of contextual factors.

Common with many other sources of noise, WTGs emit infrasound, low frequency sound and ground vibrations. However, these types of sound and vibration are a feature of the everyday environment and arise from a wide range of natural and man-made sources, such as the wind, ocean, domestic appliances, transportation and agricultural equipment. It is anticipated that infrasound levels from the Project will be comparable with existing ambient levels. Furthermore, the important point in relation to WTGs is that the levels of these types of emissions are low and therefore, in many cases, cannot generally be reliably measured amidst normal background levels.

The potential health effects associated with these types of emissions were addressed in the public statement from the Victorian Government Department of Health (2013) which concluded:

> *'Infrasound is audible when the sound levels are high enough. The hearing threshold for infrasound is much higher than other frequencies. Infrasound from wind farms is at levels well below the hearing threshold and is therefore inaudible to neighbouring residents.'*

In addition, the statement released by NHMRC (2014) for public comment concluded that there was no consistent evidence that noise from WTGs, whether estimated in models or using distance as a proxy, is associated with self-reported human health effects.

Given the above, the specific impacts of the proposed wind farm on low frequency noise and infrasound have not been assessed in detail as the risk is considered to be extremely low. As detailed in *Section 8.4* of the *Noise Impact Assessment* contained in Volume 2, studies suggest that infrasound levels from the proposed wind farm are anticipated to be comparable with the existing ambient levels.

14.8.2 Substation Operational Noise

The operational noise levels from the on-site substation were predicted to be 16dB at the nearest affected residential property (H2-participating landholder) using computer modelling software. In addition, the operational noise levels from the off-site substation were predicted to be 23dB at the nearest affected residential property located approximately 1.1km to the south-east. Noise from both substations was therefore predicted to comply with the night-time NIRV noise limit of 34dB at all assessed residential properties.

14.8.3 Transmission Line Operational Noise

High voltage overhead power lines have the potential to generate Corona and Aeolian noise during specific atmospheric conditions. Sound generated by wind passing across power lines (cables or wires) produces Aeolian tones, which are highly tonal in character. Corona discharge noise consists of broadband noise (hiss, crackle, etc.) and is generally only audible under conditions of high humidity, such as during rain or fog.

A review of the transmission line corridor to establish the risk of noise considerations associated with Aeolian tones or Corona noise was undertaken. The proposed corridor is a minimum of 500m from the nearest noise sensitive location (H40).

Based on MDA's past experience of modelling studies in close proximity to these types of transmission lines, considerations relating to Aeolian tones or Corona noise represent a low risk at the proposed separating distances, particularly at the low to moderate wind speeds that are most relevant to this type of noise source. The occurrence of these types of effects during the operation of the Project can also be reduced during the detailed design phase of the Project through the selection of appropriate cable characteristics to avoid inherent resonant frequencies that are most important to Aeolian noise.

14.8.4 Construction Noise

The construction of the Project will involve the use of heavy earth-moving and excavation equipment, such as bulldozers, graders, rock hammers and excavators. The use of this equipment during the 24-36 month construction period is likely to cause an increase in localised ambient noise levels. The creation of access tracks and excavation for cabling are likely to have the greatest noise impacts, however, such noise impacts will be localised and of short-term duration.

Construction works may need to occur outside of standard working hours (Monday to Friday 0700-1800hrs and Saturday 7am – 1pm) on some occasions. Examples of activities where this may be required include the delivery of oversize plant or structures, including WTG nacelle, blades, tower and transformers in addition to erection of these structures based on weather constraints. For such works, the guidelines require that *'affected premises should be notified of the intended work, its duration and times of occurrence.'*

The construction phase of the Project will be controlled by a construction management plan which will include details of working methods and times, and any requirements for work outside of the day period defined in the NCG.

14.8.5 Quarry Operational Noise

During selected construction phases, it is proposed to operate the quarry during both the day and evening periods (Monday to Sunday, 7am - 10pm). Without noise control treatment, noise levels from the quarry are predicted to exceed the estimated evening time noise limit.

Quarry operations will be restricted to the daytime period (Monday to Friday 7am-6pm and Saturday 7am-1pm) until a detailed noise assessment is submitted to the relevant authority detailing the noise control treatments required to achieve compliance with the evening time noise limit.

14.8.6 Construction Vibration

Given that the nearest sensitive receptor (participating landholder) is approximately 220m from the proposed road works and approximately 1km from longer term areas of construction, ground vibration levels are expected to be low.

The predicted vibration levels are expected to be below the thresholds defined for the onset of adverse reaction. Certain activities related to the access track construction may, however, exceed the threshold range for predicted vibration levels at participating receptor locations. These construction activities will generally occur for limited periods and the prediction method is generally conservative. It may, however, be necessary to notify residents of times when access track construction will occur in close proximity to their properties.

14.8.7 Airblast

The blasting process is highly non-linear and given the variability of ground and rock, it is difficult to accurately predict airblast levels. In the absence of either field data or the opportunity to conduct blasting trials in the region of interest, airblast levels were predicted in accordance with the methodology provided in AS 2187-2:2006.

Airblast levels have been predicted below 110dB at the nearest participating neighbour (H2) and below 90dB at the nearest local landholder (H8). These levels comply with the DEDJTR Guidelines.

14.8.8 Construction Traffic Noise

The preferred access to the proposed wind farm site will be gained via Woorndoo-Streatham Road. Predicted traffic movements are discussed in *Chapter 19*.

The existing and construction related traffic noise levels were predicted at dwellings most likely to be impacted by changes in traffic conditions. Traffic noise associated with the construction of the Project was predicted to increase by only 3dB at H57 (a participating landholder), which is located approximately 100m south of the preferred site access. Construction traffic noise therefore complies with the relevant NSW RNP criterion at the nearest affected residential property.

14.9 Impacts and Assessment Outcomes

The *Noise Impact Assessment* is based on compliance or non-compliance with criteria. It is not meaningful to distinguish between negligible, minor, moderate and major impacts, when the key concern is the compliance or otherwise of the Project with relevant criteria. Therefore the acoustic and vibration impacts of the Project have been described as either compliant or non-compliant.

The noise impacts of the Project and relevant noise guidelines and criteria are summarised in *Table 14-3.* Measures that will be undertaken to monitor and manage noise associated with construction and operational phases of the Project are also provided in *Table 14-3*.

Table 14-3 Noise Impacts and Impact Assessment Outcome

Impact number	Impact	Relevant noise guidelines or criteria	Impact assessment outcome
14-01	Noise levels generated during construction activities, including traffic, exceed noise criteria at the sensitive receptor locations	EPA Publication 1254 and NSW Road Noise Policy	**Compliant** Project activities will be undertaken in accordance with a Construction Noise Management Plan (CNMP). This will address potential noise impacts associated with the proposed construction activities at the nearest receptors. The CNMP will include the following measures: • Performance Requirements; • Noise Compliance Assessment; • Noise Complaints Evaluation; and • Noise Complaint Response Plan. Providing that the potentially affected residents are notified in advance, unavoidable works such as WTG erection and delivery of large size items and low noise works may be undertaken during the evening and night periods.
14-02	Vibration generated during construction activities	NSW Vibration Guidelines	**Compliant** Project activities will be undertaken in accordance with a CNMP that will address potential vibration impacts associated with the proposed construction activities at the nearest receptors. As above, the CNMP will include the following measures: • Performance Requirements; • Noise Compliance Assessment; • Noise Complaints Evaluation; and • Noise Complaint Response Plan. Notifying residents of times when access track construction will occur in close proximity to their property.
14-03	Noise and vibration associated with on-site quarry operations	Australian Standard 2187-2:2006	**Compliant** Quarrying activities will be undertaken in accordance with a Blasting Management Plan, if required. Quarry operations will be restricted to the daytime period (Monday to Friday 0700-1800hrs and Saturday 0700-1300hrs). If any changes are proposed in future, a detailed noise assessment will be undertaken and operations will accord with evening time noise limitations.

Impact number	Impact	Relevant noise guidelines or criteria	Impact assessment outcome
14-04	WTG operational noise	NZS6808:2010	**Compliant** The operation of the Project will be controlled and monitored by an Operational Noise Management Plan, which will outline measures to ensure compliance with the relevant noise criteria to the satisfaction of the responsible authority. The following measures will be undertaken: • When the final WTG model is selected, the sound power levels of the WTG will be compared to the modelled results to assess whether there is a potentially greater noise impact. If compliance with NZS 6808:2010 is not achieved, the Project layout will be subject to revisions to ensure compliance or a Noise Reduction Management Strategy will be developed; • a tonal audibility test report will be provided for the final WTG model prior to commencing any site works; • the procurement contract for the supply of WTGs to the site will typically include specifications concerning the allowable sound power levels from the WTG, and the permissible characteristics of the WTG (including special audible characteristics). In the event that WTG sound power or tonality levels are found to exceed the contracted values, the supplier will be required to implement measures to reduce the noise to the contracted value. This can include measures to rectify manufacturing defects, make appropriate modifications, or implementation of appropriate control settings; and • a Noise Reduction Management Strategy will be developed (if required), which outlines control measures to achieve noise reductions for predetermined wind speed ranges and directions.
14-05	Operation of the on-site and/or off-site substation	EPA Publication 1411	**Compliant** The operation of the Project will be controlled and monitored by an Operational Noise Management Plan, which will outline measures to ensure compliance with the relevant noise criteria to the satisfaction of the responsible authority.

14.10 Impact Assessment Conclusions

The noise assessment for the Project predicted noise levels at 26 residential properties within 5km of the wind farm site. The assessment has been conducted for all locations where an assessment is required in accordance with NZS 6808:2010, in addition to participating landholders and neighbours who have entered into a noise agreement with Trustpower. Dwellings where the owners have entered into agreements for Trustpower to acquire, remove or make uninhabitable for the duration of the wind farm operation have not been included in the assessment. Predicted noise levels associated with the operation of the wind farm comply with NZS 6808:2010 at all properties without a noise agreement. In addition, predicted noise levels for properties with a noise agreement comply with ETSU-R-97. Accordingly potential impacts as a result of noise from the wind farm are expected to be minimal.

The construction of the Project is likely to cause an increase in localised ambient noise levels during the construction phase, however, such noise impacts will be localised and of short-term duration. Potential noise impacts during the construction phase of the Project will be controlled by a Construction Noise Management Plan to ensure compliance with EPA Publication 1254. The assessment has identified recommended mitigation measures to be included in a Construction Noise Management Plan.

In addition, whilst the Project was predicted to comply with NZS 6808:2010 (for those dwellings without a noise agreement), measures have been recommended to ensure that the findings of the *Noise Impact Assessment* are carried through to the completed and operational phase of the Project with operations of the Project controlled and monitored by an Operational Noise Management Plan.

The construction and operation of the Project is predicted to give rise to audible noise on some occasions. However, on the basis that the construction and operation of the Project complies with the relevant noise guidelines and criteria, residual impacts on the amenity of the surrounding area will be acceptable.

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 15 - SHADOW FLICKER AND BLADE GLINT

This page is intentionally blank

Contents

Figures

Tables

This page is intentionally blank

15 SHADOW FLICKER AND BLADE GLINT

This Chapter describes the potential impacts of the Project in terms of shadow flicker and blade glint. It also outlines the proposed mitigation measures that are designed to ensure that the Project limits any adverse impacts with respect to shadow flicker and blade glint on neighbouring dwellings.

A *Shadow Flicker and Blade Glint Assessment* has been undertaken and concluded as follows:

- The analysis of shadow flicker has determined that four dwellings will be affected by shadow flicker, with only two dwellings predicted to receive in excess of the recommended limit of 30 hours per year outlined in the Draft National Guidelines.
- When considering the actual shadow flicker duration, which takes into account the reduction in shadow flicker due to WTG orientation and cloud cover, only one dwelling is expected to experience shadow flicker in excess of the recommended limit of 10 hours per year.
- Three of the dwellings are owned by participating landholders of the Project and one dwelling is a participating neighbour. Potential impacts can be dealt with through mitigation measures, such as the installation of screening structures or planting and the use of WTG control strategies.
- The risk of blade glint from modern WTGs is considered to be very low.

15.1 EES Objectives

The EES evaluation objective most relevant to shadow flicker and blade glint is:

Amenity – To avoid or minimise adverse noise, visual and other amenity effects on nearby residents and local communities, to the extent practicable.

This Chapter is based on the *Shadow Flicker and Blade Glint Assessment* undertaken by Garrad Hassan Pacific Pty Ltd (GL GH) (August 2014) contained in Volume 2. This Chapter and the *Shadow Flicker and Blade Glint Assessment* address the EES Scoping Requirements by:

- identifying nearby sensitive receptors that have the potential to be exposed to unacceptable levels of blade glint and shadow flicker, from project infrastructure, including WTGs and grid connection infrastructure;
- assessing the visual effects of the Project, including blade glint and shadow flicker, on neighbouring dwellings; and
- outlining and evaluating any proposed measures designed to manage and monitor residual effects of blade glint and shadow flicker on neighbouring dwellings.

15.2 Study Area

The study area for the *Shadow Flicker and Blade Glint Assessment* included the wind farm site and the locations of 58 dwellings within 7km of the wind farm boundary, as provided by Trustpower.

15.3 Assessment Methodology

Shadow flicker may occur under certain combinations of geographical position and time of day, when the sun passes behind the rotating blades of a WTG and casts a moving shadow over neighbouring areas. When viewed from a stationary position, the moving shadows appear as a flicker giving rise to the phenomenon of 'shadow flicker'.

The shadow flicker assessment is based on the methodology recommended in the *Draft National Wind Farm Development Guidelines* (Draft National Guidelines) (EPHC, 2010).

The duration of shadow flicker experienced at sensitive locations has been modelled using simple geometric analyses, which takes into account the relative position of the sun throughout the year, the WTGs at the site, and the viewer. Calculations were carried out assuming dwellings had either one or two storeys, with window heights of either 2m or 6m respectively. The relevant shadow flicker duration at a dwelling was taken as the maximum occurring within 50m of the centre of a dwelling.

The modelling conducted represents a conservative scenario and over-estimates the actual annual hours of shadow flicker experienced at a location. Therefore, an attempt has been made to quantify the likely reduction in shadow flicker duration due to variation in WTG orientation and cloud cover, and to produce a prediction of the actual shadow flicker duration likely to be experienced at a dwelling.

15.4 Legislation and Policy

The relevant legislation and government policies for shadow flicker and blade glint are outlined in *Table 15-1.* The key documentation relied upon in the preparation of the assessment were the Wind Energy Guidelines and Draft National Guidelines.

Table 15-1 Relevant Shadow Flicker and Blade Glint Legislation and Policies

Legislation / Policy	Description
State	
Policy and planning guidelines for development of wind energy facilities in Victoria (DELWP, 2015)	The Wind Energy Guidelines are for responsible authorities, proponents and the community to provide guidance about wind farms and inform planning decisions about wind energy facility proposals. The Wind Energy Guidelines specify that the shadow flicker experienced immediately surrounding the area of a dwelling (garden fenced area) must not exceed 30 hours per year as a result of the operation of the wind energy facility. The Wind Energy Guidelines also note that blade glint can result from reflection of the sun from the WRG blade, and recommends that blades should be finished with a surface treatment of low reflectivity to ensure that glint is minimised.
Local	
Moyne Planning Scheme	The Moyne Planning Scheme is implemented via the P&E Act. Clause 52.32 of the Planning Scheme sets out the matters to be considered prior to the determination of an application for a wind energy facility, which includes consideration of the Wind Energy Guidelines.
Other	
Draft National Wind Farm Development Guidelines, Environment Protection and Heritage Council (EPHC, 2010)	The purpose of the Draft National Guidelines is to provide a nationally consistent set of best-practice methods for assessing the impacts associated with wind farm developments and operations, including shadow flicker and blade glint. The Draft National Guidelines recommend a limit on the theoretical shadow flicker duration of 30 hours per year, and a limit on the actual flicker duration of ten hours per year.

15.5 Assessment of Impacts

15.5.1 Shadow Flicker

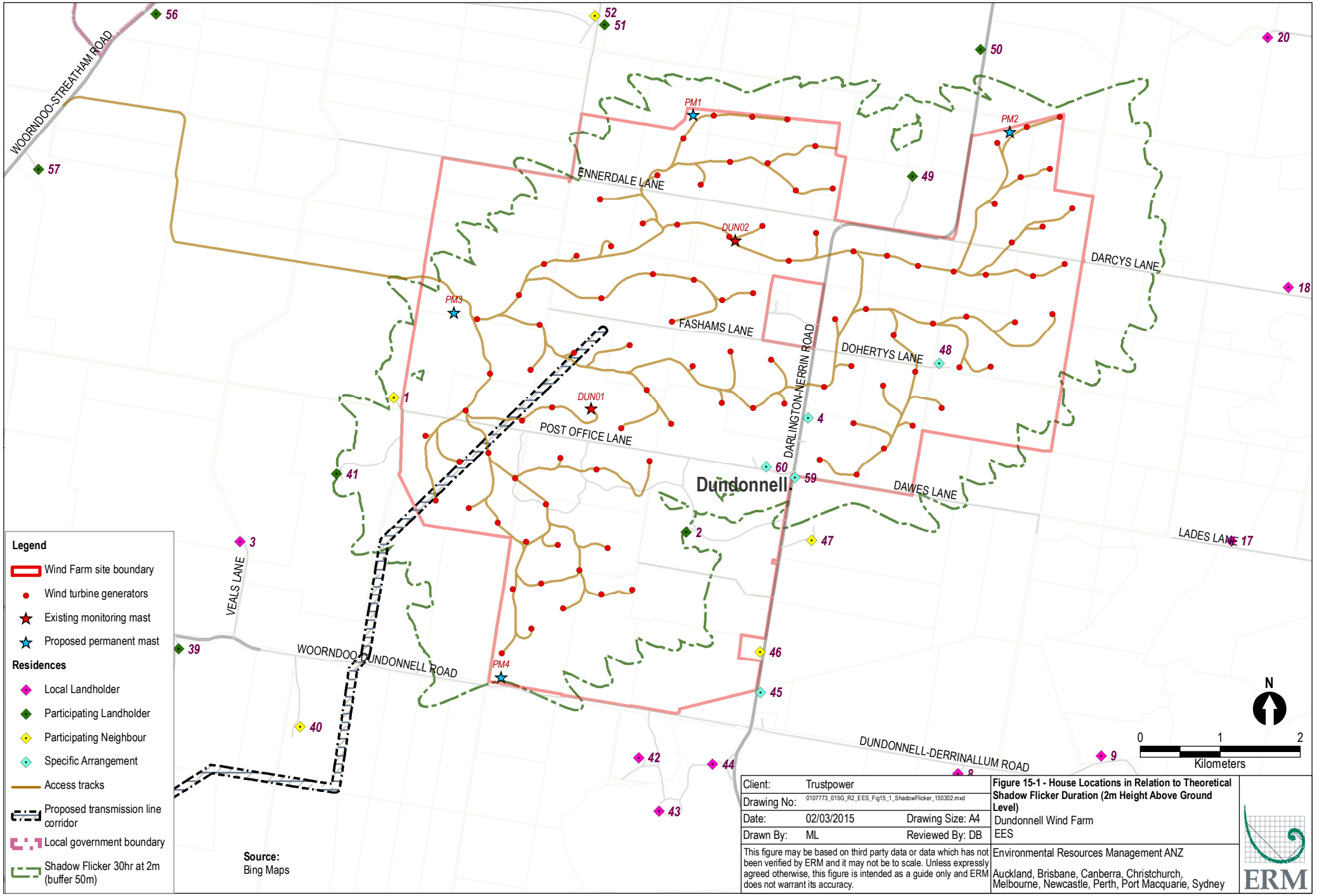
The results of the theoretical assessment as recommended by the Draft National Guidelines indicate that there are four existing dwellings, three participating landholders (H2, H41 and H49) and one participating neighbour (H1) in the vicinity of the Project that have the potential to be affected by shadow flicker, refer to *Figure 15-1*. Two dwellings (H1 and H49) are calculated to experience theoretical shadow flicker durations greater than the recommended limit of 30 hours per year outlined in the Draft National Guidelines.

When the reduction of shadow flicker due to WTG orientation and cloud cover is taken into consideration, only H49 is expected to experience shadow flicker in excess of the recommended limit of ten hours actual duration per year outlined in the Draft National Guidelines. Whilst the Draft National Guidelines recommend that only reductions due to cloud cover be included, GL GH considers the additional reduction due to WTG orientation is appropriate, as the projected area of the WTG, and therefore the expected shadow flicker duration, is reduced when the WTG rotor is not perpendicular to the line joining the sun and dwelling.

The results of the theoretical and predicted actual shadow flicker durations are summarised in *Table 15-2*.

Table 15-2 Theoretical and Predicted Actual Shadow Flicker Durations

House ID	Easting/ northing (m)	Contributing WTGs	Theoretical				Predicted actual	
			At dwelling (hr/yr)		Max within 50m of dwelling (hr/yr)		Max within 50m of Dwelling (hr/yr)	
			SF at 2m	SF at 6m	SF at 2m	SF at 6m	SF at 2m	SF at 6m
H1	669031/ 5806382	T063, T073	33.1	32.2	37.3	36.4	8.9	8.7
H2	672692/ 5804682	T094	18.06	18.0	21.8	21.1	5.4	5.2
H41	673137/ 5807601	T079, T089	24.4	23.6	27.8	26.6	6.0	5.8
H49	675775/ 5807307	T006, T008, T013, T016	59.0	57.2	64.6	62.2	14.9	14.4
Limits			30		30		10	
Source: GL GH, 2014								


WOORNDOO-STREATHAM ROAD
ENNERDALE LANE
DARCYS LANE
FASHAMS LANE
DOHERTYS LANE
POST OFFICE LANE
DARLINGTON-NERRIN ROAD
DAWES LANE
LADES LANE
VEALS LANE
WOORNDOO-DUNDONNELL ROAD
DUNDONNELL-DERRINALLUM ROAD
Dundonnell
PM1
PM2
PM3
PM4
DUN01
DUN02
1
2
3
4
9
17
18
20
39
40
41
42
43
44
45
46
47
48
49
50
51
52
56
57
59
60
Legend
Wind Farm site boundary
Wind turbine generators
Existing monitoring mast
Proposed permanent mast
Residences
Local Landholder
Participating Landholder
Participating Neighbour
Specific Arrangement
Access tracks
Proposed transmission line corridor
Local government boundary
Shadow Flicker 30hr at 2m (buffer 50m)
Source:
Bing Maps
N
0
1
2
Kilometers
Client: Trustpower
Drawing No: 0107773_015G_R2_EES_Fig15_1_ShadowFlicker_150302.mxd
Date: 02/03/2015
Drawing Size: A4
Drawn By: ML
Reviewed By: DB
This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.
Figure 15-1 - House Locations in Relation to Theoretical Shadow Flicker Duration (2m Height Above Ground Level)
Dundonnell Wind Farm
EES
Environmental Resources Management ANZ
Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney
ERM

15.5.2 Blade Glint

Blade glint can occur when sun is reflected from the WTG blades. The occurrence of blade glint depends on a combination of factors including the orientation of the nacelle, angle of the blade, the angle of the sun and the reflectiveness of the surface of the blade.

Blade glint is generally not a problem for modern wind farms, provided non-reflective coatings are used for the surface of the blades.

15.6 Impacts and Mitigation Measures

For shadow flicker and blade glint impacts, impact assessment is based on compliance or non-compliance with criteria, and it is not meaningful to distinguish between negligible, minor, moderate and major impacts, when the key concern is the compliance or otherwise of the Project with relevant criteria. Therefore, in this EES, impacts of the Project have been described as either compliant or non-compliant. A 'compliant' rating encompasses the impact ratings of negligible or minor, and 'non-compliant' includes moderate and major impacts.

The shadow flicker and blade glint impacts of the Project are summarised in *Table 15-3.* Measures to minimise impacts if required are also provided in *Table 15-3*.

Table 15-3 Shadow Flicker and Blade Glint Impacts, Mitigation Measures and Residual Impacts

Impact number	Impact	Relevant guidelines or criteria	Impact Assessment Outcome
15-01	WTGs result in shadow flicker hours to nearby dwellings in excess of the recommended annual limit	The Wind Energy Guidelines; Draft National Guidelines.	**Compliant** The following mitigation measures will be implemented if required: • the installation of screening structures or planting of trees to block shadows cast by the WTGs; • the use of WTG control strategies, which shut down WTGs when shadow flicker is likely to occur. An agreement is in place with Trustpower and the owners of H1 and H49, whose dwellings are predicted to experience shadow flicker duration in excess of the recommended limits, to provide screening for other purposes.
15-02	WTGs result in blade glint to nearby dwellings	The Wind Energy Guidelines;	**Compliant** The proposed blades will be finished with a non-reflective surface to reduce or negate any potential effects.

15.7 Impact Assessment Conclusions

The modelling and analysis of shadow flicker has determined that four dwellings will be affected by shadow flicker, with only two dwellings predicted to receive in excess of the recommended limits of 30 hours theoretical duration per year. Furthermore, only one dwelling is predicted to receive in excess of ten hours actual duration per year. Of these, three dwellings are owned by participating landholders and a participating neighbour of the Project and impacts can be dealt with through mitigation measures.

Blade glint is generally not a problem for modern wind farms, provided non-reflective coatings are used for the surface of the blades. The proposed blades will be finished with a non-reflective finish to minimise any impact.

Given the above assessment, it is concluded that the Project will have minimal residual impacts on the amenity of the surrounding area associated with shadow flicker and blade glint.

This page is intentionally blank

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 16 - ELECTROMAGNETIC INTERFERENCE

This page is intentionally blank

Contents

Figures

Tables

This page is intentionally blank

16 ELECTROMAGNETIC INTERFERENCE

This Chapter describes the potential electromagnetic interference (EMI) impacts of the Project and the proposed mitigation measures that are designed to ensure that the Project minimises any adverse impacts on communication services in the area.

An *Assessment of Electromagnetic Interference Issues for the Dundonnell Wind Farm* has been undertaken to assess the potential impacts on radiocommunications systems in the vicinity of the Project. The Assessment concluded as follows:

- The Project does have the potential to impact on television broadcasting signals within the vicinity of the wind farm site, however, pre and post-construction surveys of television reception will be undertaken to ensure that if impacts do occur they are quickly mitigated. Loss of reception in the area is unlikely to be an issue due to the transition to digital television in December 2013.
- One point-to-point microwave link with a path over the wind farm site was identified as potentially affected; however Trustpower has consulted with Aussie Broadband, the owner of the link, who has advised that the Project will not adversely impact on their services.
- One point-to-multipoint licence exists in proximity to the wind farm site; however Trustpower has consulted with Aussie Broadband, the owner of the link, who has advised that the Project will not adversely impact on their services.
- The assessment confirmed that the Project is unlikely to cause any unacceptable interference to fixed radio links operating in the Project locality.
- Review of the mobile phone towers in the vicinity of the wind farm site indicated that large scale interference to mobile phone signals is unlikely.

16.1 EES Objectives

The EES evaluation objective most relevant to EMI is:

Amenity – To avoid or minimise adverse noise, visual and other amenity effects on nearby residents and local communities, to the extent practicable.

This Chapter is based on the *Assessment of Electromagnetic Interference Issues for the Dundonnell Wind Farm* undertaken by Garrad Hassan Pacific Pty Ltd (GL GH) dated August 2014. This report is contained in Volume 2: Supplementary Reports. Whilst the EES Scoping Requirements do not specifically refer to EMI, this Chapter and the EMI Assessment address the following by:

- identifying sensitive receptors that may be subject to EMI from the Project; and
- outlining and evaluating any proposed measures designed to manage and monitor residual effects of EMI on existing services operating in the vicinity of the Project and neighbouring dwellings.

16.2 Study Area

The study area for the EMI assessment included the wind farm site, the locations of 58 dwellings within 7km of the wind farm boundary and the radiocommunications systems within the vicinity of the wind farm boundary.

16.3 Assessment Methodology

The methodology used for the EMI assessment included:

- a review of the radio communication licences held by the Australian Communications and Media Authority (ACMA) within 75km of the wind farm site related to the following:
  - fixed point-to-point links;
  - fixed point-to-multipoint links; and
  - radio communications assets belonging to emergency services;
- a review of the trigonometrical stations within 75km of the wind farm site;
- a review of the aviation and meteorological radar within 250 nautical miles (463km) of the wind farm site;
- a review of the following communications:
  - broadcast television;
  - citizens band (CB) radio and mobile phones;
  - wireless internet;
  - broadcast radio; and
  - satellite television and internet;
- liaison with organisations that have or may have communication equipment in the region (telecommunication companies, media companies, emergency services and government agencies); and
- a review of the Draft National Guidelines.

Further detail of the methodology used to assess each potential impact is provided in the EMI Assessment contained in Volume 2.

16.4 Legislation and Policy

The relevant legislation and government policies for EMI are outlined in *Table 16-1.* The key documentation relied upon in the preparation of the EMI assessment was the Wind Energy Guidelines and Draft National Guidelines.

Table 16-1 Relevant EMI Legislation and Policies

Legislation / Policy	Description
State	
Policy and planning guidelines for development of wind energy facilities in Victoria (DELWP, 2015)	These Wind Energy Guidelines are for responsible authorities, proponents and the community to provide guidance about wind farms and inform planning decisions about wind energy facility proposals. The Guidelines also set out information requirements for wind energy development, including EMI related matters. The Wind Energy Guidelines note that the effects of WTGs on electromagnetic waves will usually be relatively limited and that the potential for EMI from the generation of electricity from a wind energy facility should be minimised, if not eliminated, through appropriate WTG design and siting.
Local	
Moyne Planning Scheme	The Moyne Planning Scheme is implemented via the P&E Act. Clause 52.32 of the Planning Scheme sets out the matters to be considered prior to the determination of an application for a wind energy facility, which includes consideration of the Wind Energy Guidelines.

Legislation / Policy	Description
Other	
Draft National Wind Farm Development Guidelines (EPHC, 2010)	The purpose of the Draft National Guidelines is to provide a nationally consistent set of best-practice methods for assessing the impacts associated with wind farm developments and operations, including EMI. The Draft National Guidelines recommend that a radial distance of 50-60km from the centre of the wind farm would normally capture all of the potentially affected services in the area.

16.5 Assessment of Impacts

16.5.1 Overview

Wind farms have the potential to affect the performance of radio communications services through the introduction of EMI.

Services most likely to be affected include television broadcast signals and fixed point-to-point microwave signals. Terrestrial broadcast signals are commonly used to transmit domestic television, while microwave links are used for line-of-sight connections for data, voice and video.

The ACMA database search identified 449 radiocommunication towers within a 75km radius of the wind farm site. The potential impact of the Project to each of the radiocommunication licenses attached to these towers was assessed and the potential impacts are summarised below.

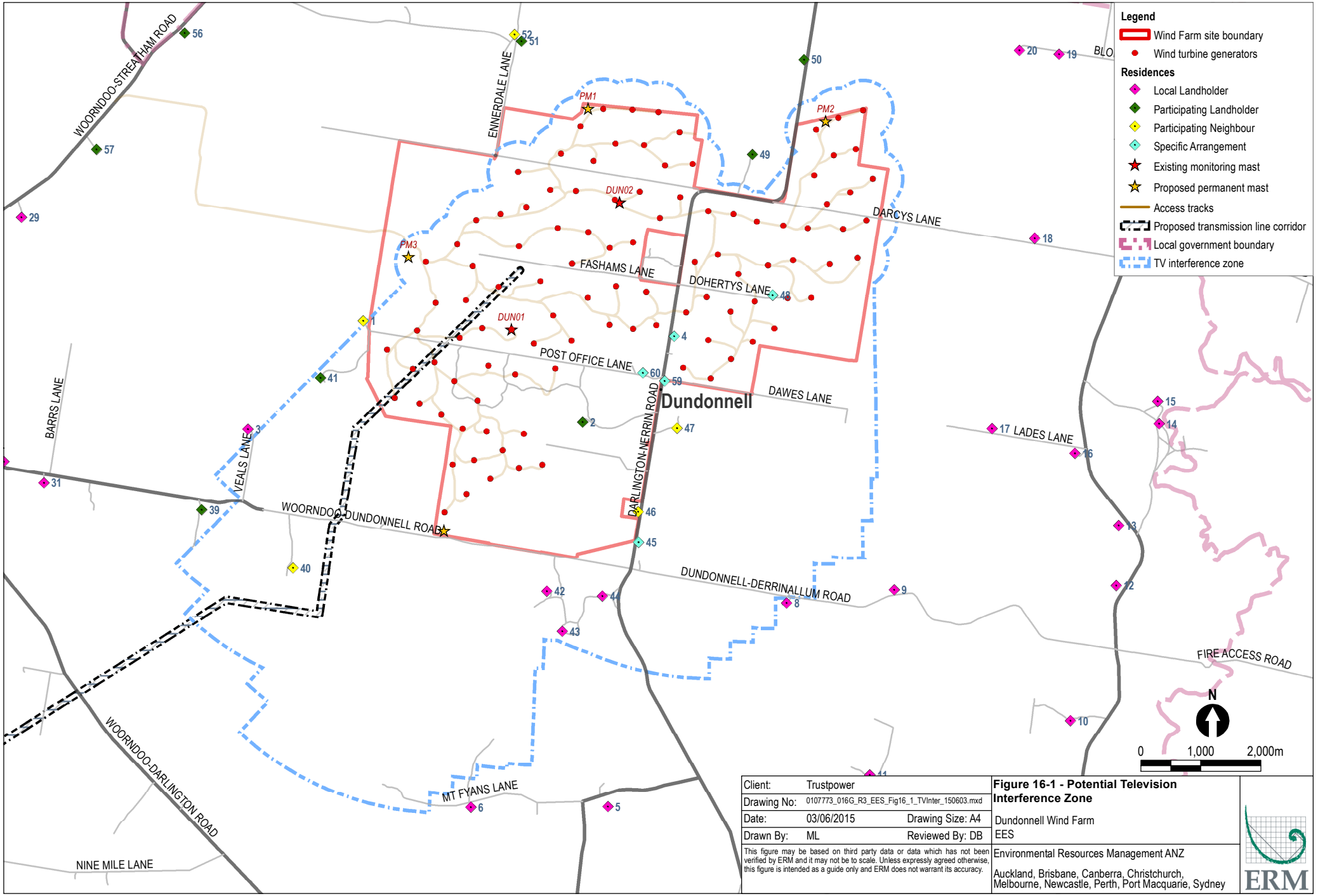
16.5.2 Terrestrial Television Broadcasting

Terrestrial television is broadcast in Australia by a number of networks, both public and commercial. As of December 2013, all television broadcasts in Victoria are now digital broadcasts, which are typically more robust in the presence of interference than analogue television signals. Therefore, loss of reception in the area as a result of the Project is unlikely to be an issue.

Digital broadcasts from the Ballarat transmitter at Lookout Hill currently service the area around the Project and the Switchover Australia website indicates that the digital television signal has 'good' coverage across most of the wind farm site, with some regions of 'variable' coverage.

The assessment identified eight dwellings (two participating landholders, three participating neighbours and three local landholders); where the Project had the most potential to impact on television broadcasting signals, refer to *Figure 16-1.* A pre-construction survey will be carried out to determine television reception strength at dwellings within 5km of the wind farm site. Subject to any complaints related to reception being received following commencement of operation, a post-construction survey will be carried to ensure that if impacts do occur they are mitigated.

If some residents currently experience poor or marginal reception of the digital signals, they may be susceptible to interference from the Project.



Client:	Trustpower		
Drawing No:	0107773_016G_R3_EES_Fig16_1_TVInter_150603.mxd		
Date:	03/06/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 16-1 - Potential Television Interference Zone

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

16.5.3 Fixed Licenses of Point-to-Point (Microwave) Type

A review of the ACMA database shows that there is one link passing over the proposed wind farm site. This link crosses the site in a north-east to south-west direction and is operated by Aussie Broadband. A defined exclusion zone for WTGs has been identified for this link, and WTGs have been located to avoid it. There are two WTGs located just outside the defined exclusion zone, however the link does not cross the site at such a height where the wind turbine blades can potentially intersect with the link. Aussie Broadband was also consulted during the course of the assessment and confirmed that the Project will not adversely impact on its services.

16.5.4 Fixed Licenses of Point-to-Multipoint Type

A review of the ACMA database indicated that there were 116 licenses within 75km of the wind farm boundary. As the ACMA database only details the locations of static sites, transmission vectors for point-to-multipoint licenses are not readily identifiable and therefore, prediction of potential impacts is difficult.

There is one point-to-multipoint station within 20km of the proposed wind farm boundary listed in the ACMA database. This station is owned by Aussie Broadband. In consultations with Aussie Broadband, it was confirmed that the Project will not adversely impact its services.

There are a number of point-to-multipoint stations at a distance of greater than 20km of the wind farm. The potential risk of interference with links decreases with distance and therefore impacts to operators greater than 20km from the Project are expected to be low. Ongoing consultation with operators of stations within 60km from the centre of the wind farm site has had no response to date to indicate that services may be adversely affected.

16.5.5 Emergency Services

Interference to emergency services with licenses for radio communications assets is not expected, however consultation with operators of stations within 60km of the wind farm site are ongoing to identify affected parties. GL GH has received responses from all identified parties with none indicating that services may be adversely impacted.

16.5.6 Aviation Radar and Aircraft Navigation Systems

The Draft National Guidelines recommend that radar operators be notified of the development of wind farms within 250 nautical miles (463km) of aviation radar operators. The Project is located 170km from Melbourne International Airport. Given this distance and the high probability that the WTGs will be sited below the radar line-of-sight, it is unlikely that the Project will cause interference with the aviation radar.

There are also three secondary airports within 190km of the Project and numerous regional airports, however these airports do not have radar installations.

An assessment of potential Project impacts on aircraft navigation systems was undertaken as part of the aviation risk assessment conducted by Aviation Projects (refer to *Chapter 21*). This assessment concluded that the Project would not have an adverse impact on aviation navigation systems.

16.5.7 Meteorological Radar

The Draft National Guidelines recommends consultation is undertaken with operators of weather stations within 250 nautical miles (463km) of a wind farm development. The Bureau of Meteorology (BoM) operates eight weather stations within that range, with the closest station "Melbourne" located approximately 160km east of the Project.

The Project is not expected to cause interference with BoM radar installations given the distance between the site and the radar installations and the intervening terrain. BoM has indicated that the proposed WTGs do not pose interference risk to BoM radar.

16.5.8 Trigonometrical Station

A review of the Primary Geodetic Network of Australia indicated that there are 62 trig points within 75km of the wind farm boundary. Whilst it is unlikely that the trig points in proximity to the Project will be susceptible to EMI, Geoscience Australia and DELWP were notified of the Project.

16.5.9 Citizen's Band Radio

Users of Citizen's Band Radio (CB radio) do not require a licence. Therefore, there is no record of users of such a service, or their location, the channels shared amongst its users and the repeater stations. The impact of the Project on CB radio is expected to be minimal.

16.5.10 Mobile Phones

In general, mobile phone signals are not susceptible to interference from WTGs. A review of mobile phone towers in the vicinity of the Project indicated that the nearest tower is located more than 13km from the wind farm site therefore large-scale interference to mobile phone signals is unlikely. Optus, Telstra and Vodafone were consulted during the course of the assessment and both Optus and Telstra have indicated that services should not be adversely impacted by the Project.

16.5.11 Wireless Internet

Aussie Broadband Pty Ltd provides wireless internet services to customers in the vicinity of the Project. As the locations of customers are unknown, it is not possible to determine the potential for interference to services to such customers. However, Aussie Broadband has confirmed that the Project will not adversely impact their services.

Residents in the vicinity of the Project may also utilise Telstra Next G wireless broadband, which utilises the same network as the NextG mobile phone service. The presence of the WTGs is unlikely to cause any interference to this service, as discussed in *Section 16.5.10*.

16.5.12 Satellite Television and Internet

In some rural or remote areas, television and internet access can only be provided through satellite. A review of the line-of-sight between all useable television, internet satellites and dwellings considered in the analysis in the region of the Project was undertaken. This review concluded that no WTGs intercept the line-of-sight of the television and internet satellites commonly used in Australia.

16.5.13 Radio Broadcasting

Radio Broadcasting using Amplitude Modulation (AM) signals is able to propagate around obstructions such as WTGs, and therefore is not expected to cause significant interference for a receiver.

Frequency Modulation (FM) radio signals are susceptible to interference from buildings and other structures and can result in hissing and distortion being heard by a listener. Any interference is likely to be only in the immediate vicinity of the WTG.

At present, digital radio is not available in the Dundonnell region.

16.6 Impacts and Mitigation Measures

The EMI impacts of the Project and initial impact ratings are summarised in *Table 16-2*. Mitigation measures to minimise impacts, and the residual impact rating after environmental mitigation measures have been applied, are also provided in *Table 16-2*.

Table 16-2 EMI Impacts, Mitigation Measures and Residual Impacts

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
16-01	Potential for the Project to affect the performance of the following radio communications services through the introduction of EMI: • Fixed point-to-point links; • Point-to-multipoint links; • Emergency services; • Aviation radar; • Meteorological radar; • Trig stations; • CB Radio; and • Satellite television and internet.	Minor	Ongoing consultation with service operators.	Minor
16-02	Potential for the Project to affect the performance of television and radio broadcasting through the introduction of EMI.	Minor	Project activities will be undertaken in accordance with a Television and Radio Reception Management Plan. The Plan will include the following requirements: • Before the commencement of construction of the wind energy facility, a pre-construction survey must be carried out to determine television and radio reception strength in the area within 5km of the wind farm site and in which dwellings are located, to the satisfaction of the responsible authority. • The pre-construction survey must include testing at selected locations to enable the average television and radio reception strength in the area within 5km of the wind farm site to be determined. The specific locations of testing will be determined by an independent television and radio-monitoring specialist, to the satisfaction of the responsible authority. • If, following commencement of the operation of the Project, a complaint is received regarding the Project having an adverse effect on television or radio	Minor

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
			reception at any dwelling within 5km of the wind farm site, which existed prior to construction, a post-construction survey must be carried out at the dwelling. • If the post-construction survey establishes any increase in interference to reception as a result of the Project, the operator of the wind farm must undertake measures to mitigate the interference and return the affected reception to pre-construction quality to the satisfaction of the responsible authority. If required, the following mitigation measures can be implemented (in approximate order of increasing cost): 1. Realigning the householder's TV antenna more directly towards their existing transmitter; 2. Tuning the householder's antenna into alternative sources of the same or suitable signal; 3. The installation of more directional and/or higher gain antenna at the affected house; 4. Relocating the antenna to a less affected position; 5. The installation of cable/satellite television at the affected house; and 6. Installation of a television relay station. • In the event that DTV reception cannot be improved, satellite television will be considered as an alternative. • Interference to radio broadcasting can be mitigated through the installation of a high quality antenna and/or amplifier.	
16-03	Potential for the Project to affect the performance of mobile phones and wireless internet through the introduction of EMI.	Minor	No specific mitigation measures are required as simple procedures are available to mitigate interference, such as moving a short distance to a new or higher location until the signal improves, or using an external antenna to improve the signal.	Minor

16.7 Impact Assessment Conclusions

The assessment has determined that the Project is unlikely to have an adverse impact on the performance of radiocommunications systems through the introduction of EMI.

Any potential interference from the Project on television broadcasting, mobile phones, wireless internet and radio broadcasting could be rectified with the implementation of mitigation measures. The overall residual EMI impacts as a result of the construction and operation of the Project would be minor.

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 17 - LANDSCAPE AND VISUAL

This page is intentionally blank

Contents

Figures

Tables

This page is intentionally blank

17 LANDSCAPE AND VISUAL

This Chapter describes the landscape and visual impacts of the Project and the proposed mitigation measures that are designed to minimise any adverse impacts on the landscape values in the vicinity of the Project.

A *Landscape and Visual Impact Assessment* was undertaken for the Project and concluded as follows:

- The Project is located within a highly modified rural landscape and the existing rural activities, associated structures and other infrastructure have created a landscape that can readily absorb change.
- On-site assessment of potential visual impact at 40 publically accessible viewpoints within the viewshed of the Project determined that the visual impact of the Project at all locations would be negligible to minor.
- Owners of residential dwellings located within 2km of a WTG are either participating in the Project or have given their consent for the Project to proceed. Between 2km and 4km of WTGs, there are an additional 13 dwellings which are not participating in the Project. Landscape mitigation measures have been recommended, and if necessary will be offered to reduce visual impact to these residential dwellings.
- Cumulative visual impacts as result of the Project will be limited to the regional and local road network, and will be minor for most viewers.

17.1 EES Objectives

The EES evaluation objectives relevant to landscape and visual impact are:

Landscape and Geoscience Values - To avoid or minimise adverse effects on the landscape and geoscience values of the region.

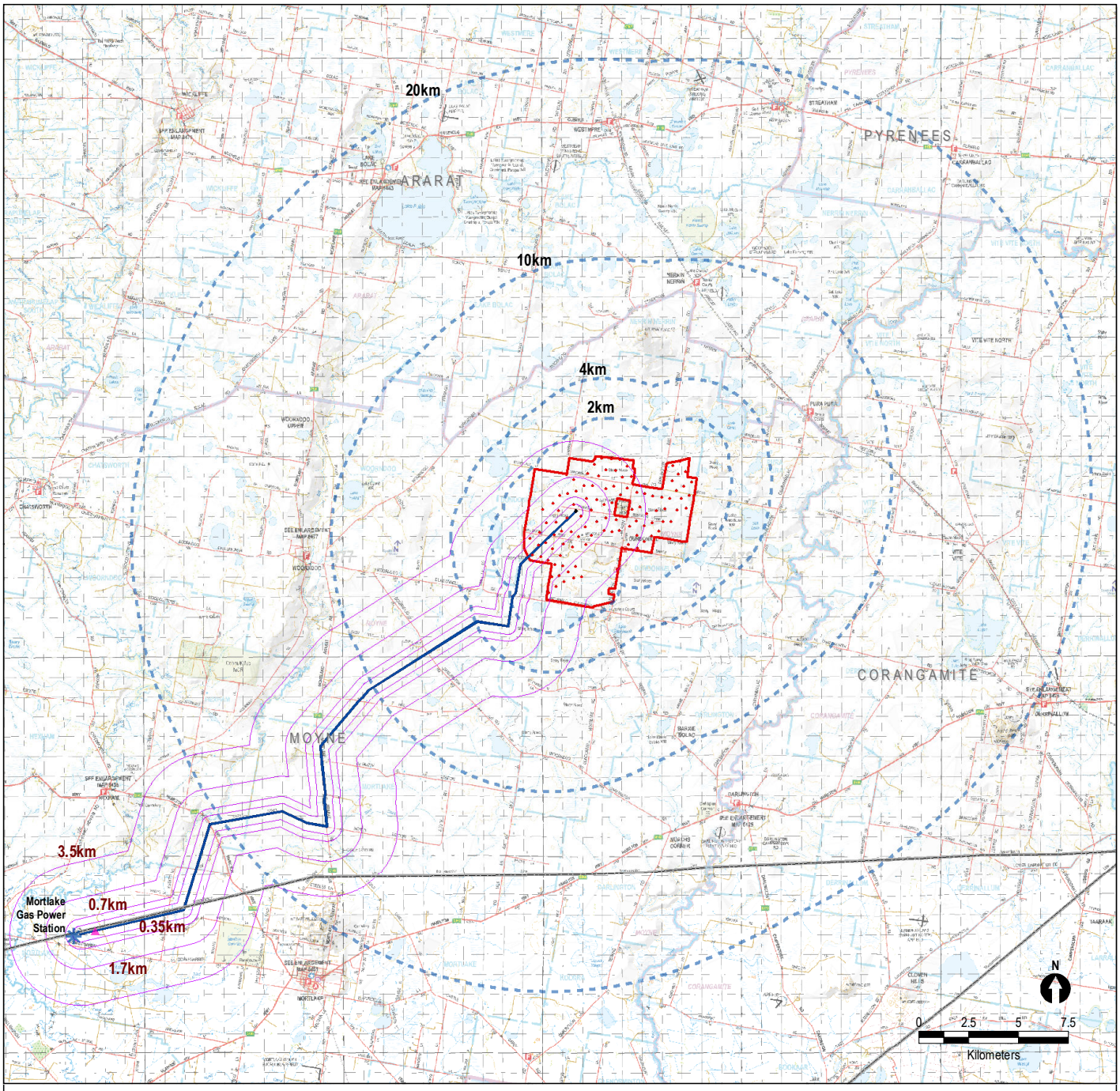
Amenity – To avoid or minimise adverse noise, visual and other amenity effects on nearby residents and local communities, to the extent practicable.

This Chapter is based on the *Landscape and Visual Impact Assessment* (LVIA) undertaken by ERM dated October 2014. This report is contained in Volume 2. A peer review of the LVIA was undertaken by Moir Landscape Architecture in 2014 and is also included at Volume 2. The EES Scoping Requirements are addressed in this Chapter and in the LVIA by:

- identifying the components of the Project that may result in a significant visual amenity effect including WTGs, transmission lines and the connection to the grid and off-site substation;
- identifying effects on significant landscape values of the region;
- characterising the landscape character, features and values of the Project area, their significance and sensitivity to change;
- assessing the likely effects of the Project on identified landscape values, including in the context of the objectives of the Kanawinka Global Geopark;
- identifying sensitive receptors that may be subject to the various amenity effects from the Project including, but not limited to all dwellings within 2km of WTGs;
- identifying significant public and private viewsheds to and from the Project;
- assessing the visual effect of the Project, using photomontages or other visual techniques to support this assessment;
- undertaking an assessment of likely cumulative landscape effects; this takes account of simultaneous as well as sequential views along tourist routes; and
- outlining potential design and siting options that could mitigate effects on visual amenity from adjoining residences.

17.2 Study Area

The study area for the LVIA is defined by the viewshed for the Project, which is the area within which it is considered that a development could create recognisable impacts within a landscape. The study area is identified in *Figure 17-1*.



Legend

- Wind Farm site boundary
- Wind turbine generators
- Off-site substation
- Mortlake Gas Power Station
- Existing transmission line
- Proposed transmission line corridor
- Transmission line ZVI (3.5km ~ Study Area)
- Wind farm ZVI (20km ~ Study Area)

Client:	Trustpower		
Drawing No:	0107773_017G_R2_EES_Fig17_1_LVIA_StudyA_150414.mxd		
Date:	14/04/2015	Drawing Size:	A4
Drawn By:	ML	Reviewed By:	DB

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 17-1 - LVIA Study Area and Zones of Visual Influence (ZVI)

Dundonnell Wind Farm

EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

17.2.1 Viewshed

The area that may potentially be visually affected by the Project is called the viewshed. The viewshed is the delineation of the area from which development could create a recognisable impact within a landscape. It is noted that the viewshed does not take into account screening or topography.

The viewshed can be defined by the distance at which the tallest component of the Project would take up less than 5% of the vertical field of view. Typically the field of view of a person is 10°, and 5% of the vertical field of view is approximately equal to 0.5°.

At 20km distance, a 165m high WTG would take up 5% of the vertical field of view. The distance at which a 35m high monopole would take up 5% of the vertical field of view is 3.5km. The methodology for the calculation of the viewshed is further explained within the LVIA contained at Volume 2.

Within the viewshed there are zones of visual influence (ZVI), or distance ranges, which have been established to determine the influence that distance has on visual impact.

The ZVI included in the LVIA is described at *Table 17-1*.

Table 17-1 Zones of Visual Influence

Distance from observer to nearest WTG	Distance from observer to transmission line	Zones of visual influence
>20km	>3.5km	*Outside the viewshed*
10km-20km	1.5km-3.5km	*Visually recognisable* A small element which is visually discernible in most lighting conditions. At the outer edge of this range, in all but exceptionally clear lighting conditions WTGs become increasingly imperceptible.
4.0km-10km	700m-1.5km	*Visually noticeable* The proposed WTGs/ transmission line will be visible in most lighting conditions. Landscape between the viewer and WTGs can reduce visual impact, more so if vegetation is closer to the viewer.
2.0km-4.0km	50m-700m	*Visually prominent* The proposed WTGs/transmission line will be visually prominent in the landscape. The degree of prominence will depend on the WTGs' placement within the landscape.
<2.0km	<50m	*Visually dominant* The proposed WTGs/transmission line will dominate the landscape. The degree of visual dominance may be reduced by the screening offered by nearby vegetation or buildings. Foreground vegetation/landscaping can be effective in mitigating impact if located next to an observer.
ERM, 2014		

17.3 Assessment Methodology

The methodology used is detailed in the LVIA at Volume 2 and included the following:

- defining the viewshed and zones of visual influence (ZVI) of the Project (based on the parameters of human vision);
- identifying Landscape Units within the viewshed;
- undertaking a Seen Area Analysis (SAA) using Geographic Information System (GIS) (a SAA illustrates those areas from which WTGs are visible either as a whole or in part);
- preparing photomontages;
- undertaking a visual impact assessment of publicly accessible viewpoints; and
- comparing the impacts assessment results against past community perception studies to benchmark community responses regarding the impact of wind farms on the landscape with the evaluation within the LVIA.

17.4 Legislation and Policy

The relevant legislation and government policies for landscape and visual impact are outlined in *Table 17.1*. It is noted that the Kanawinka Global Geopark designation, the *Draft National Wind Farm Guidelines* and the *South West Victoria Landscape Assessment Study* (SWVLAS) do not carry any statutory weight in the assessment of visual impacts, however they have been included in *Table 17-2* to provide policy context. The key policy relevant to the assessment of landscape and visual impact is the Wind Energy Guidelines.

Table 17-2 Relevant Landscape and Visual Impact Legislation and Policies

Legislation / Policy	Description
State	
Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria (DELWP, 2015)	The Wind Energy Guidelines provide guidance in the assessment of wind farms and inform planning decisions about wind energy facility proposals. The Wind Energy Guidelines set out information requirements for wind energy developments, including the preparation of a visual impact assessment to accompany planning permit applications for wind energy facilities, which outline how the proposal responds to any significant landscape values in the area. The Wind Energy Guidelines also specify matters for consideration by a responsible authority when assessing a planning permit application, which includes provisions in planning schemes that relate to landscape significance or community values, and that have been identified within the Planning Schemes applying to areas within the viewshed.
Planning and Environment Act 1987	All Victorian municipalities are subject to land use planning controls governed by the P&E Act. The purpose of the Act is to establish a framework for planning the use, development and protection of land in Victoria in the present and long-term interests of all Victorians. The P&E Act requires that a planning framework, termed a Planning Scheme, be established for all land within Victoria. Local planning schemes refer to the Wind Energy Guidelines as the basis for the assessment of the visual impacts of a wind farm. Clause 52.32 of all planning schemes in Victoria requires consideration for the Wind Energy Guidelines prior to determination of an application of a planning permit application for a wind energy facility. The VPPs also highlight the importance of areas within a Significant Landscape Overlay (SLO).

Legislation / Policy	Description
Great South Coast Regional Plan, Victorian Government, July 2014 (GGP)	The GGP is recognised under Clause 11.05-4 'Regional planning strategies and principles' of the State Planning Policy Framework. The GGP outlines the land use planning framework for the Great South Coast region and a 30-year vision for the Great South Coast, with the aim to *'create a thriving, multifaceted and resilient economy, while valuing and managing out natural resources and environment…'* The GGP recognises that an abundance of energy assets, including renewable energy resources for wind, is one of the key influences on future growth in the Great South Coast region and offers opportunities to diversify the economy, particularly in rural areas. Relevant strategies include avoiding development impacts on land that contains high biodiversity values, landscape amenity, water conservation values, food production and energy production capacity, extractable resources and minerals, cultural heritage and recreation values, assets and recognised uses.
Local	
Moyne Planning Scheme	The entire Project as well as the majority of the viewshed is within Moyne Shire Council. The Moyne Planning Scheme is implemented via the P&E Act. Clause 21.06 'Environment' of the Moyne Planning Scheme outlines the physical nature of the land within the Shire; identifies areas that have significant landscape character; and outlines strategies to protect areas of high scenic value. There are no SLOs identified within the Moyne Planning Scheme that are within the viewshed for the Project.
Corangamite Planning Scheme	Areas within the east of the Project viewshed fall within the Corangamite Shire. Clause 21.02 'Key Influences' of the Corangamite Planning Scheme identifies issues affecting development, including the protection of sensitive coastal and volcanic landscapes, and natural and built heritage assets. Clause 21.04 'Objectives, Strategy and Implementation' outlines environmental objectives within the Shire. To achieve the stated environmental objectives, visual assessments of important landscape features and environments are identified as a relevant strategy. Two areas within the Project viewshed are affected by SLO Schedule 1 (SLO1). These are related to Mt Elephant, which is approximately 19 km to the south-east of the wind farm site and a rise to the west of Vite Vite Skipton Road and south of Alexanders Road, approximately 20km north-east of the wind farm site.
Ararat Planning Scheme	A portion of the viewshed to the north of the Project falls within the Ararat Shire. Clause 21.04 'Environment' of the Ararat Planning Scheme outlines the objective to protect rural and natural landscapes, including areas surrounding the Grampians National Park, Langi Ghiran State Park, Black Range and the Mt Buangor State Park. The Clause also seeks to ensure that land use and development does not adversely impact on the environment, social and economic values of public land. There are no SLOs identified in the Ararat Planning Scheme within the Project viewshed.
Pyrenees Planning Scheme	Only a small area to the north east of the Project viewshed falls within the Pyrenees Shire. Key objectives in the Pyrenees Planning Scheme include the need to retain the dominance of the landscape from key viewing locations throughout the region. There are no SLOs identified in the Pyrenees Planning Scheme within the Project viewshed.

Legislation / Policy	Description
Kanawinka Global Geopark – recognised by UNESCO	A Geopark is a geological site or a collection of sites with specific geological heritage of international significance. It encourages sustainable economic development, mainly through tourism. The Kanawinka Geopark covers a significant portion of western Victoria. The viewshed of the Project falls partly within the 'Lakes and Craters Precinct'. \
Other	
Draft National Wind Farm Development Guidelines (EPHC, 2010)	The purpose of the Draft National Guidelines is to provide a nationally consistent set of best-practice methods for assessing the impacts associated with wind farm developments and operations, including landscape and visual impact.
South West Victoria Landscape Assessment Study, Planisphere, June 2013 (SWVLAS).	The SWVLAS assesses the visual character and landscape significance of South West Victoria. This study is intended to ensure landscapes of importance are adequately protected and managed into the future and inform planning decisions. The Western Volcanic Plains (Character Type 1) is the only character type identified within the viewshed of the wind farm site. The SWVLAS does not identify any views of state or regional significance within the Project viewshed.

17.5 Project Visual Components

The visual components of the Project will include the WTGs, wind monitoring masts, above ground transmission lines, the on-site substation, temporary concrete batching plant and on-site quarry. An off-site substation to connect the Project to the electrical grid is proposed to be constructed adjacent to the MOPS at the south-western end of the 220kV transmission line. The maximum overall height of the WTGs will be 165m and will be the largest element of the Project. The tallest proposed structure associated with the 220kV transmission line will be monopoles up to a maximum height of 35m AGL. Double pole structures may be required in select locations due to topography or other technical requirements.

17.6 Existing Conditions

17.6.1 Land Form and Land Use

The study area is located within the Western Volcanic Plains of South Western Victoria. The topography within the viewshed is predominantly gently undulating to flat. Within the viewshed, the topography ranges between 200m to 250m Australian Height Datum (AHD). Three topographically derived landforms occur within the viewshed. These are:

- the flatter alluvial and basaltic plains;
- the stony rises; and
- the volcanic cones.

The volcanic cones located within the viewshed include Mt Hamilton, Mt Shadwell and Mt Elephant. These volcanic cones rise some 100m above the surrounding plains.

The predominant land use within the study area is agriculture. Other elements within the viewshed include towns and rural hamlets, road infrastructure such as highways and local roads, and electrical infrastructure.

The majority of native vegetation within the viewshed has been cleared, and replaced with exotic pasture grasses. Taller vegetation is confined to roadsides, fence lines and boundaries, watercourses and windbreaks.

17.6.2 Landscape Units within the Viewshed

Landscape units are areas with similar visual characteristics determined by geology, vegetation, topography and drainage patterns, the extent of man-made modifications and urban development.

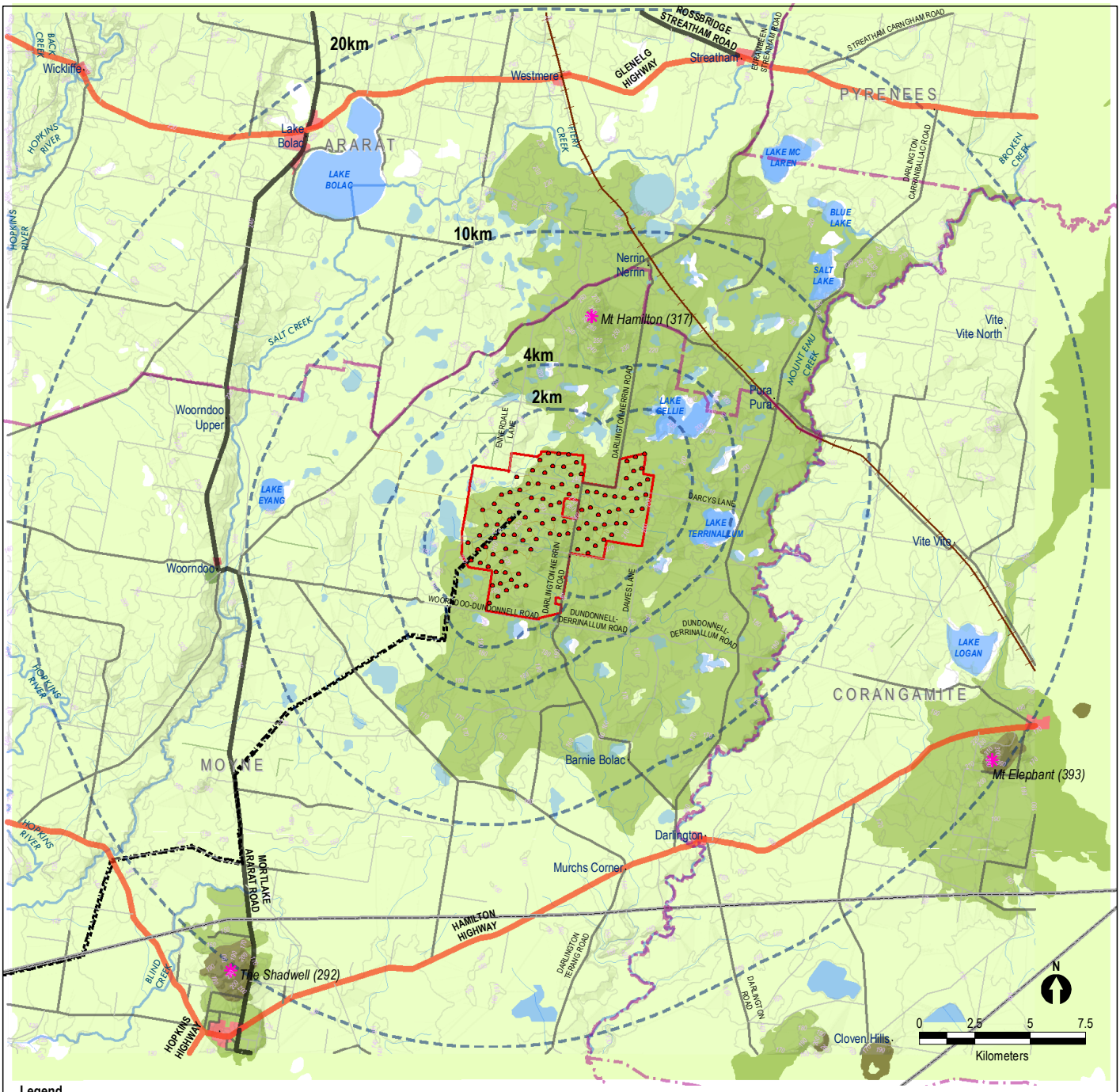
The SWVLAS identifies the landscape character types in South West Victoria. The Western Volcanic Plains (Character Type 1) is the only character type identified within the viewshed of the wind farm. The SWVLAS acknowledges the presence of WTGs in this man-modified landscape. The landscape units identified in the LVIA are broadly consistent with the classification of landscape character areas identified in the SWVLAS.

Landscape sensitivity is defined as the ability of a landscape unit to absorb visual change, taking into account the attributes of a particular landscape unit. The sensitivity of viewers to changes in landscape units will depend on the location, rarity and scenic qualities of the setting as well as the subjective opinion of the viewer. Generally, the greater the existing modifications that have occurred to the landscape the lower its sensitivity to change will be.

The landscape units within the viewshed and their sensitivity are described in *Table 17-3* and illustrated in *Figure 17-2*.

Table 17-3 Landscape Units within the Viewshed

Landscape Units		Description	Sensitivity
1	Farmland Landscape Unit, comprising two sub-units (below)	'Farmland Landscape Unit' comprise of areas used primarily for agricultural purposes. This landscape unit includes two sub-units, "the plains" and "stony rises".	Ephemeral water bodies occur within the farmland landscape both in "the plains" as well as "stony rises". Given the temporal nature of these water bodies, the visual sensitivity of the farm landscape will vary between wet and dry seasons.
1A	Plains	The plains are characterised by gentle slopes and are derived from scoria basaltic flows, alluvial or sedimentary origins. This landscape unit is predominantly cleared with remnant patches of vegetation occurring along drainage lines and creek beds, interspersed with shelterbelt planting and hedgerow planting.	*Low* This unit is heavily man-modified, contains other infrastructure, is not topographically dramatic and does not contain large areas of water.
1B	Stony rises	The stony rises are characterised by basalt rocks scattered throughout the farmland landscape. This landscape unit has a higher visual sensitivity to that of 'The Plains', as the presence of tumbled blocks and rock walls provide a visual contrast to the surrounding landscape.	*Medium* Whilst this unit is also heavily modified, the broken undulating topography is more interesting and landscape elements, such as the volcanic rock walls which run across the landscape unit and make it more appealing.
2	Rural Communities and Townships Landscape Unit	Characterised by a cluster of residential dwellings around a main street with shops. Some townships have parks and reserves as well as community orientated buildings. Vegetation located within rural communities and townships are typically located within road reserves and residential gardens.	*Medium* An abundance of built forms and other visual elements lessen the sensitivity of these areas, however, due to the presence of houses, the landscape sensitivity is rated medium.
3	Volcanic Cones Landscape Unit	Volcanic cones provide easily recognisable points within the region. Mt Hamilton, Mt Elephant and Mt Shadwell are three volcanic cones that occur within or near the viewshed. Volcanic cones rise above the surrounding plains and provide easily recognisable points within the region.	*High* At a higher elevation to the surroundings, this unit offers views to both natural and constructed elements and area unique elements especially within the surrounding plains.



Legend

- Wind Farm site boundary
- Wind turbine generators
- Access tracks
- Proposed transmission line corridor
- Existing transmission line
- Rail
- Zones of visual influence (2.0km,4.0km,10km,20km)
- Volcanic Cones

Landscape units

- Unit 1a - Farmlands on Plains
- Unit 1b -Farmland on Stony Rises
- Unit 2 - Rural Communities and Townships
- Unit 3 - Volcanic Cones (scoria)

Client:	Trustpower	
Drawing No:	0107773_017G_R2_EES_Fig17_2_Lunits_150414.mxd	
Date:	14/04/2015	Drawing Size: A4
Drawn By:	ML	Reviewed By: DB

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 17-2 - Landscape Units within the Viewshed

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

17.7 Assessment of Impacts

17.7.1 Seen Area Analysis

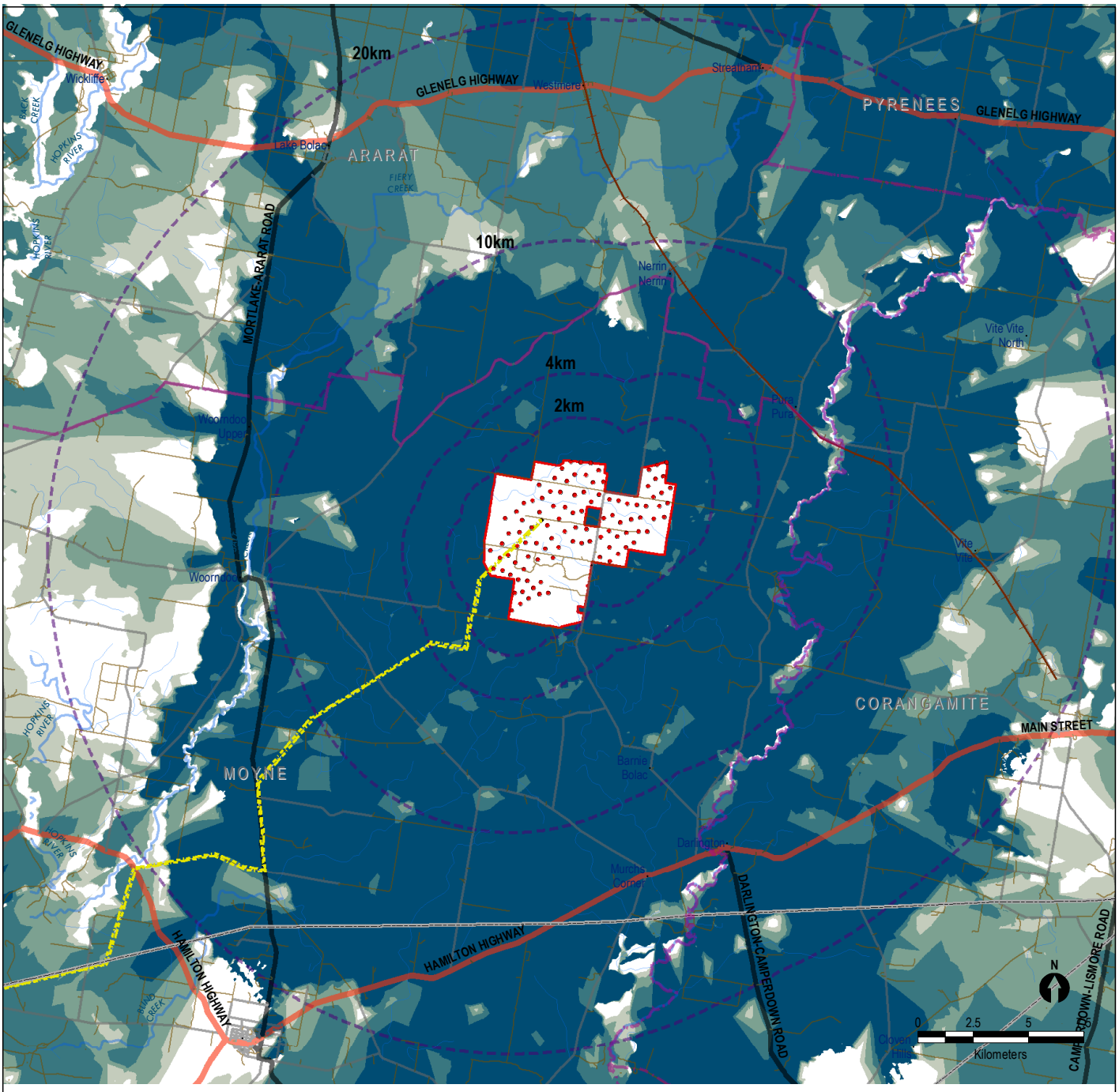
A Seen Area Analysis (SAA) maps those areas within the viewshed from which WTGs, or sections of WTGs, may be visible. The extent to which a wind farm is visible depends upon the nature of the intervening topography. The SAA is a conservative map of the extent of visibility as it does not take into account screening by vegetation, minor topographic changes and buildings.

The visibility of the WTGs within the viewshed is illustrated in *Figure 17-3*. The extent of WTG visibility within Zone A and Zone B of the viewshed is shown in *Figure 17-4* and *Figure 17-5*. Additional maps are provided in Volume 2.

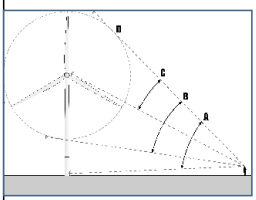
Results of the SAA indicate:

- there are very few locations from which there will be views to all of the WTGs in their entirety (Zone A). These are limited to the area to the immediate west of the wind farm site and along sections of Mortlake-Ararat Road on the western escarpment of Salt Creek and from Mt Elephant and Mt Hamilton;
- the swept path (Zone B) will be visible for a large proportion of the viewshed to the south and areas up to the 8.5km viewshed to the north; and
- due to the gently sloping nature of the land within the viewshed, the upper section of the swept path (Zone C) will be potentially visible from most locations within the viewshed.

Visibility may be reduced by vegetation, buildings or minor topographic features that are too small to show in the contour data.



Legend



Wind Turbine Visibility

Zone A	One or more wind turbines visible in their entirety
Zone B	The entire swept path of the blades of one or more wind turbines visible
Zone C	At least half of the swept path of one or more wind turbines visible
Zone D	Any part of one or more wind turbines visible
None Visible	

- Wind turbine generators
- Proposed transmission line corridor
- Zones of visual influence (2.0km,4.0km,10km,20km)
- Wind Farm site boundary

Client:	Trustpower	
Drawing No:	0107773_017G_R2_EES_Fig17_3_VisAll_150414.mxd	
Date:	14/04/2015	Drawing Size: A4
Drawn By:	ML	Reviewed By: DB

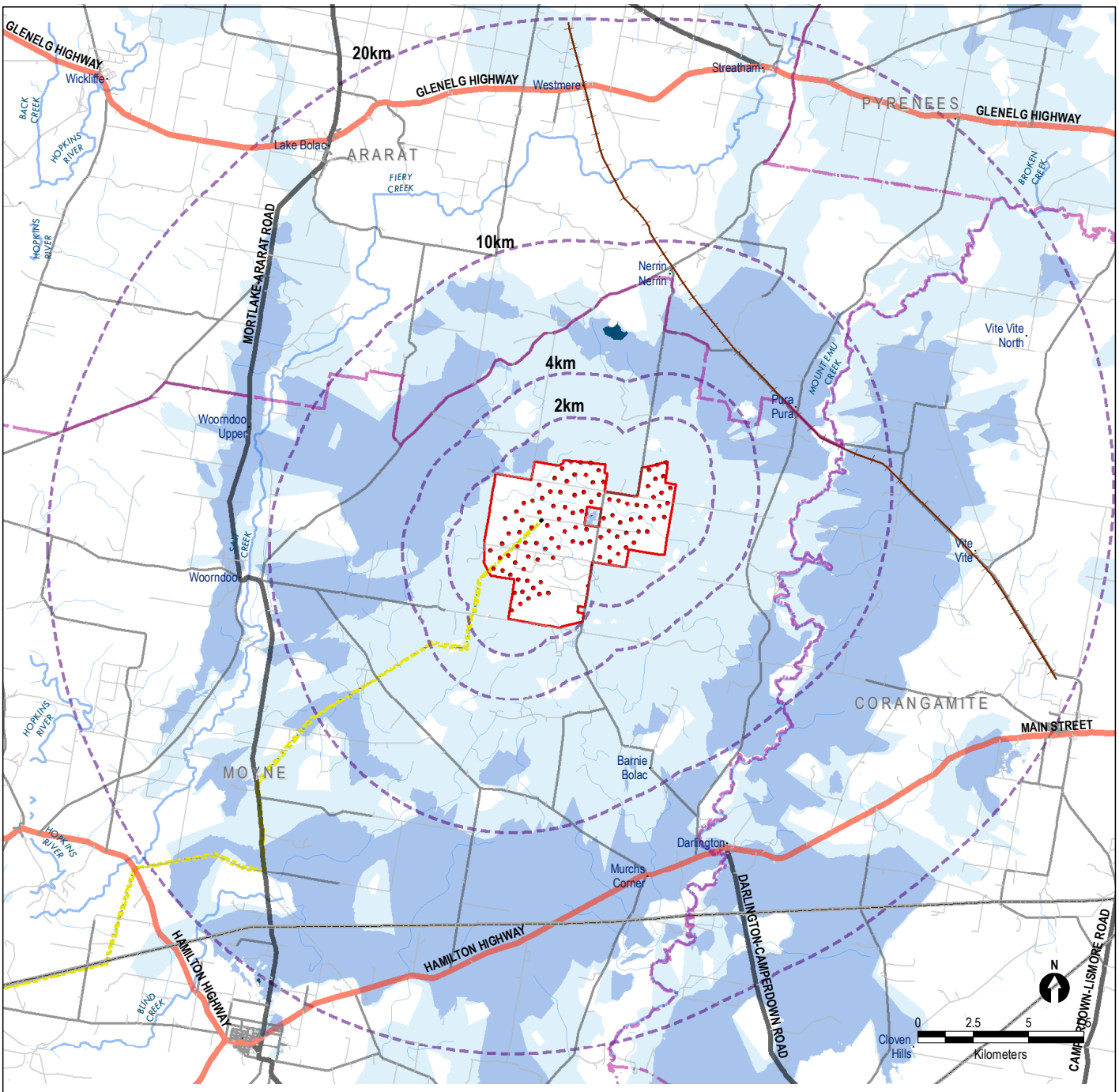
Figure 17-3 - Visibility of Whole or Part of WTGs within the ZVI

Dundonnell Wind Farm
EES

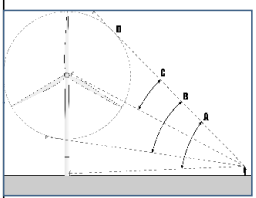
Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Legend



Wind Turbine Visibility (Zone A)

No of wind turbines visible

- None visible
- 1 - 35
- 36 - 70
- 71 - 104

- Wind Farm site boundary
- Wind turbine generators
- Zones of visual influence (2.0km,4.0km,10km,20km)
- Proposed transmission line corridor

Client:	Trustpower	
Drawing No:	0107773_017G_R2_EES_Fig17_4_ZoneA_150414.mxd	
Date:	02/03/2015	Drawing Size: A4
Drawn By:	ML	Reviewed By: DB

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

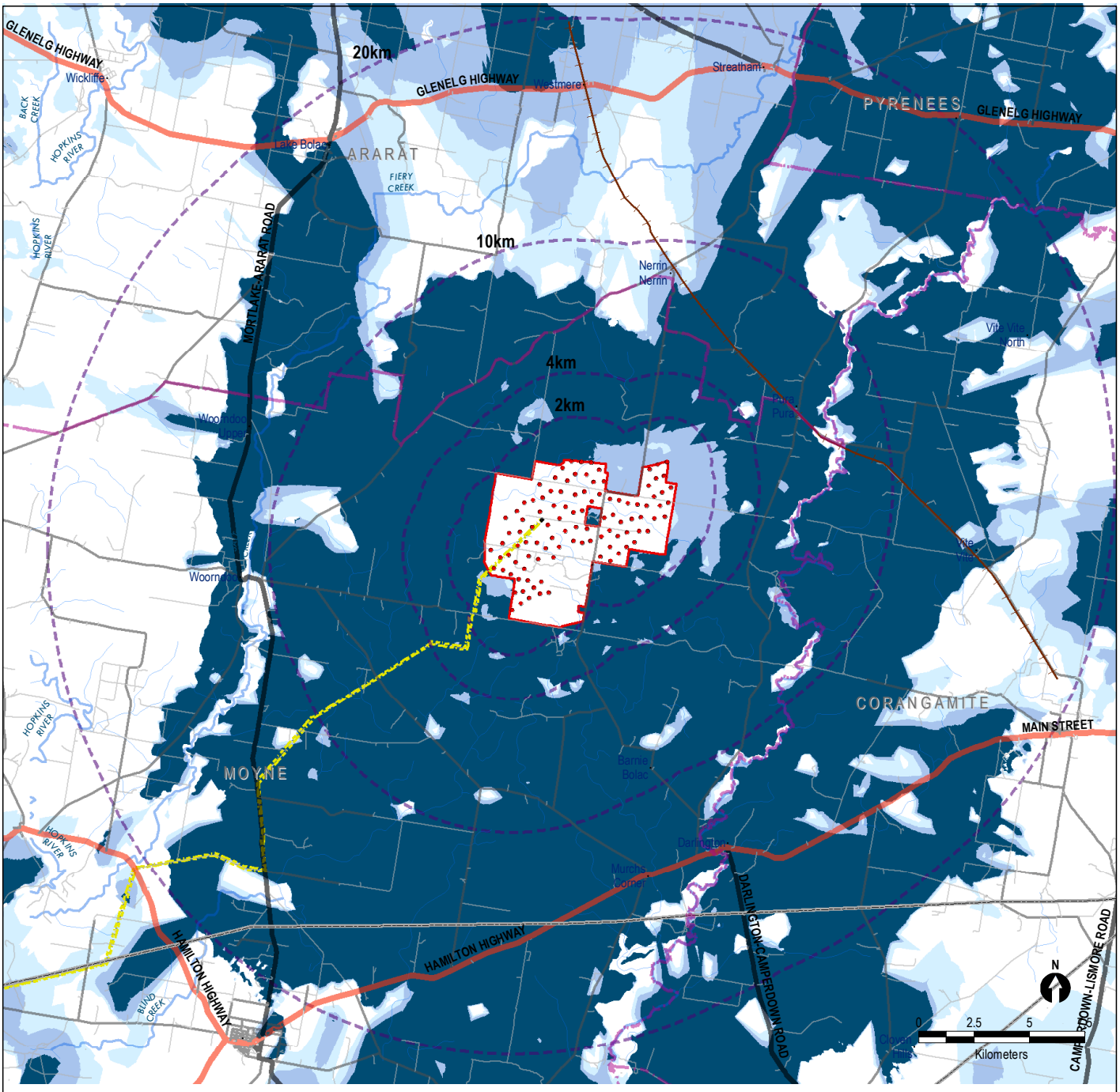
Figure 17-4 - Zone A - Visibility of One or More Whole WTGs within the Viewshed

Dundonnell Wind Farm
EES

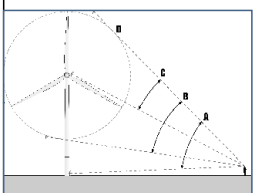
Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Legend



Wind Turbine Visibility (Zone B)

No of wind turbines visible

- None visible
- 1 - 35
- 36 - 70
- 71 - 104

- Wind Farm site boundary
- Wind turbine generators
- Zones of visual influence (2.0km,4.0km,10km,20km)
- Proposed transmission line corridor

Client:	Trustpower	
Drawing No:	0107773_017G_R2_EES_Fig17_5_ZoneB_150414.mxd	
Date:	14/04/2015	Drawing Size: A4
Drawn By:	ML	Reviewed By: DB

Figure 17-5 - Zone B - Visibility of Swept Path of One or More WTGs within the Viewshed

Dundonnell Wind Farm

EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

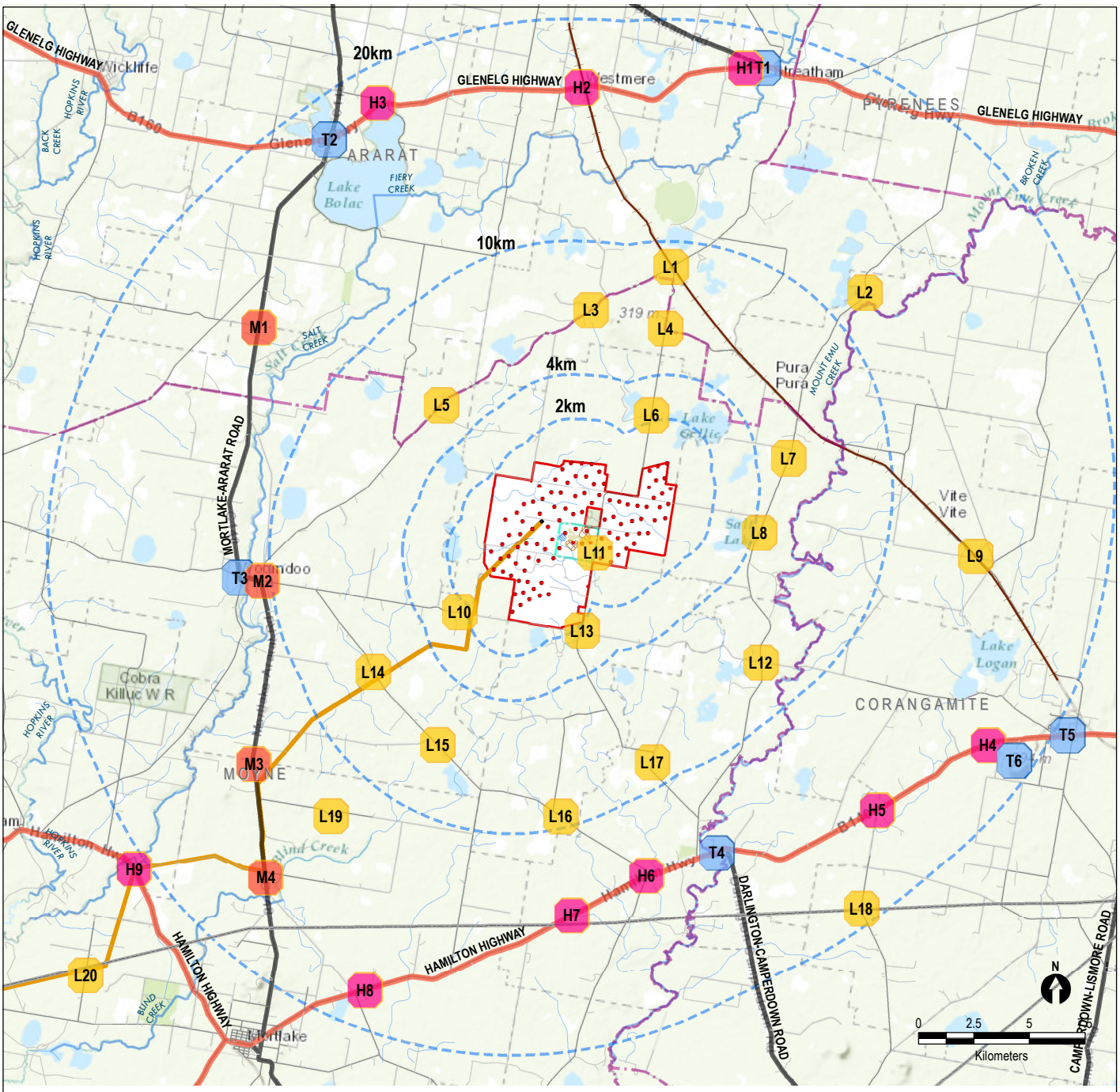
17.7.2 Publically Accessible Viewpoints

Forty viewpoints within the ZVI were selected as representative of publicly accessible locations in and around the Project. Viewpoints were selected based on SAA results.

A number of viewpoints with similar locational attributes were grouped together in order to determine the overall visual impact from the different areas or locations. The LVIA at Volume 2 illustrates the selected viewpoints and describes the visual impacts from each of the individual viewpoints. Viewpoint locations in the farmland where large water bodies may be present in the viewshed are identified as being of greater landscape sensitivity. Photomontages were developed illustrating the potential visual impact of the WTGs from six of the selected viewpoints. The photomontages are included within an annex of the LVIA at Volume 2. The viewpoints selected are shown in *Figure 17-6* and the level of assessed visual impact is described in *Table 17-4*.

Table 17-4 Locational Groups and Visual Impacts

Locational Group	Viewpoints	Assessed level of impact
Rural townships and Reserves: Streatham, Bolac, Woorndoo, Darlington and Derrinallum	T1-T6	*Negligible/Minor* Townships and reserves are rated as having a high sensitivity to visual change, however, the wind farm is distant from each of these viewpoints (between 12km and 17km from the WTGs) and seen across an open rural landscape. The WTGs will be noticeable on the periphery of the townships but will not have any visual impact from locations within the townships. The WTGs are screened by vegetation from locations within the reserves.
Highways: Glenelg Highway, Hamilton Highway, and Mortlake-Ararat Road	H1-H9	*Negligible/Minor* Views from these locations are over Landscape Unit 1 – Farmland, which is considered to have a low level of visual sensitivity. The Glenelg and Hamilton Highways are at such a distance (between 12km-20km) that the WTGs would be visible; however, they will be only a small element in the view.
Major Roads: Mortlake Ararat Road	M1-M4	*Negligible* The viewpoints are located more than 10km from the nearest WTG. At this distance, even without intervening vegetation, the overall visual impact is assessed as negligible.
Local Roads	L1-L21	*Minor* Fifteen of the twenty-one viewpoints assessed along the local road network are less than 10km from the nearest WTG. These roads have low viewer numbers and views across a landscape with low sensitivity to visual change. Therefore the overall visual impact is assessed as low-negligible. Viewpoint L8 is located within the Farmland Landscape Unit, and the overall visual impact is assessed as low. However given the presence of an ephemeral water body, the level of impact during wet periods is assessed as moderate. Viewpoint L11 is located approximately 300m from the nearest WTG and the view is across the Stony Rises. For this viewpoint, the visual impact is assessed as low. Viewpoint L21 is approximately 30km to the south west of the wind farm and 500m from the off-site substation proposed to be constructed within the MOPS. The new substation would be visually similar, albeit much smaller than the existing power station. Existing vegetation planted along the site boundary of the MOPS will filter most views to the new substation from Connewarren Lane. For this viewpoint, the visual impact is assessed as negligible.



Legend

- Wind Farm site boundary
- Wind turbine generators
- Quarry access track
- Quarry
- Storage dam
- WA1540
- Zones of visual influence (2.0km,4.0km,10km,20km)
- Proposed transmission line corridor

Viewpoints

- Towns
- Highway
- Major Roads
- Local Roads

Client:	Trustpower	
Drawing No:	0107773_017G_R3_EES_Fig17_6_Viewpoints_150603.mxd	
Date:	03/06/2015	Drawing Size: A4
Drawn By:	ML	Reviewed By: DB

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 17-6 - Viewpoint Locations

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

17.7.3 Residential Properties

Owners of residential dwellings located within 2km of a WTG are either participating in the Project or have given their consent for the Project to proceed. Landscape and visual impacts to these dwellings have therefore not been considered as part of this assessment.

The greatest potential for visual impacts to occur is to neighbouring, non-participating residential properties within 4km of a WTG. Between 2km and 4km of WTGs, there are an additional 13 dwellings which are not participating in the Project. At the time of the LVIA preparation, none of these landholders have requested a visual impact assessment be undertaken from their property. Trustpower has advised that the community consultation undertaken to date has provided these residents with opportunity to come forward and request a visual impact assessment be undertaken. Mitigation measures are available to reduce visual impact to residential dwellings and are detailed in *Table 17-5*. Such mitigation measures are typically made available for up to one year after completion of construction of the wind farm.

17.7.4 Transmission Line Impacts

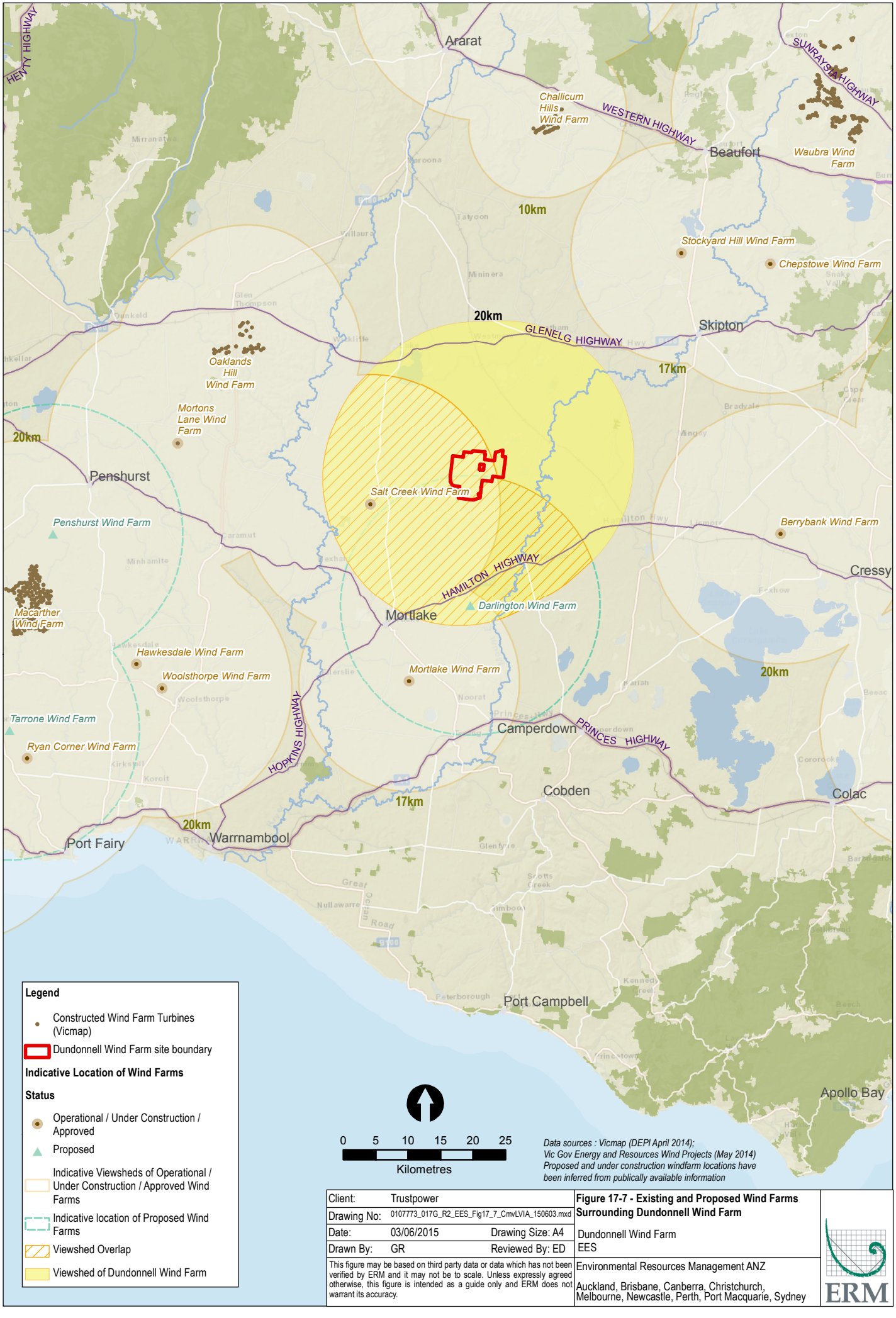
The proposed electricity infrastructure is similar in scale and type to the existing electrical infrastructure found in the landscape surrounding the Project. The Project viewshed can accommodate the electrical transmission lines with a minor level of visual and cumulative impact.

17.7.5 Cumulative Impacts

Overview

The presence of multiple wind farms has the potential to result in cumulative visual impacts. This can occur when either simultaneous and/or sequential views are available to WTGs and can lead to a change in perception of a region. Simultaneous views are those where more than one wind farm is visible from the same location. Sequential views are those that occur when a viewer observes a wind farm and then, from a different location, another wind farm.

The potential for simultaneous visual impact to occur is limited to locations where the viewshed of two or more wind farms would overlap. The operational, approved and under construction wind farms surrounding the Project showing the overlap in ZVI is identified in *Figure 17-7*.



Client:	Trustpower	
Drawing No:	0107773_017G_R2_EES_Fig17_7_CmvLVIA_150603.mxd	
Date:	03/06/2015	Drawing Size: A4
Drawn By:	GR	Reviewed By: ED

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 17-7 - Existing and Proposed Wind Farms Surrounding Dundonnell Wind Farm

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

Simultaneous Visual Impacts

The greatest area of viewshed overlap is to the west and south of the Project where the viewsheds of the Salt Creek, Mortlake South and Darlington wind farms have the potential to intersect that of the Project, as shown in *Figure 17-7*. Both the Salt Creek and Mortlake wind farms are under construction. Cumulative visual impacts would occur for viewers travelling the surrounding road network (Hamilton Highway, Mortlake-Ararat Road and local roads) and from residential dwellings to the south and west of the wind farm site.

The only publicly accessible elevated lookout within the viewshed of the Project is located at Mt Elephant over 18km to the south-east. This lookout is over 20km from the Darlington Wind Farm, 30km from the Salt Creek Wind Farm and 40km from the Mortlake South Wind Farm. At these distances, visibility of the Project would be limited to clear days only and would be one of many constructed elements in views from this location.

The cumulative visual impact as a result of simultaneous views is therefore considered to be minor.

Sequential Visual Impacts

The Hamilton Highway and the Glenelg Highway are the main east west routes through south-west Victoria. Both highways are within the viewshed of the Project. Views to the Project along these roadways are over distances greater than 10km from the nearest WTGs. From these routes, the WTGs will be barely discernible. Therefore the cumulative visual impact brought about by sequential views along the Hamilton and Glenelg Highway is assessed as minor.

Mortlake-Ararat Road lies to the west of the wind farm site and is within the viewshed of the Project and Salt Creek Wind Farm. At its nearest it is over 8km from the Project. At this distance, there will be minimal change to views and impacts are therefore assessed as minor.

In some instances, multiple wind farms will be seen as road users traverse the regional and local road network. Visual impacts from publically accessible viewpoints on these roads have been assessed as negligible-minor due to low viewer numbers and the landscape having a low sensitivity to visual change. For the users of these local roads there may be a degree of perception change. For those who find wind farms unattractive, this will be a negative change to their cognitive landscape. For those who find wind farms attractive, this will be a positive change to their cognitive landscape. Cumulative visual impacts from regional and local roads are assessed as negligible.

17.8 Impacts and Mitigation Measures

The landscape and visual impacts of the Project and an initial impact rating are summarised in *Table 17-5.* The assessment determined that the landscape surrounding the site can visually accommodate the Project without the need for visual mitigation (other than potentially in relation to residential properties within 4km). The residual impact rating after consideration of environmental mitigation measures (if relevant) are also provided in *Table 17-5.*

Table 17-5 Landscape and Visual Impacts, Mitigation Measures and Residual Impacts

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
17-01	Visual Impact upon townships and public reserves	Negligible/ Minor	The siting of the wind farm and WTGs has been designed to minimise landscape and visual impacts. No further mitigation measures necessary.	Negligible/ Minor
17-02	Visual impact upon highways	Negligible/ Minor	The siting of the wind farm and WTGs has been designed to minimise landscape and visual impacts. No further mitigation measures necessary.	Negligible/ Minor
17-03	Visual impact upon major roads	Negligible	The siting of the wind farm and WTGs has been designed to minimise landscape and visual impacts. No further mitigation measures necessary.	Negligible
17-04	Visual impact upon local roads	Negligible/ Moderate	The visual impact is assessed as low to negligible from all local road viewpoints, except for viewpoint L8 in which the impact is assessed as moderate. The siting of the wind farm and WTGs has been designed to minimise landscape and visual impacts. No further mitigation measures necessary.	Negligible/ Moderate
17-05	Potential visual impact to residential properties within 4km of a WTG	Not assessed	The following mitigation measures will be implemented for potentially affected residential properties: • landscape mitigation measures to be offered to residential properties within 4km of the nearest WTG. Any such offer should remain in place for a period of one year after construction, to allow people time to either adjust or to decide that landscape filtering or screening is warranted; • site visit to affected residences and creation of a landscape concept. Species selection determined in consultation with landholders using advice from the local Landcare group; • consultation and agreement upon landscape mitigation measures between landholder and Trustpower; • implementation of agreed landscape concept carried out by the landholder and reimbursed by the Trustpower. This approach avoids the introduction of weeds to the landholder's property; and • ongoing maintenance of the agreed landscape works undertaken by the landholder not the Trustpower.	Not assessed

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
17-06	Cumulative visual impacts as a result of simultaneous views	Minor	The siting of the wind farm and WTGs has been designed to minimise landscape and visual impacts. No further mitigation measures necessary.	Minor
17-07	Cumulative visual impacts as a result of sequential views	Negligible	The siting of the wind farm and WTGs has been designed to minimise landscape and visual impacts. No further mitigation measures necessary.	Negligible

17.9 Impact Assessment Conclusions

The Project is located within a highly modified rural landscape. The siting of the wind farm and WTGs has been designed to minimise landscape and visual impacts. Moreover, rural activity, associated structures and other infrastructure have created a landscape that can readily absorb change.

The landscape and visual impact assessment has not identified any locations within the viewshed that have a high degree of visual impact from publicly accessible locations, with Project visual impacts to all groups of publicly accessible viewpoints assessed as negligible to minor, with the exception of one viewpoint from a local road which is assessed as moderate.

There may be potential visual impacts on residential properties within 2km to 4km of the Project, and appropriate mitigation measures for these properties will be implemented if required. Cumulative impacts will be limited to the regional and local road network, and will be minor for most viewers.

Perception studies consistently show that the majority of viewers do not object to the construction of WTGs on any but the most sensitive landscapes. These perception studies support the findings of this landscape and visual impact assessment.

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 18 - PLANNING AND LAND USE ASSESSMENT

This page is intentionally blank

Contents

Figures

Tables

This page is intentionally blank

18 PLANNING & LAND USE ASSESSMENT

This Chapter describes the potential planning and land use impacts of the Project and the proposed mitigation measures that are designed to ensure that the Project reduces any adverse impacts on planning and land use in the area.

A *Planning and Land Use Assessment* has been undertaken to assess the potential planning and land use impacts of the Project and concluded as follows:

- The Project accords with the relevant planning policy provisions and represents an appropriate planning and land use outcome that supports the development of renewable energy in Victoria and will result in economic and social benefits for both present and future generations.
- The development of the Project will not adversely impact on existing and potential future land uses, including agricultural activities, housing and public infrastructure.
- Management and mitigation measures have been identified to ensure the Project does not unreasonably restrict or prohibit agricultural activities from continuing on the land and to minimise potential impacts on neighbouring residential properties.

18.1 EES Objectives

The EES evaluation objectives relevant to planning and land use are as follows:

Land use and Socio-economic - To avoid or minimise disruption and other adverse effects on local infrastructure (including roads), land use (including agricultural and residential) and to neighbouring landowners and road users during construction and operation of the project.

Sustainable Development – Overall, to ensure that the Dundonnell Wind Farm Project achieves a balance of economic, environmental and social outcomes that contributes to sustainable development and provides a net community benefit over the short and longer-term.

This Chapter is based on the *Planning and Land Use Assessment* (PLUA) undertaken by ERM, dated June 2015. This report is contained in Volume 2: Supplementary Reports. This Chapter also draws on the other relevant specialist technical assessments and technical chapters of the EES.

This Chapter, the *Planning and Land Use Assessment*, the *Socio-Economic Impact Assessment* (Capire Consulting Group Pty Ltd, 2014) and the *Economic Impact Assessment* (Hudson Howells, 2014) address the EES Scoping Requirements by:

Land use and Socio-economic:

- outlining the potential for the Project to unreasonably disrupt existing and/or proposed land uses, with associated economic and social effects on households and businesses;
- describing the Project area in terms of land use (existing and proposed), residences, zoning and overlays under the Moyne Planning Scheme and public infrastructure that support current patterns of economic and social activity;
- identifying potential long and short-term effects of the Project on existing and potential proposed land uses and public infrastructure;
- demonstrating whether the Project is consistent with relevant provisions of the Moyne Planning Scheme and other relevant strategies made under Victorian legislation;
- identifying measures to mitigate and manage any adverse land use effects; and

- identifying proposed management and monitoring measures to further reduce the risk of effects and provide an estimation of likely residual effects.

Sustainable Development:

- providing an integrated assessment of the economic, social and environmental performance of the Project, including the proposed approaches to avoiding, mitigating, managing and offsetting potential adverse effects;
- providing a proportionate assessment of any relevant aspects of sustainability not otherwise addressed in the preceding sections; and
- evaluating the overall implications of the Project in the context of key aspects of legislation and statutory policy, as well as the principles and objectives of ecologically sustainable development and environment protection.

This Chapter also identifies whether any planning permits are required to facilitate the Project and includes an assessment of the Project against any relevant planning considerations and/or requirements, where appropriate.

18.2 Study Area

The study area for the PLUA included the wind farm site, the proposed off-site substation and the 38km transmission line corridor. The study area also included the properties surrounding the wind farm, substation and transmission line corridor.

18.3 Assessment Methodology

The methodology used for the PLUA included:

- a desktop review of relevant planning legislation, policies and controls;
- a desktop review of aerial photography and the reported land uses on farms in the broader region, as provided by Trustpower (planned future land uses were also considered);
- a site inspection;
- consideration of the findings of the other technical studies to inform the assessment of the Project against the planning policies, and zoning and overlay controls of the Moyne Planning Scheme;
- consultation with representatives from the Moyne Shire Council, DELWP and the CFA;
- consideration of potential impacts on planning and land use during construction of the Project; and
- consideration of potential ongoing impacts on planning and land use during the operation of the Project.

18.4 Legislation and Policy

The relevant legislation and government policies for planning and land use are outlined in *Table 18-1*. The key documentation relied upon in the preparation of the PLUA were the Moyne Planning Scheme and the Wind Energy Guidelines.

Table 18-1 Relevant Planning and Land Use Legislation and Policies

Legislation / Policy	Description
State	
Planning and Environment Act 1987	All Victorian municipalities are subject to land use planning controls governed by the P&E Act. The purpose of the Act is to establish a framework for planning the use, development and protection of land in Victoria in the present and long-term interests of all Victorians.
Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria (DELWP, 2015)	The Wind Energy Guidelines is a reference document at Clause 52.32 of the Victorian Planning Provisions and were developed to provide guidance about wind farms and inform planning decisions about wind energy facility proposals. The Guidelines also set out information requirements for wind energy developments.
Permitted clearing of native vegetation – Biodiversity assessment guidelines (DEPI, 2013)	The *Permitted clearing of native vegetation – Biodiversity assessment guidelines* (Biodiversity Assessment Guidelines) is an incorporated document at Clause 81.01 of the Victoria Planning Provisions and all planning schemes in Victoria. The purpose of these Guidelines is to guide how impacts on biodiversity should be considered when assessing an application for a permit to remove, lop or destroy native vegetation. The objective for permitted clearing of native vegetation is 'No net loss in the contribution made by native vegetation to Victoria's biodiversity.' These requirements have been considered as part of the Flora and Fauna Assessment undertaken by BL&A (2015).
Victorian Greenhouse Strategy Action Plan Update (DSE, 2005)	The Victorian Greenhouse Strategy recognises the importance of '*Positioning Victoria's economy for a low carbon future*'. Accordingly, a number of actions have been established, including those intended for supporting renewable energy and supporting cleaner energy technologies. While the focus of the Victorian Greenhouse Strategy is on government investment into projects and policies, it demonstrates the State's commitment to the establishment and use of renewable energy resources and its support for the development of renewable energy.
Regional	
Great South Coast Regional Growth Plan (Victorian Government, 2014)	The *Great South Coast Regional Growth Plan* is a reference document at Clause 11.05-4 of the Moyne Planning Scheme and outlines the land use planning framework for the Great South Coast region, which includes the Moyne LGA. The plan contains a 30-year vision for the Great South Coast, which aims to *'create a thriving, multifaceted and resilient economy, while valuing and managing out natural resources and environment…'* This vision will be achieved by (amongst other things) strengthening the region's economy through increased industry diversification, innovation and development and sustainably managing natural resources and environmental assets.

Legislation / Policy	Description
	The plan recognises that an abundance of energy assets, including renewable energy resources for wind, is one of the key influences on future growth in the Great South Coast region and offers opportunities to diversify the economy, particularly in rural areas.
South West Victoria Landscape Assessment Study (DPCD and Planisphere, 2013)	The *South West Victoria Landscape Assessment Study* (DPCD & Planisphere, 2013) has been prepared to identify and understand the landscape character types in South West Victoria, including the Moyne LGA. The Western Volcanic Plains (Character Type 1) is the only character type identified within the viewshed of the Project. It is noted that the SWVLAS has not been through any form of formal amendment process and therefore does not carry any statutory weight.
Local	
Moyne Planning Scheme	The P&E Act requires that a planning framework, termed a Planning Scheme, be established for all land within Victoria. A planning scheme is a statutory document which sets out objectives, policies and provisions relating to the use, development, protection and conservation in the area to which it applies, which in this case is the Moyne Shire Council. The relevant provisions of the Moyne Planning Scheme are outlined in *Table 18-2*.
Draft Major Energy Proposals and their Ancillary Infrastructure (Moyne Shire Council, 2011)	The *Draft Major Energy Proposals and their Ancillary Infrastructure* document is intended to assist Council deal with major energy projects within the Moyne Shire. The document specifically outlines the various information requirements that should accompany planning permit applications for wind farms. The document is yet to be considered via a formal planning scheme amendment process and therefore has no statutory weight.
Environmental Sustainability Strategy (Moyne Shire Council, 2012)	The *Environmental Sustainability Strategy* was adopted by Council in July 2012 and provides a framework for the protection and management of all environmental issues within the Moyne Shire. The Moyne Shire Council is committed to environmental sustainability and as part of this commitment has set targets to reduce the level of Greenhouse Gas (GHG) emissions through reductions in energy consumption and utilisation of renewable energy.
Other	
Draft National Wind Farm Development Guidelines, Environment Protection and Heritage Council (EPHC, 2010)	The purpose of the Draft National Guidelines is to provide a nationally consistent set of best-practice methods for assessing the impacts associated with wind farm developments and operations.

18.5 Existing Conditions

18.5.1 Tenure

Trustpower has entered into commercial agreements with 11 landholders to host the wind farm. The associated transmission line runs approximately 38km to the south-west of the wind farm site and will generally be located on private land and within road reserves. Trustpower has entered into commercial agreements with 15 landholders to host the transmission line easement. The transmission line connects with the proposed off-site substation on the land to the east of MOPS (EPA Licence 8750) and a commercial agreement will be in place.

A summary of the Certificates of Title relevant to the Project is provided at Volume 3, together with copies of the titles. Some of the Certificates of Title identify encumbrances on the land including caveats and powerline easements.

Trustpower is not seeking approval for the use and development of three Crown land allotments that are located within the wind farm site boundary, because it is not proposing to use or develop this land for wind farm-related purposes. There are however 'paper roads' within the wind farm site which will be traversed by wind farm cables and access tracks.

In addition, there are three small allotments located adjacent to Darlington-Nerrin Road which do not form part of the subject site. These allotments are formally described as Lot 1 on TP757231, Allotment 85A Parish of Terrinallum and Lot 1 on TP575737. These lots are illustrated in *Figure D-1* provided at *Annex D* of the PLUA.

In the case of those sections of the proposed transmission line running along Mortlake-Ararat Road and Castle Carey Road, the transmission line will be located within the road reserves and will not extend into private land adjacent to the road reserves (noting that as a result of the scale used in some of the EES mapping of the transmission line corridor, this may not always be exactly clear from those maps). Thus in those locations, Trustpower is not seeking approval for use and development of land beyond the extent of the road reserves.

18.5.2 Zoning and Overlay Controls

The wind farm site and off-site substation are contained within the Farming Zone (FZ). The transmission line crosses land within the FZ, Special Use Zone Schedule 1 (SUZ1) and Road Zone Category 1 (RDZ1). A zoning map showing the location of the Project components is provided at *Figure 18-1.*

In addition, whilst the wind farm site is not affected by any overlays, the off-site substation and the southern end of the transmission line corridor are located in Schedule 3 of the Environmental Significance Overlay (ESO3) 'Mortlake Power Station Environs'. This overlay surrounds MOPS to the east and north-east, and is shown in *Figure 18-2.*

18.5.3 Current Land Use

The wind farm site, transmission line corridor and adjoining areas are primarily improved pasture used for grazing. The land has been partly cleared for improved pasture, and land use surrounding the Project also includes cropping. Existing infrastructure within the wind farm site and surrounding area is predominantly associated with these agricultural uses and includes isolated homesteads, sheds, access tracks and fencing.

The Mt Fyans Wildlife Reserve is located centrally to the wind farm, but has been excluded from the site, and comprises scattered patches of remnant native vegetation and shrubland.

The off-site substation is proposed to be constructed on the land to the east of MOPS, which is currently cultivated for tree plantations.

18.5.4 Housing

There are currently three dwellings within the boundary of the wind farm site that are within 1km of a proposed WTG (H4, H48, and H60). These dwellings, together with H45 and H59, which are located just outside the boundary, have not been considered in the various specialist technical assessments. Refer to *Figure 2-1* for dwelling locations. The owners of these dwellings have given their consent for these WTGs to be included in the proposed wind farm layout. The owners have also each entered into legal agreements with Trustpower on mutually acceptable terms, such that if the wind farm proceeds to construction, these dwellings will either be acquired by Trustpower, removed, or modified and uninhabited for the duration of the wind farm's operation. These five dwellings are defined as "specific agreement" dwellings.

There are a further nine dwellings within 2km of a proposed WTG, five participating landholders (H2, H41, H49, H50 and H51) and four participating neighbours (H1, H46, H47 and H52). The owners of these dwellings have given their consent for these WTGs to be included in the proposed wind farm layout, refer Volume 4 of the EES. This reflects the previous planning controls that were in place in relation to wind farms (prior to Amendment VC124 being gazetted) whereby evidence of written consent was required of any owner of an existing dwelling located within 2km of a proposed turbine forming part of a wind energy facility, instead of 1km as now applies.

In total, there are seven dwellings located within 1km of a WTG. These are H1, H2, H4, H47, H48, H59 and H60, of which, as discussed above, four will be uninhabited for the duration of the wind farm's operation.

The nearest non-participating dwelling is H42, which is located just over 2km from the nearest WTG.

Figure 2-1 in *Chapter 2* identifies the location of the houses within and surrounding the Project.

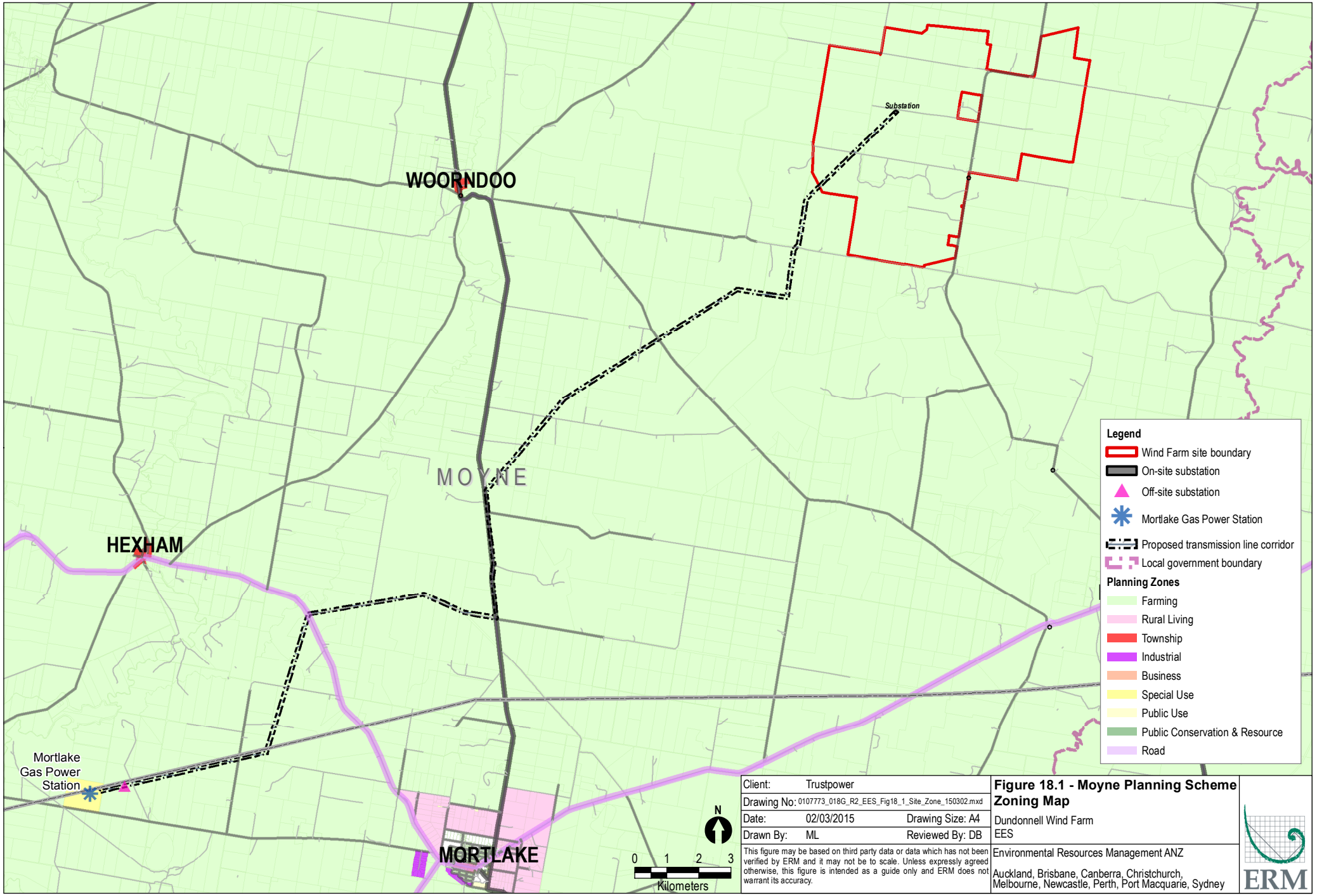
18.5.5 Infrastructure

Road infrastructure identified within the study area is addressed in *Chapter 19* – Traffic and Transport.

Community infrastructure surrounding the site is generally located within the townships in the wider area. The closest townships are Woorndoo and Darlington, both located approximately 12km from the wind farm site.

18.5.6 Potential Future Land Use and Development

As of March 2015, there are no current Planning Scheme Amendments or planning permits for dwellings within the wind farm site or neighbouring properties within 1km of the proposed WTGs. The potential for the wind farm to affect the development of new dwellings (not yet contemplated or known) on adjoining properties is addressed in *Section 18.6.2*.



Client:	Trustpower		
Drawing No:	0107773_018G_R2_EES_Fig18_1_Site_Zone_150302.mxd		
Date:	02/03/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

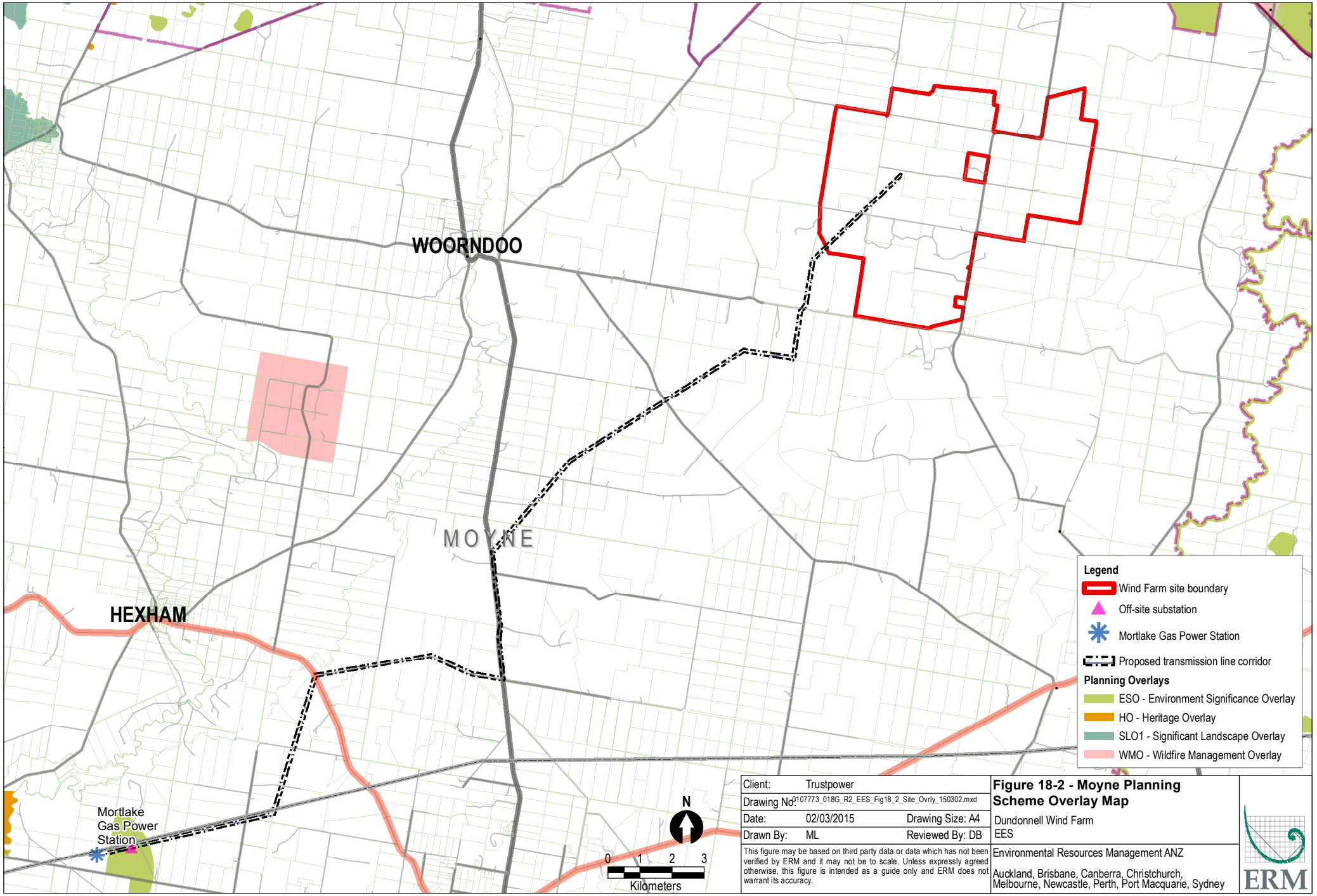
Figure 18.1 - Moyne Planning Scheme Zoning Map

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Trustpower		
Drawing No:	0107773_018G_R2_EES_Fig18_2_Site_Ovrly_150302.mxd		
Date:	02/03/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 18-2 - Moyne Planning Scheme Overlay Map

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

18.6 Assessment of Impacts

The key issues for consideration as part of the PLUA include:

- Consistency with the statutory and strategic policy provisions, including the Moyne Planning Scheme; and
- Compatibility of the Project with existing and potential future land uses, including agricultural uses, housing and public infrastructure.

18.6.1 Consistency with Relevant Statutory and Strategic Policy Provisions

Based on a balanced assessment of key planning issues and policies, it is considered that the Project represents an appropriate planning outcome that will result in the development of an additional renewable energy resource in Regional Victoria. It is also considered that the Project is in the interests of net community benefit and sustainable development for the benefit of both present and future generations.

A summary of the planning assessment undertaken for the Project is provided within *Table 18-2*. A more detailed policy assessment is provided in the PLUA prepared by ERM and contained at Volume 2.

Table 18-2 Planning Policy Assessment

Policy / Planning Control	Principle / Objective	Summary of Policy Assessment
State and Local Planning Policy Frameworks		
Clause 10 Operation of the State Planning Policy Framework	This Clause outlines the purpose, goal, application and decision making framework for planning in Victoria. The primary objective is *'to provide for the fair, orderly, economic and sustainable use and development of land.'*	The preparation of the EES and planning permit applications has involved an assessment which encompasses and integrates relevant environmental, social and economic factors. Based on this assessment of policies and factors, it is considered that the Project will result in an appropriate planning and land use outcome that is in the interests of net community benefit and will provide for the fair, orderly, economic and sustainable use, and development of land.
Clause 11 Settlement	Relevant policies within this Clause aim to prevent environmental problems caused by siting incompatible land uses close together; promote the sustainable growth and development of Regional Victoria; and manage rural areas to promote agriculture.	The location of the Project in a rural area, where the primary land use is agriculture, and where there are limited houses in proximity to the wind farm site, is an appropriate planning outcome. It is considered that the Project, which will involve a minimal loss of land from farming pursuits, has been appropriately located and is unlikely to cause any unreasonable environmental impacts as a result of incompatible land uses. The Project will contribute positively to the growth and development of regional Victoria, consistent with the Great South Coast Regional Growth Plan, through the further expansion of the renewable energy sector in the region.
Clause 12 Environment and Landscape Values, Clause 21.06 and Clause 22.02 - Environment	These clauses recognise the need to protect and conserve Victoria's biodiversity and identified environmental and landscape values.	The Project will require the removal of native vegetation associated with the wind farm infrastructure and transmission line corridor. The *Flora and Fauna Assessment* (BL&A, 2015) and *Brolga Assessment* (BL&A, 2014) have concluded that the wind farm and transmission line are able to be developed without having unacceptable adverse impacts on the identified biodiversity values. Potential visual impacts are addressed in the *Landscape and Visual Impact Assessment* (ERM, 2014), which recognises that the proposed wind farm is located within a highly modified rural landscape that can readily absorb change as a result of existing rural activity and associated infrastructure.

Policy / Planning Control	Principle / Objective	Summary of Policy Assessment
Clause 13 Environmental Risks	This Clause states that planning should adopt a best practice environmental management and risk management approach, which aims to avoid or minimise environmental degradation and hazards including erosion, salinity, noise abatement and bushfire management.	*The Geoscience Features – Significance and Sensitivity Assessment* (Environmental GeoSurveys Pty Ltd, 2014) states that the proposed construction and operation of the Project is not expected to result in adverse erosion and salinity impacts provided appropriate mitigation and management measures are implemented. These measures include the implementation of a detailed Environmental Management Plan (EMP), which will outline (amongst other things) the drainage and sediment control measures required. Glenelg-Hopkins Catchment Authority will be consulted as part of the preparation of the EMP. A *Noise Impact Assessment* (MDA, 2014) has been undertaken against the requirements of NZS 6808:20120 'Acoustics – Wind Farm Noise'. This Assessment concludes that the wind farm will be able to achieve the requirements of NZS 6808:2010 at all existing, non-participating dwellings. In addition, predicted noise levels for properties with a noise agreement comply with ETSU-R-97. Whilst the Project is not affected by a Bushfire Management Overlay (BMO) pursuant to the Moyne Planning Scheme, the site has been identified as 'bushfire prone' by the Victorian Government. A Wildfire Prevention and Emergency Response Plan (WPER) will be prepared, in consultation with the CFA, for implementation during the construction and operation phases of the Project.
Clause 14 Natural Resource Management	Relevant policies within this Clause include those relating to protection of agricultural land, catchment planning and management, water quality, and mineral and stone resources.	The use and development of the Project is not expected to result in significant loss or fragmentation of existing agricultural land in the immediate area, as the wind farm infrastructure equates to only 2% of the site area. Furthermore, the off-site substation involves the removal of only a small portion of land cultivated for tree plantations and will not affect the viability of the overall plantation. In addition, the Project is not expected to have any significant impacts on the water environment within the wind farm site and surrounding area. The management of water quality has been assessed, and the risks and mitigation measures identified in the *Surface Water Assessment* (Water Technology, 2014) and the *Hydrogeological Study* (ERM, 2015a). The Draft Work Plan for the proposed quarry (CK Prowse & Associates, 2015) will ensure compliance with the appropriate environmental standards and management of potential environmental impacts.

Policy / Planning Control	Principle / Objective	Summary of Policy Assessment
Clause 15 Built Environment and Heritage and Clause 22.01-1 – Aboriginal Heritage	These clauses recognise that planning should ensure all new land use and development appropriately responds to its landscape, valued built form and cultural context, and protect places and sites with significant heritage, architectural, aesthetic, scientific and cultural value.	The Project infrastructure will be located within a highly modified rural landscape. The siting of infrastructure has been designed to minimise landscape and visual impacts and ensure the Project will not result in obtrusive form when viewed from publically accessible locations. The visual impacts of the Project have been assessed in the *Landscape and Visual Impact Assessment* (ERM, 2014). With regards to heritage, draft CHMPs and HHAs have been prepared for the wind farm site and transmission line corridor, as provided at Volume 2. The draft CHMPs identified six registered Aboriginal cultural heritage places within the wind farm site and no registered Aboriginal cultural heritage places within the transmission line corridor. In addition to registered places, there are areas of Aboriginal cultural heritage scientific sensitivity within the study area. The Project has been designed to avoid areas considered most likely to contain significant Aboriginal cultural heritage and these areas have been defined as 'no-go zones'. Of the registered places, four of these will be avoided by the wind farm infrastructure, while two will be impacted by the works. The two impacted places comprise artefact scatters. These artefacts have been documented and will be managed in accordance with the Wind Farm CHMP. In addition, the salvage of some artefacts within one place will be undertaken. The CHMPs address risk mitigation strategies associated with the registered sites, including further testing during the construction phase of the Project in areas considered likely to contain cultural heritage. In addition, the CHMPs identify procedures to be followed should any previously unrecorded heritage places be encountered during construction. The HHAs indicate that there are two historic heritage places that have the potential to be impacted by the Project, although these places are considered to be of low historic significance. The HHAs include mitigation measures to reduce impacts to minimise impacts to these places and recommend that the EMP include contingency measures to manage any unexpected discovery of historical heritage sites and features.

Policy / Planning Control	Principle / Objective	Summary of Policy Assessment
Clauses 17, 21.07 and 22.03 Economic Development	These clauses recognise that planning is to contribute to the economic well-being of communities and the State as a whole by supporting and fostering economic growth and development, facilitating decisions, and resolving land use conflicts.	The Project will contribute to the economic well-being of the local community and the State throughout the planning, construction and operational phases. The Project will contribute positively to the development of local employment opportunities, particularly during the construction phase, where over 200 direct and 100 indirect jobs (full time positions) are envisaged during the two-to-three year period. In addition, up to ten direct and six indirect jobs (full time positions) will be created once the Project is operational. The income provided by the wind farm also has the potential to assist in the ongoing agricultural operations on the wind farm site. Further details of the economic benefits of the Project are provided in the *Economic Impact Assessment* (Hudson Howells, 2014).
Clause 18 Transport and Clause 21.08 Infrastructure and Particular Uses	Relevant policies within these clauses encourage an integrated and sustainable transport system and aim to restrict incompatible land use and development in the vicinity of airfields.	The Project has been designed and sited to ensure appropriate transport routes are available to the locations for the wind farm and off-site substation, particularly during the construction phase, to ensure there are minimal impacts on the surrounding road network, as outlined in the *Traffic Impact Assessment* (Cardno, 2014). In addition, the Project is not expected to impact on aircraft navigation, communications or procedures as discussed in more detail in the *Aeronautical Impact and Night Lighting Assessment* (Aviation Projects, 2014).
Clause 19.01 Renewable Energy	This Clause promotes the provision of renewable energy in a manner that ensures appropriate siting and design considerations are met.	The Project will have significant environmental and economic benefits both at a local level and the broader regional and State level. These benefits include the provision of another source of renewable energy, economic activity associated with manufacturing and employment during the construction phase and ongoing revenue streams once the wind farm is operational. The proposed wind farm site has been specifically selected based on its consistent wind speed characteristics, relative isolation with a low density population and close proximity to the existing electricity network. Based on the consideration of other relevant State and Local Planning Policies, zoning and overlay requirements and the potential environmental and amenity impacts addressed in the various technical assessments, the Project has been appropriately located and sited in the context of this Clause.

Policy / Planning Control	Principle / Objective	Summary of Policy Assessment
Clause 21.03 Factors Influencing Future Planning and Development and Clause 21.04 – Municipal Vision	This Clause outlines the key factors, which are of importance to the Shire's future land use and development vision, and includes those related to agricultural activity, native vegetation and landscape character.	The Project will not adversely impact on agricultural uses in the area nor conflict with existing surrounding uses. The Project has been sited and designed to minimise impacts to the landscape character and avoid and minimise native vegetation impacts. Any native vegetation proposed for removal will be offset in accordance with the Biodiversity Assessment Guidelines, thereby ensuring no net loss to Victoria's biodiversity.
Zoning Overlay Controls and Particular Provisions		
Clause 35.07 Farming Zone (FZ)	The FZ encourages the retention of productive agricultural land and aims to avoid non-agricultural uses impacting on the use of land for agriculture. The FZ relates to the wind farm site, off-site substation and the southern end of the transmission line. A permit is required for the use of the land for a wind energy facility (and its associated infrastructure) and a utility installation.	The development of agricultural land for a wind farm does not compromise the stated purpose of the FZ at Clause 35.07, which encourages the protection of productive farmland from inappropriate development and sustainable agricultural land uses. It is expected that the existing agricultural activities within the wind farm site, transmission line corridor and neighbouring properties will continue to occur post operation of the Project, as is the case for other operating wind farms in Victoria. In addition, the construction of improved access tracks may improve the agricultural efficiency for participating landholders. The proposed off-site substation is located adjacent to MOPS and is required to connect the wind farm to the 500kV network. The footprint of the substation is such that the small loss of land within the tree plantation will be inconsequential.
Clause 36.04 Road Zone Category 1 (RDZ1)	The RDZ1 identifies significant existing roads. The RDZ1 is relevant to the transmission line and a permit is required for a utility installation pursuant to the RDZ1.	Whilst the transmission line crosses VicRoads controlled roads, it is not expected to impact on the safety or function of these roadways.
Clause 37.01 Special Use Zone Schedule 1 (SUZ1)	The SUZ1 facilitates the development and use of a gas-fired power station in a manner which recognises the character and amenity of the surrounding area. The SUZ1 relates to the southern end of the transmission line and a permit is required for a utility installation pursuant to the SUZ1.	The proposed transmission line is required to connect the wind farm to the 500kV network at MOPS and is therefore entirely compatible with the SUZ1 and ESO3, which seek to ensure the Power Station is not constrained by the establishment of potentially conflicting land uses.

Policy / Planning Control	Principle / Objective	Summary of Policy Assessment
Clause 42.01 Significance Overlay Schedule 3 (ESO3) - 'Mortlake Power Station Environs'	ESO3 identifies areas where the development of land may be affected by the Mortlake Power Station. Whilst the off-site substation and transmission line are located on land affected by the ESO3, no planning permit is required for these components of the Project pursuant to the provisions of the overlay.	
Clause 52.05 Advertising Signs	The FZ is in Category 4, which has the maximum limitations in relation to advertising signs. In this category, a business identification sign is a permissible use, however it must not exceed 3m2 in size.	Business identification signs will be minimal and will be designed to be in compliance with the provisions of Clause 52.05.
Clause 52.08 Earth and Energy Resources	Clause 52.08 encourages land to be used and developed for exploration and extraction of earth and energy resources in accordance with acceptable environmental standards.	An EES has been prepared for the Project under the EE Act and a Draft Work Plan (WA 1540) has been prepared for the proposed quarry (CK Prowse & Associates, 2015). On this basis and subject to the approval of the Work Plan and granting of a Works Authority by DEDJTR, a permit is not required under Clause 52.08.
Clause 52.09 Stone Extraction and Extractive Industry Interest Areas	Clause 52.08 provides for the use and development of land for stone extraction that does not adversely affect the environment or amenity of the area during or after extraction.	As mentioned previously, an EES has been prepared for the Project under the EE Act and a Draft Work Plan has been prepared for the proposed quarry. On the basis that the conditions of Clause 52.08-1 are met, a permit is not required under Clause 52.09.
Clause 52.17 Native Vegetation	Clause 52.17 provides for the permitted clearing of native vegetation that results in no net loss in the contribution made by native vegetation to Victoria's biodiversity. Under this Clause, a permit is required to remove, destroy or lop native vegetation under this Clause (subject to the exemptions listed at Clause 52.17-6).	The Project has been sensitively designed and has undergone a number of changes to layout to ensure impacts to native vegetation have been avoided where possible and minimised in accordance with the Biodiversity Assessment Guidelines. Removal of native vegetation in the development footprint of the wind farm site and transmission line corridor has been avoided and minimised through initial siting of WTGs, access tracks and associated infrastructure. In accordance with Clause 52.17 any approved native vegetation removal will be offset in a manner that makes a contribution to Victoria's biodiversity equivalent to the contribution made by the native vegetation to be removed in accordance with the Biodiversity Assessment Guidelines. Subject to the approval of the work plan, a permit is not required to remove native vegetation associated with the proposed quarry.

Policy / Planning Control	Principle / Objective	Summary of Policy Assessment
Clause 52.29 Land Adjacent to a Road Zone Category 1	Clause 52.29 provides for appropriate access to identified roads. In accordance with the RDZ1, a permit is required to alter access to these roads.	The proposed road widening at the intersection of Mortlake-Ararat Road, Woorndoo-Dundonnell Road and Woorndoo-Streatham Road (contained within the RDZ1) to accommodate construction vehicles will facilitate improved road conditions for all road users.
Clause 52.32 Wind Energy Facility	Clause 52.32 facilitates the establishment and expansion of wind energy facilities, in appropriate locations, with minimal impact on the amenity of the area. This Clause outlines the information requirements for any application for a wind energy facility.	Based on the technical assessments prepared in support of the planning permit applications and EES, the Project has had appropriate regard to the decision guidelines of Clause 52.32 and the Wind Energy Guidelines as follows: • the Project accords with the State and Local Planning Policy Frameworks; • the design response results in acceptable impacts within regard to noise, blade glint, shadow flicker and EMI; • the Project can be readily absorbed within the surrounding landscape without presenting unreasonable visual impacts; • the development of rigorous management and mitigation measures, including 'no go' zones and buffer zones, to be implemented during the construction of the Project minimise potential impacts to the natural environment, natural systems and cultural heritage; • the layout of the facility will not unreasonable impact on aircraft safety; and • the wind farm will be able to achieve the requirements of the NZS 6808:2010 for all dwellings without a noise agreement. Clause 52.32-3 states that 'an application that includes a turbine that is within one kilometre of an existing dwelling must be accompanied by: • A plan showing all dwellings within one kilometre of a proposed turbine. • Evidence of the written consent of any owner of an existing dwelling located within one kilometre of a proposed turbine that forms part of a Wind energy facility.'

Policy / Planning Control	Principle / Objective	Summary of Policy Assessment
		The planning permit applications relating to the Project were prepared prior to Amendment VC124 being gazetted and thus were prepared at a time when the above requirements related to 2km, rather than 1km. Accordingly, with regards to the (previous) 2km requirement, there are currently 14 dwellings within 2km of a proposed WTG, of which five are within 1km of a proposed turbine (H4, H45, H48, H59 and H60). The owners of all 14 dwellings have given their consent for the WTGs to be included in the proposed wind farm layout, notwithstanding the fact that as a result of Amendment VC124 consent is now only required from those dwellings within 1km (seven dwellings). The statements of consent from the owners of all fourteen dwellings are included at Volume 4.

18.6.2 Compatibility of the Project with Existing and Future Land Uses

Agricultural Activities

The development of the Project will not prohibit the land within the wind farm site, transmission line corridor and surrounding properties from continuing existing agricultural activities. Based on experience with other wind farm projects and assessment of the extent of Project infrastructure, it is estimated that less than 2% of the wind farm site will be used for the WTGs, access tracks and other infrastructure.

Furthermore, whilst the off-site substation involves the removal of a small area currently cultivated for tree plantations, the footprint is such that the loss of agricultural land, when compared to the wider area, will be inconsequential. Given the purpose of the substation is to connect the transmission line to MOPS, it is entirely compatible with the operation of the power station.

The operation of the Project will not adversely affect agricultural practices as the land agreements do not specify restrictions on existing farming practices (other than the avoidance of damage to Project infrastructure and temporary limitations on feeding practices that have been agreed with one landholder). In addition, the operation of the wind farm will comply with the applicable environmental standards and once decommissioned, the land will be rehabilitated (as outlined in the EES). Accordingly, there is not expected to be any long term adverse effect on the farming use of the land.

Existing Housing

There are currently three dwellings within the boundary of the wind farm site that are within 1km of a proposed WTG (H4, H48, and H60). These dwellings, together with H45 and H59, which are located just outside the boundary, have not been considered in the various specialist technical assessments. The owners of these five dwellings have given their consent for these WTGs to be included in the proposed wind farm layout. The owners have also each entered into legal agreements with Trustpower on mutually acceptable terms, such that if the wind farm proceeds to construction, these dwellings will either be acquired by Trustpower, removed, or modified and uninhabited for the duration of the wind farm's operation. These five dwellings are defined as “specific agreement” dwellings.

The remaining dwellings on properties surrounding the wind farm site and transmission line corridor can continue to be occupied as permanent residencies with minimal amenity impacts as a result of the Project.

In summary, there are seven dwellings located within 1km of a WTG. These are H1, H2, H4, H47, H48, H59 and H60, of which, four will be uninhabited for the duration of the wind farm's operation.

The key potential amenity impacts as a result of any wind farm development comprise visual impacts, noise and vibration, blade glint, shadow flicker and electromagnetic interference (EMI). As discussed in other chapters of this EES and the various specialist technical assessments in Volume 2, the Project is not expected to have any significant impact on the amenity of surrounding landholdings by way of visual impacts, noise and vibration, blade glint, shadow flicker and EMI.

Notwithstanding the above, concerns have previously been expressed in relation to other wind farm projects of the potential to create adverse impacts on human health. These concerns are generally in relation to operational noise (including low frequency and infrasound emissions), shadow flicker or electromagnetic radiation. Potential health effects have been reported to cover a wide array of physical and mental health outcomes, sleep disturbance, annoyance and ‘quality of life’ impacts.

Despite these previous concerns, public health authorities at the national level have found that there is no consistent direct evidence that exposure to wind farms is associated with any health outcome (National Health and Medical Research Council, 2014 and Australian Medical Association, 2014). The Commonwealth Government’s National Health and Medical Research Council (NHMRC) observed that although there may be some association between

exposure to wind farms and annoyance, sleep impacts and quality of life, current research does not establish that any impacts of wind farms cause these effects (NHMRC, 2014).

The findings by public health authorities have been accepted and applied by various decision-making bodies when assessing and issuing approvals for wind farms. In its decision regarding the Cherry Tree Wind Farm, the Victorian Civil and Administrative Tribunal (VCAT) stated that *'it should not pioneer new and different standards from those specified in the planning scheme,'* nor should it substitute its own expertise for *'the considered views published by statutory authorities or other eminent bodies which are specialist in particular areas'* (*Cherry Tree Wind Farm v Mitchell SC (Includes Summary) (Red Dot)* [2013] VCAT 1939, [32]).

Future Housing

The requirements of the FZ are such that a dwelling is an 'as of right' use provided it is proposed on a lot of 40ha or more, is the only dwelling on the lot, and is able to meet the various requirements of Clause 35.07-2 in relation to access and connection to services.

The potential for the wind farm layout to impact on the ability of surrounding landholders to locate new 'as of right' houses on their properties therefore requires consideration.

This issue has been addressed in a number of previous Panel Reports for wind farms, including the Bald Hills Panel Report (2004: 280) stating:

> *'In relation to all other dwellings that post date the wind farm planning process whether as of right or subject to a permit, the following principle should apply: the onus of responsibility – for the cost of management of turbine noise and blade shadow amenity impacts- should fall upon the agent of changes.*
>
> *Where a new dwelling is as of right, it should not be subject to the amenity protections otherwise provided in the wind farm development approval.*
>
> *Where a new dwelling is subject to a permit, it will be normal to expect that the wind farm operator may object and request the application of a permit condition to ensure appropriate siting and or design measures to reasonably control amenity impacts.'*

Having regard to the above, and on the basis that appropriate siting and design measures are taken into consideration as part of any future proposals for dwellings on adjoining land, the wind farm is not expected to result in any unreasonable amenity impacts to future housing where that housing is an 'as of right' use.

Other Land Uses

The Mt Fyans Wildlife Reserve is located centrally to the wind farm site, but does not form part of the Project area and comprises remnant native vegetation and shrubland. The proposed layout of the wind farm, including the buffer distances to the WTGs, will minimise potential impacts on the reserve.

Public Infrastructure

The potential impacts of the Project on the local road network are addressed in the *Traffic Impact Assessment* (Cardno, 2014). The Project will result in increased traffic during the construction phase, however the traffic volumes are considered reasonable by Cardno in the context of the existing road network, and therefore are not expected to prejudice other road users.

Vehicle movements associated with the construction and operation of the on-site quarry will largely be contained within the wind farm boundary and will therefore not impact on the local road network.

Community infrastructure generally occurs within the townships in the wider area. These townships and communities are located in excess of 12km from the proposed wind farm and therefore are not expected to be adversely impacted by the Project.

18.7 Planning Permit Applications

In addition to the EES, planning approvals are required to facilitate the Project under the zone and overlay provisions of the Moyne Planning Scheme, as detailed in the PLUA at Volume 2. Three separate planning permit applications will be lodged concurrently for the Project and are summarised as follows:

1. Use and development of a wind energy facility, comprising up to 104 wind turbines, main site access track, internal access tracks, on-site substation, electrical reticulation, up to four wind monitoring masts, permanent operations/maintenance facility, temporary concrete batching plant and site office buildings; removal of native vegetation; business identification signage; and alterations to roads located in a Road Zone Category 1.
2. Use and development of a utility installation (power lines designed to operate at 220,000 volts or more) for a length of approximately 38 kilometres and associated removal of native vegetation, to enable the connection of the Dundonnell Wind Farm to an off-site substation and subsequent connection into the electricity grid at the Mortlake Gas Power Station.
3. Use and development of a utility installation associated with the off-site substation.

It is noted that due to recent Amendment VC124, the Minister for Planning is now the responsible authority for the approval of all wind farms in Victoria. Thus, of the three planning permit applications listed above, the wind farm application will be lodged with DELWP whilst the transmission line and off-site substation applications will be lodged with the Shire of Moyne.

The planning permit applications for the wind farm, transmission line and off-site substation have been prepared in accordance with the Wind Energy Guidelines.

18.8 Impacts and Mitigation Measures

The impacts of the Project on planning and land use, and an initial impact rating are summarised in *Table 18-3*. Mitigation measures and the residual impact rating after environmental mitigation measures have been applied are also provided in *Table 18-3.*

Table 18-3 Planning and Land Use Impacts, Mitigation Measures and Residual Impact

Impact Number	Impact	Impact rating	Mitigation Measures	Residual Impact Rating
18-01	Potential for inconsistency with planning policies and provisions, including the Moyne Planning Scheme.	Minor	The Project will be undertaken in accordance with planning permit conditions which will ensure compliance with the general objectives of relevant policies and provisions of the Planning Scheme.	Negligible
18-02	Potential impact of the Project on existing and potential future land uses, including agricultural uses, housing and public infrastructure.	Moderate	EMPs will be prepared which will provide detailed management procedures and controls including: • Dust, sediment, erosion, water run-off, weed management, noise and traffic; • rehabilitation of the site following construction, including potential opportunities to establish surface vegetation on hardstand areas and certain access tracks with pasture species to allow agricultural grazing; • decommissioning of the wind farm in accordance with legal agreements with participating landholders, including removal of infrastructure and revegetation of hardstand areas and access tracks (not required by the landholder) with pasture species to allow agricultural grazing; • limiting construction activities to specific construction impact zones and access tracks as agreed with participating landholders; • development of management and operating procedures in consultation with participating landholders to ensure existing agricultural activities can be continued around the majority of the site; and • ongoing discussions with participating landholders and surrounding neighbours to provide information to assist with the location of future dwellings, as requested.	Minor

18.9 Impact Assessment Conclusions

In conclusion and based on a balanced assessment of key planning and land use issues and policies, it is considered that the Project will be an appropriate planning and land use outcome that supports the development of renewable energy in Victoria and will result in economic and social benefits for both present and future generations.

In addition, management and mitigation measures have been identified to ensure that the development of the Project does not unreasonably restrict or prohibit agricultural activities from continuing within the wind farm site and on neighbourhood properties.

The layout of the wind farm has also adopted appropriate separation distances between existing dwellings and WTGs, and detailed technical assessments have been carried out to assess and mitigate potential impacts on residential properties.

It is therefore concluded that the overall residual impact to planning and land use as a result of the construction and operation of the Project will be negligible to minor.

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 19 - TRAFFIC

This page is intentionally blank

Contents

Figures

Tables

This page is intentionally blank

19 TRAFFIC

This Chapter describes the potential traffic and transport related impacts associated with the Project and the proposed mitigation measures that are designed to ensure that the Project minimises any adverse impacts on traffic and transport.

A *Traffic Impact Assessment* has been undertaken to assess the potential traffic impacts associated with the Project and concluded as follows:

- Subject to obtaining relevant approvals and permits from VicRoads, it is expected that over-dimensional (OD) vehicles will use haulage routes from Portland and the Port of Geelong previously approved for other projects, including the MOPS and the Salt Creek Wind Farm.
- From Woorndoo, the OD haulage route specific to the Project is east via the Mortlake-Ararat Road, then Woorndoo-Streatham Road ending at the site access point south of Warings Lane. This route utilises the shortest and safest route and consists of roads that are generally well-maintained with sufficient road widths and intersections to accommodate OD vehicles.
- Based on the expected development timeframes and assumptions, construction traffic generated by the Project can be accommodated by Bolac Plains Road and Woorndoo-Streatham Road without significant upgrade works being required.
- Four locations have been identified where localised road widening is likely to be required to accommodate OD vehicles.
- The majority of vehicle movements associated with the operation and maintenance of the wind farm will be internal to the wind farm site with minimal impacts on the surrounding road network.
- A Traffic Management Plan (TMP) will be prepared following Project approval and prior to the commencement of works. This will include detailed measures to address traffic generation, measures to minimise impacts to existing road users and to maintain and rectify haulage route roads and road infrastructure. The TMP will address any requirements for specific work stage construction traffic management plans; and contain any additional matters identified and required by VicRoads and Moyne Shire Council.

19.1 EES Objectives

The EES evaluation objectives most relevant to traffic and transport are:

Land use and Socio-economic - To avoid or minimise disruption and other adverse effects on local infrastructure (including roads), land use (including agricultural and residential) and to neighbouring landowners and road users during construction and operation of the Project.

Amenity – To avoid or minimise adverse noise, visual and other amenity effects on nearby residents and local communities, to the extent practicable.

This Chapter is based on the *Traffic Impact Assessment* undertaken by Cardno, dated August 2014, contained in Volume 2. This Chapter and the *Traffic Impact Assessment* address the EES Scoping Requirements by:

- describing the existing road network surrounding the Project area in terms of capacity, condition, accessibility and travel;
- describing the chosen traffic routes and any measures (e.g. upgrades) designed to mitigate effects on traffic networks;
- assessing the potential effects of construction activities on existing traffic, preferred traffic routes and road conditions;

- assessing amenity and accessibility impacts on adjoining residents and in nearby townships, and physical impacts on the road infrastructure;
- identifying any additional road works/upgrades required to accommodate the wind farm traffic during the construction stage, and any significant environmental effects arising from such works;
- assessing the effect of the Project on State and local infrastructure capacity and demand (including road maintenance costs and the need for additional emergency response capacity); and
- outlining and evaluating any proposed measures designed to manage and monitor residual effects on local infrastructure, land use and neighbouring landowners and road users.

19.2 Study Area

The study area for the *Traffic Impact Assessment* included the road network connecting the wind farm site to the Port of Portland and the Port of Geelong. The study focussed on routes previously identified between these ports and the Mortlake/Woorndoo area and from Mortlake/Woorndoo to the wind farm site.

19.3 Methodology

The methodology used for the traffic impact assessment included:

- collation and analysis of relevant traffic data;
- a review of proposed access to and within wind farm site;
- a desktop review of traffic impact assessments prepared for previously considered and approved OD vehicle haulage routes from Portland, the Port of Geelong and the Port of Melbourne to the Mortlake / Woorndoo area. Of specific relevance, the approved OD vehicle route associated with the nearby Salt Creek Wind Farm site and the approved transformer OD vehicle route associated with the recently completed MOPS were considered;
- a site inspection of wind farm site and surrounding road network; and
- consultation with Moyne Shire Council and VicRoads.

19.4 Legislation and Policy

The relevant legislation and government policies for traffic are outlined in *Table 19-1.*

Table 19-1 Relevant Traffic and Transport Legislation and Policies

Legislation / Policy	Description
State	
Roads Management Act 2004	The *Road Management Act 2004* (RM Act) provides *'practical guidance to any person conducting, or proposing to conduct, any works on a road in Victoria.'* The Act has been established to promote safe and efficient road networks and a coordinated approach for the management of public roads. The *Road Management Act (General) Regulations 2005* and the *Road Management Act (Works and Infrastructure) Regulations 2005* have been established under the RM Act and are to be complied with for all public roads.
Draft Guidelines for Assessing Impacts of Wind Energy Projects (VicRoads, 2011-2012)	The *VicRoads Draft Guidelines for Assessing Impacts of Wind Energy Projects* specify the obligations to be met when assessing impacts from projects on the arterial road network. They give all parties a clear understanding of the information required for developing traffic management plans, and an early indication of developers' possible financial obligations in relation to damage to the arterial road network.

Legislation / Policy	Description
Policy and planning guidelines for development of wind energy facilities in Victoria (DELWP, 2015)	The Wind Energy Guidelines are for responsible authorities, proponents and the community to provide guidance about wind farms and inform planning decisions about wind energy facility proposals. The Guidelines set out information requirements for wind energy developments, including the matters to be addressed in relation to amenity impacts (including traffic related matters).
Local	
Moyne Planning Scheme	The Moyne Planning Scheme is implemented via the P&E Act. Clause 18 'Transport' encourages *'an integrated and sustainable transport system that provides access to social and economic opportunities, facilitates economic prosperity, contributes to environmental sustainability, coordinates reliable movements of people and goods, and is safe.'* Clause 52.32 of the Planning Scheme sets out the matters to be considered prior to the determination of an application for a wind energy facility, which includes consideration of the Guidelines.

19.5 Existing Conditions

19.5.1 Assumptions

The following assumptions were relied upon during the determination of the transport route for construction materials:

- construction timeframe of 24-36 months;
- a temporary concrete batching plant will be located on-site, with 80% of the required rock/ aggregate sourced from the on-site quarry and water for use in construction sourced on-site, if possible;
- two transformers for the Project will be delivered to the Port of Geelong and transported to Mortlake (approximately 30km south of the wind farm site). One transformer will remain at the off-site substation location adjacent to MOPS and one will be transported to the wind farm site. Subject to obtaining relevant approvals and permits from VicRoads, it is expected that OD vehicles will utilise the Geelong to Mortlake route previously approved for the construction of MOPS; and
- WTG towers, blades, and nacelles will be imported to the Port of Portland, and transported by road to the wind farm site. Subject to obtaining relevant approvals and permit from VicRoads, it is expected that OD vehicles will utilise the Portland to Woorndoo haulage route previously approved for the Salt Creek Wind Farm Project.

The proposed OD haulage routes from Portland to Woorndoo and Geelong to Mortlake are identified in *Figure 19-1* and *Figure 19-2* respectively. The majority of the route proposed would utilise the approved Salt Creek OD route and the approved MOPS OD route with only small extensions required utilising the existing road network from these to serve the Project. The proposed route extensions are discussed in further detail in *Section 19.5.2*.

Client:	Trustpower	
Drawing No:	0107773_019G_R2_EES_Fig19_1_RdHaul_portland_150302.mxd	
Date:	02/03/2015	Drawing Size: A4
Drawn By:	ML	Reviewed By: DB

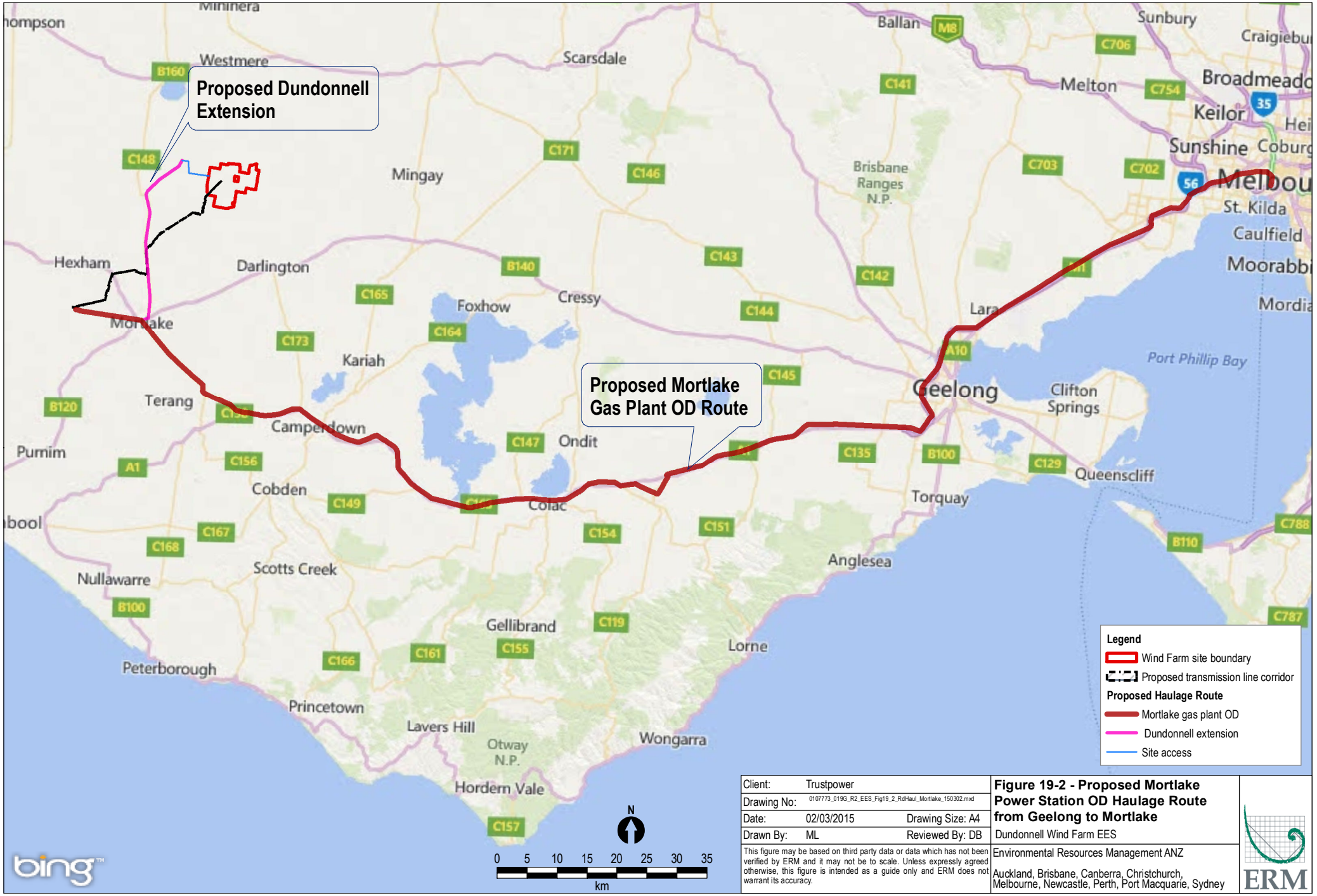
This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 19-1 - Proposed Salt Creek OD Haulage Route from Portland to Woorndoo
Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM



Client:	Trustpower		
Drawing No:	0107773_019G_R2_EES_Fig19_2_RdHaul_Mortlake_150302.mxd		
Date:	02/03/2015	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 19-2 - Proposed Mortlake Power Station OD Haulage Route from Geelong to Mortlake

Dundonnell Wind Farm EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

19.5.2 Roads

OD haulage routes between Portland and Woorndoo have previously been approved as part of the nearby Salt Creek Wind Farm Project and between Geelong and Mortlake as part of the MOPS Project. Based on the above assumption, and in order to minimise further road impacts, it is proposed to utilise the previously approved routes so far as possible, with:

- construction road access from Geelong to the wind farm site which is likely to be provided via: Princes Freeway, Terang-Mortlake Road and Mortlake-Ararat Road; and
- construction road access from Portland to the wind farm site which is likely to be provided via: Henty Highway, Glenelg Highway, Mortlake-Ararat Road, and Hexham-Woorndoo Road.

These routes consist of roads that are generally well-maintained with sufficient road widths and intersections to accommodate OD vehicles.

The proposal would require only a small extension to the existing OD haulage routes to provide access to the proposed wind farm site. These will utilise the existing roads, with the route beyond Woorndoo, specific to the Project running east from Woorndoo via the Mortlake-Ararat Road, then Woorndoo-Streatham Road ending at the site access point to the south of Warings Lane. While utilising the existing road network, this will require minor road widening works to accommodate the OD vehicles, as detailed in *Section 19.6.3*.

Mortlake-Ararat Road

Mortlake-Ararat Road is a VicRoads controlled road that runs generally north-south between Mortlake and Maroona, where it continues further north as the Pyrenees Highway.

The road has a sealed width between 7.2m and 7.7m and has one lane of traffic in either direction. The pavement is in generally good condition with nominal pavement surface wear in some locations.

The Mortlake-Ararat Road bridge provides the sole crossing over Salt Creek when approaching from the north. The bridge appears to have been significantly altered and now consists of concrete beams and piers built over the original stone pier structure. A preliminary structural assessment of the bridge capacity has been undertaken, with this assessment indicating that the bridge is considered to be able to accommodate the design loads generated by the OD traffic (refer to the *Traffic Impact Assessment* contained in Volume 2). Once project specific vehicle and load combinations are known, further structural investigation will be undertaken to determine whether any works are required to prepare the bridge for use.

Woorndoo-Streatham Road

Woorndoo-Streatham Road runs north from Woorndoo-Dundonnell Road to the intersection of Glenelg Highway, Streatham.

From Woorndoo-Dundonnell Road to Bolac Plains Road, the road cross-section varies from a 7.7m seal for approximately the first 50m, and then narrows to a pavement seal between 3.4m and 3.9m with gravel shoulders between 2.1m and 2.7m for the remainder of the OD route. The pavement surface is in generally good condition.

North-east from Bolac Plains Road, Woorndoo-Streatham Road varies between recently reconstructed and older sections of pavement. The newer sections of pavement have approximately 4m sealed surface and 2m shoulders. The older pavement sections have a sealed width of 3.5m and shoulders varying between 1m and 2.5m.

In the recently upgraded sections of Woorndoo-Streatham Road, culverts are generally in excellent condition, showing no visible signs of damage and provided with greater than 400mm depth of cover from the pavement surface. Culverts in sections of road with old pavement were in poor condition, with obvious spalling and cracking in the concrete pipe and only 100-150mm of cover between the road surface.

The May 2013 traffic volumes provided by Moyne Shire Council show that the roads to be used from Woorndoo currently carry relatively low levels of traffic. Woorndoo-Dundonnell Road has an Annual Average Daily Traffic (AADT) estimate of 130 vehicles, comprising 18% heavy vehicles, and Woorndoo-Streatham Road has an AADT estimate of 98 vehicles comprising 18% heavy vehicles.

Quarry Construction

Deliveries of quarry equipment will likely be transported to the site via the Glenelg Highway or Hamilton Highway and the local road network. The vehicles will ultimately enter the wind farm site via Post Office Lane or Fashams Lane which are unsealed, single-lane roads. Specific requirements for deliveries will be organised with Moyne Shire and detailed in a Traffic Management Plan (TMP). If OD transport vehicles are required, these will be subject to the same permit requirements and process as WTG component deliveries.

School Bus Routes

Consultation was undertaken with local schools identified by Moyne Shire Council as likely to have school bus routes and times operating within the Woorndoo area. Mortlake College operates a route along Mortlake-Ararat Road and Woorndoo-Dundonnell Road at approximately 7.40am and 3.50pm on school days.

Lake Bolac College advised they operate two bus routes on the Mortlake-Ararat Road, along the proposed OD route, with pick up times between 7.40am and 8.20am.

19.6 Assessment of Impacts

19.6.1 Vehicle Types

The vehicles to be used in the construction of the wind farm and their purposes are described in *Table 19-2*.

Table 19-2 Vehicle Types

Vehicle Type	Use
OD vehicles, e.g. extendable rear-steerable trailer delivery vehicles, low load trailer systems.	Delivery of high-mass items including: WTG components (tower sections, blades, hubs and nacelle) and transformers.
Heavy vehicles, e.g. semi-trailers, truck and dogs, tankers and cranes.	Delivery of plant, rock material for access track and hardstand, concrete constituents, concrete reinforcement, transmission towers and cables and substation components.
General traffic, e.g. vans, utility vehicles and cars.	Construction staff transport.

19.6.2 Site Establishment and Construction

Overview

Levels of traffic will vary across the construction period and therefore the assessment considers two key work phases; site establishment and construction. Assumptions used in the generation of the average daily traffic volumes are listed in the *Traffic Impact Assessment* contained at Volume 2. The proposed works will be undertaken in accordance with a TMP which is expected to be implemented as a condition of any planning permit issued. As detailed construction works for the wind farm are not yet confirmed and given the potential for changes to road and

other conditions prior to the commencement of works, the TMP will be prepared prior to commencement of works, and is detailed further in *Table 19-5*.

Quarry

The establishment of the on-site quarry will be one of the first activities undertaken and will provide the material to construct the site access track from Woorndoo-Streatham Road. Traffic associated with establishment of the on-site quarry will enter the wind farm site via Fashams Lane or Post Office Lane. Mobile plant and equipment will be trucked on-site at the commencement of establishment and remain on-site.

It is estimated that quarry establishment works will require approximately 16 heavy vehicle movements over a period of up to four days. Once operational, the traffic movements and subsequent impact on Fashams Lane and Post Office Lane are anticipated to be minor. While both Post Office Lane and Fashams Lane are unsealed, single-lane roads, in consideration of the brief period over which heavy vehicle deliveries will occur, and the minimal impacts associated with staff, this proposed arrangement is considered satisfactory.

Based on the *Draft Quarry Work Plan* (CK Prowse and Associates, 2015), it is assumed that the majority of aggregate required for the wind farm construction will be available from the proposed on-site quarry and therefore impacts to the local traffic network from the quarry as a result of construction will be limited.

Wind Farm

Construction traffic will use the Woorndoo- Streatham Road south of the identified site access, to Mortlake-Ararat Road. From Mortlake-Ararat Road, all WTG OD vehicle movements will be from the north, with other heavy vehicle movements likely to be relatively evenly distributed to the north and south. The anticipated daily traffic volumes associated with other site establishment works, excluding the quarry establishment, along with the construction phase of the Project are summarised in *Table 19-3.*

Table 19-3 Average Daily Generated Traffic

Vehicle type	Average vehicle movements per day
Wind Farm site establishment	
Vehicle movements during this phase will largely consist of machinery, equipment and site facility deliveries, as well as a nominal level of material required to establish initial internal access roads, the on-site concrete batching plant, quarry and water storages.	
OD*	-
Heavy vehicle	12
General traffic	70
TOTAL	**90**
Construction phase	
Activities will include WTG footings and crane hardstand site construction; internal site access road construction; substation construction; transmission tower erection; and WTG/ wind observation tower erection.	
OD	10
Heavy vehicle	20
General traffic	270
TOTAL	**300**
***Some OD vehicle traffic may access the site during the establishment phase (e.g. quarry traffic), but irregularly.**	

General vehicle traffic will likely be concentrated during the morning and afternoon peak with staff arrivals and departures. The majority of construction staff are expected to approach and depart from the wind farm site from the south towards Woorndoo-Dundonnell Road and Mortlake-Ararat Road. The peak periods for staff movements are not expected to coincide with heavy vehicle and OD vehicle movements to and from the wind farm site.

When combined with the existing traffic volumes along Woorndoo-Streatham Road of approximately 98 vehicle movements per day, the traffic generated during construction will result in the following typical daily traffic volumes (rounded-up) during peak activity at the wind farm site:

- site establishment – approximately 190 vehicle movements per day; and
- construction – approximately 400 vehicle movements per day.

Given the extent of additional movement, Woorndoo-Streatham Road is considered to have capacity to accommodate the expected traffic volumes without necessitating widening or pavement upgrade works (beyond the specific upgrades required to accommodate OD vehicles, which are discussed in *Section 19.6.3*). The upgrade of Woorndoo-Streatham Road to a sealed pavement is not considered necessary, as traffic volumes will only exceed the recommended range during a brief period of construction. The bulk of additional movements will be limited to short periods and general staff traffic is unlikely to coincide with heavy vehicle movements.

It is acknowledged that the increase in vehicular movements is likely to result in an increased number of vehicles relying on the gravel shoulder for passing, resulting in increased wear and tear to the gravel shoulders of the road. It is also likely that culverts in existing poor condition will be further damaged by OD vehicles, and may require repair and replacement. Trustpower will monitor the roads and they will be maintained to current standards for the life of the Project. In addition, traffic management measures will be implemented along Woorndoo-Streatham Road and Bolac Plains Road that will assist in reducing impacts on the road surface.

The above consideration of traffic movements assumes that the water that will be required for use during the construction phase for the wind farm will primarily be able to be sourced on site. However, on the basis that it may

not be possible to source all the required water on-site, consideration has been given to the possibility of sourcing off-site water.

The most appropriate off-site water source for the Project, if one is required, has been identified as Absalons Bore (operated by Wannon Water). Water from this bore would be sourced from taps located adjacent to MOPS on Connewarren Lane, to the west of Mortlake. During peak construction periods, transport of water to meet requirements is estimated to equate to three loaded and three unloaded heavy vehicle trips to the external road network per day. If required, the impact of these additional heavy vehicle movements would require further assessment and discussion with Moyne Shire Council and VicRoads. This scenario however, is considered highly unlikely as preliminary investigations suggest that the majority of water required will be able to be sourced on-site subject to further investigation and obtaining necessary approvals.

Off-site Substation

Heavy vehicle access to the off-site substation site adjacent to MOPS will be required during the main wind farm construction phase for the substation footing construction and substation installation. Construction materials required for the off-site substation will be sourced externally and involve in the order of 100 heavy vehicle movements across the construction period of 4-6 weeks (excluding OD vehicle movements). Heavy vehicle traffic associated with the substation construction will approach the site from Hamilton Highway via Connewarren Lane.

The Project will require the delivery of two transformers weighing approximately 132 tonnes each. One transformer will be delivered to the off-site substation from Geelong and is expected to utilise the route approved for MOPS. OD vehicles to transport the transformers will exceed VicRoads maximum Gross Combination Mass Limits for heavy vehicles. These activities will be subject to specific permit requirements and preparation of a detailed TMP.

Transmission Line

The majority of construction activity associated with the transmission line between the wind farm and the substation near MOPS will occur off-site. It is anticipated that the majority of vehicles will access the transmission line corridor where it crosses existing roads, and travel along an access track running along the corridor. Therefore impacts on public roads along the transmission line corridor are anticipated to be minor and limited to a short period of time before construction progresses to a different location. Access management plans will be prepared in conjunction with Moyne Shire when required as works along the corridor progress.

School Bus Routes

Two schools operate bus routes along or in the vicinity of the proposed OD access route. A period of inactivity for construction vehicles during the time of school bus services will be negotiated to avoid interaction between OD vehicles and school bus traffic. Details of this will be confirmed in the TMP prepared for the Project.

19.6.3 Road Network Upgrades

The *Traffic Impact Assessment* included a swept path analysis of the full length of the preferred access route along Mortlake-Ararat Road from Woorndoo to the site access point to determine the suitability of the road to accommodate OD vehicles. The modelled design vehicle could track within the existing sealed pavement for the majority of the preferred access route, with the exception of intersections and some bends on the Woorndoo-Streatham Road.

At this stage, four locations have been identified where road widening works will be required for OD vehicles, as summarised in *Table 19-4* and identified in *Figure 19-3*. In accordance with the requirements of the *Road Management Act 2004* permits will be obtained for any necessary road widening works. All widening currently proposed is expected to be able to be accommodated within the existing road reserve.

Table 19-4 Identified Road Upgrades for the Proposed OD Haulage Route

Road	Construction vehicle impact	Investigation/ upgrade required
Mortlake-Ararat Road	OD vehicles will occupy both traffic lanes and will traverse the inside (northern) shoulder of the western Mortlake-Ararat Road bridge approach.	Shoulder widths of between 1.2m and 1.4m appear to be trafficable, however further investigation is required to determine whether formal road widening works are needed on the approach to the northern shoulder.
Mortlake-Ararat Road / Woorndoo-Dundonnell Road/ Woorndoo-Streatham Road	Through the Mortlake-Ararat Road/ Woorndoo-Dundonnell Road intersection OD vehicles will occupy the full width of the intersection. OD vehicles will have to cross the existing splitter island on the Woorndoo-Dundonnell Road and will cut across the verge on the northern side of this intersection. There is a significant level difference between the road surface and the level of the verge. Through the Dundonnell Road/ Woorndoo-Streatham intersection OD vehicles will occupy the full width of the intersection as well as the existing verge on the western side of the intersection. This verge is adjacent to a significant conservation area, however the area of significance will not be impacted.	The verge north of the Mortlake-Ararat Road/ Woorndoo-Dundonnell intersection will need to be built up to the road surface level and widened. The existing culvert will require extension. The splitter island on the Woorndoo-Dundonnell Road approach may need to be temporarily removed to accommodate OD movements (this will need further input from the delivery contractor). The verge on the western side of the Dundonnell Road/ Woorndoo-Streatham Road intersection will require widening.
Woorndoo-Streatham Road	Through the intersection of Woorndoo-Streatham Road and Bolac Plains Road OD vehicles will track outside of the sealed road surface, which through this bend is approximately 4m.	Incorporate existing gravel shoulders into sealed road surface to create a sealed road width of approximately 6.2m.
Woorndoo-Streatham Road	Within this segment, the OD vehicle will occupy both lanes and partially across the outside shoulder.	Shoulder widths of between 0.9m and 1.7m appear trafficable. Providing a bitumen surface on the existing shoulder is anticipated to be sufficient to accommodate OD traffic.

Client:	Trustpower		
Drawing No:	0107773_019G_R2_EES_Fig19_3_Road_wid_141015.mxd		
Date:	15/10/2014	Drawing Size: A4	
Drawn By:	ML	Reviewed By: DB	

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 19-3 - Location of Road Widening Upgrades

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

19.6.4 Operational Traffic

Vehicle movements associated with the operation of the Project will consist of daily maintenance activities carried out by two people, with daily traffic generation to the surrounding road network likely to consist of four vehicle movements. Fortnightly and monthly maintenance activities are expected to increase the daily traffic generation of the site up to a maximum of approximately 10 vehicle movements. The majority of vehicle movements associated with ongoing maintenance will be internal to the wind farm site with minimal impacts on the surrounding road network.

Maintenance such as the replacement of a WTG blade involving OD vehicle movements will occur infrequently. Any OD vehicle movements to accommodate these activities will be subject to VicRoads permitting requirements.

The eventual decommissioning of the wind farm site will involve the removal of all above ground structures. This excludes part of the foundations and access tracks. In comparison to the construction period, the traffic generated during decommissioning of the site will be minimal and will not adversely affect the surrounding road network.

19.7 Impact and Mitigation Measures

The traffic impacts of the Project and an initial impact rating are summarised in *Table 19*-5. Mitigation measures and the residual impact rating after environmental mitigation measures have been applied are also provided in *Table 19*-5.

Table 19-5 Traffic Impacts, Mitigation Measures and Residual Impact

Impact Number	Impact	Impact rating	Mitigation Measures	Residual Impact Rating
19-01	All construction related traffic impacts	Moderate	Project Activities will be undertaken in accordance with a Traffic Management Plan. This Plan will be prepared prior to the commencement of works and will include a further review of expected traffic volumes during construction, outline measures to minimise impacts to existing road users during works and will identify maintenance and rectification works during/post construction. In general, the Traffic Management Plan will include (but is not limited to) the following: • Confirmation of expected traffic volumes generated by the wind farm for all work stages; • Identification/qualification of all heavy vehicle and OD vehicle haulage routes for all work stages, including for the MOPS substation construction work stage; • A mechanism to review identified haulage route road conditions prior to the commencement of works; • Mechanisms/agreements to maintain haulage route roads and road infrastructure during construction works and to reinstate roads to at least pre-construction conditions; • Qualification of any requirement for specific work stage construction traffic management plans; and • Qualification and identification of relevant mechanisms for OD vehicle permits and traffic management requirements. Specific items that will be addressed within the Traffic Management Plan with regards to VicRoads include: • Confirmation of arterial road OD routes to be used and expected associated traffic volumes (as AADT); • Confirmation of arterial heavy vehicle haulage routes to be used and expected associated traffic volumes (as AADT); • The preparation of a functional plan of works required at the Mortlake-Ararat Road / Woorndoo-Dundonnell Road and Woorndoo-Streatham Road / Woorndoo-Dundonnell Road intersection (in conjunction with Moyne Shire) to accommodate OD vehicles including: ○ The extent of prospective widening/improvement works required to facilitate OD vehicle movements (and any resultant works); ○ Improvements/changes to signage and line marking at and on approach to the intersection required for the safe operation of this intersection for non-wind farm vehicle traffic;	Minor

Impact Number	Impact	Impact rating	Mitigation Measures	Residual Impact Rating
			○ The preparation of a functional stage Road Safety Audit (RSA) of the Mortlake-Ararat Road / Woorndoo-Dundonnell Road and Woorndoo-Streatham Road / Woorndoo-Dundonnell Road intersection works; ○ The preparation of Construction Traffic Management Plan for the Mortlake-Ararat Road between Woorndoo and the Ararat-Mortlake Road / Woorndoo-Dundonnell Road intersection (to be coordinated with any adjacent local road CTMP's prepared for Moyne Shire); ○ The preparation of a Construction Traffic Management Plan post implementation RSA, with particular consideration of the Mortlake-Ararat Road Salt Creek Bridge approach sightlines; ○ A detailed structural analysis of the Mortlake-Ararat Road Salt Creek Bridge; and ○ The preparation of a developer funded road maintenance levy or agreed alternative in accordance with the draft VicRoads Guidelines and Framework for Assessing Wind Farm Energy Project guidelines. Specific items that will be addressed within the Traffic Management Plan with regards to Moyne Shire Council roads include: • Functional plans of the identified potential road widening works on Woorndoo-Streatham Road and Woorndoo-Dundonnell Road required for OD vehicles; • Confirmation of expected traffic volumes to be generated on Woorndoo-Streatham Road and Woorndoo-Dundonnell Road for each identified works stage and further assessment of potential road up-grade works required to cater for this traffic, including: ○ Additional road widening works beyond that already identified of OD vehicles; ○ Upgrade of road pavements to support expected traffic volumes; and ○ Any required culvert/drainage upgrade/mitigation works. • The preparation of Construction Traffic Management Plans for each work identified stage for Woorndoo-Dundonnell Road between Ararat-Mortlake Road and Woorndoo-Streatham Road, Woorndoo-Streatham Road from Woorndoo-Dundonnell Road to the site access, and for any other identified sites where construction activity may impact on then local road network (to be coordinated with any adjacent local road Construction Traffic Management Plans prepared for VicRoads). • The Construction Traffic Management Plan will include: ○ Any signage/line marking requirements; ○ Expected haulage hours, including identification of non-activity periods during school	

Impact Number	Impact	Impact rating	Mitigation Measures	Residual Impact Rating
			bus times; ○ A 6 month review non-activity haulage periods associated with school bus times in consultation with Moyne Shire Council (to be undertaken prior to the commencement of semester 1 and semester 3); • An on-site contact responsible for the implementation and maintenance of the Construction Traffic Management Plan; ○ The preparation of a Construction Traffic Management Plan post implementation RSA for each work stage; and ○ The preparation of a workable road maintenance agreement between Moyne Shire and Trustpower for the relevant sections of Woorndoo-Dundonnell Road and Woorndoo-Streatham Road (and other Council roads identified as additional haulage roads) that: ▪ Establishes existing road conditions prior to the commencement of works on-site; ▪ Establishes a regular inspection and reporting schedule of haulage route road conditions; ▪ Nominates an appropriate on-site contact for the reporting of road maintenance issues identified outside of regular inspections; ▪ Establishes timeframes and procedures for rectification of identified issues; and ▪ Identifies the standard and extent of post construction rectification works of roads (to existing conditions or an agreed alternative). Should the anticipated levels of rock and water sourced on-site not be achievable, then further assessment will be undertaken to detail the impact of additional heavy vehicle traffic beyond the site and will be addressed in the Traffic Management Plan.	

Impact Number	Impact	Impact rating	Mitigation Measures	Residual Impact Rating
19-02	Construction vehicles damage existing culverts along the access route	Minor	A structural review will be undertaken of existing culverts on local access route prior to the commencement of construction to confirm their suitability for OD vehicle loads. A photographic survey will be undertaken of the condition of all culverts prior to construction to document their pre-development condition. Culverts will be improved and replaced as necessary to withstand OD vehicle traffic. The condition of all culverts will be reviewed post construction, and works will be undertaken to reinstate culverts to pre-development conditions where required.	Minor
19-03	OD vehicles impact on overhanging branches along access route	Minor	Overhanging branches will be restrained or pruned to ensure that adequate overhead clearance is provided for OD vehicles.	Minor
19-04	Construction vehicles interact with school bus routes	Moderate	A period of inactivity will be negotiated for construction vehicles during the time of school bus services and details of this arrangement will be confirmed in the Construction Traffic Management Plan prepared for the Project.	Minor

19.8 Impact Assessment Conclusions

In assessing the traffic impacts of the Project, overall impacts were initially assigned a moderate impact rating. The preferred access route utilises the shortest and safest route to the wind farm site and consists of roads that are generally well-maintained with sufficient road widths and intersections to accommodate OD vehicles. The highest initial risks were associated with construction traffic impacts on road infrastructure, and potential interactions with the school bus both of which were rated as moderate. It is considered that these potential impacts can be dealt with through mitigation measures and the TMP to be prepared for the Project.

Accordingly it is considered that the impacts to the local roads and the broader road network are likely to be minimal subject to the preparation and implementation of the TMP, to be prepared in consultation with Moyne Shire Council and Vic Roads.

The overall residual impact for traffic and transport as a result of the construction and operation of the Project is expected to be minor.

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 20 – SOCIO-ECONOMIC

This page is intentionally blank

Contents

Tables

This page is intentionally blank

20 SOCIO-ECONOMIC

This Chapter describes the potential social and economic benefits and impacts of the Project along with the proposed mitigation and monitoring measures that are designed to ensure that the Project limits any adverse social or economic impacts.

A *Socio-Economic Impact Assessment and Economic Impact Assessment* have been undertaken for the Project and have concluded as follows:

- The Project will make a net contribution of $309 million to the Gross State Product over the three year construction period. Once operational, the Project is also estimated to provide $12 million of value added contributions each year (i.e. in labour and returns to capital).
- At the regional level, the Project will generate $79 million of value added contribution to the Gross Regional Project during the construction phase and $4.7 million of value added in the region during the operational phase.
- At the local level, the Project will generate $33 million of value added contribution in the Moyne Shire during the construction phase and $1.7 million value added in the Shire during the operational phase.
- The Project supports increased direct and indirect employment opportunities at the State, regional and local level during the construction and operational phases of the Project. This includes the creation of over 200 direct and 100 indirect jobs (full time positions) during the two to three year construction period and up to ten direct and six indirect jobs (full time positions) during operation of the wind farm.
- The Project includes the introduction of new and diversified land uses which are likely to provide a positive offset to the overall trend of declining agricultural land uses in rural areas.
- The Project will result in increased revenue for participating landholders of the Project and ongoing opportunities to contribute to community benefit programs.
- Increased demand will also result for services/positions within existing local businesses creating short term job opportunities and provision of a broader knowledge base and range of experiences.
- The increased size of the construction workforce will offer increased incentive to local residents to remain in the local area and support local membership to volunteer groups.

20.1 EES Objectives

The EES evaluation objective most relevant to socio-economic matters is:

Land use and Socio-economic – To avoid or minimise disruption and other adverse effects on local infrastructure (including roads), land use (including agricultural and residential) and to neighbouring landowners and road users during construction and operation of the project.

This Chapter is based on the *Socio-Economic Impact Assessment* (SIA) undertaken by Capire Consulting Group Pty Ltd, dated August 2014 and the *Economic Impact Assessment* (EIA) undertaken by Hudson Howells, dated April 2014. This Chapter should be read in conjunction with the *Planning and Land Use Assessment* (PLUA) undertaken by ERM, dated June 2015. These reports are contained in Volume 2: Supplementary Reports. This Chapter also draws on the other relevant specialist technical assessments and technical chapters of the EES.

This Chapter together with the SIA, EIA and PLUA address the EES Scoping Requirements by:

- outlining the potential for the Project to unreasonably disrupt existing and/or proposed land uses, with associated economic and social effects on households and businesses;

- describing the Project area in terms of existing and proposed land uses, residences and public infrastructure that supports the current patterns of economic and social activity;
- identifying potential long and short-term effects of the Project on existing and potential proposed land uses and public infrastructure;
- identifying any proposed measures to mitigate adverse land use effects;
- identifying the potential economic effects of the Project, taking into account direct and indirect consequences on employment and existing economic land uses within the area; and
- identifying proposed management and monitoring measures to further reduce the risk of effects of the Project and provide an estimation of likely residual effects.

20.2 Study Area

The study area for the socio-economic assessment included the Project area encompassing the wind farm site, transmission line corridor and off-site substation, and consideration of the potential positive and negative impacts of the Project on the broader regional and local community.

The EIA includes as assessment of the Project in terms of economic benefits to the State of Victoria, the region and also the local community.

20.3 Assessment Methodology

The methodology used for the SIA included:

- identifying the existing socio-economic profile for the broader regional and local area using data from the Australian Bureau of Statistics (ABS) Census 2011 data;
- desktop review of relevant policy, discussion papers and technical studies relating to other wind farm projects undertaken in Victoria (and the broader wind energy industry) to provide broad context of common social and economic issues relating to wind farm developments;
- review of technical reports and assessment documents provided by Trustpower and relating to the Project including:
  - Dundonnell Wind Farm EIA (Hudson Howells, 2014); and
  - Dundonnell Wind Farm PLUA (ERM, 2015b);
- assessment of socio-economic impacts grouped under the following four key themes:
  - function of place;
  - access to employment opportunities;
  - capacity of support functions in the region; and
  - certainty and peace of mind.

The methodology for the EIA focused on the effect of the Project on regional and local incomes and employment associated with the construction and operating phases of the Project. Economic modelling undertaken as part of the assessment was derived from information obtained from the Victorian Government available on Econsearch. Further details on methodology for the EIA are provided at *Section 3* of the EIA.

20.4 Legislation and Policy

The relevant legislation and government policies for socio-economic matters are outlined in *Table 20-1.*

Table 20-1 Relevant Socio-Economic Legislation and Policies

Legislation / Policy	Description
State	
Public Health and Wellbeing Act 2008	This Act recognises the State's role in promoting, protecting and reducing inequalities in public health and wellbeing. The Act promotes collaboration between all levels of Government and industry, business, communities and individuals.
Planning and Environment Act 1987	The P&E Act has the objective of securing *'a pleasant, efficient and safe working, living and recreational environment for all Victorians and visitors to Victoria'*. The Act also addresses the protection of public utilities for the benefit of the community.
Policy and planning guidelines for development of wind energy facilities in Victoria (DELWP, 2015)	The Wind Energy Guidelines are for responsible authorities, proponents and the community to provide guidance about wind farms and inform planning decisions about wind energy facility proposals. The Guidelines also set out information requirements for wind energy developments.
Local	
Moyne Planning Scheme	The Moyne Planning Scheme is implemented via the P&E Act. Clause 10.01 'Purpose' outlines the purpose, goal, application and decision making framework for planning in Victoria. The primary objective is *'to provide for the fair, orderly, economic and sustainable use and development of land.'* Clause 19.01 'Renewable energy' requires that '*consideration be given to the economic and environmental benefits* to *the broader community of renewable energy generation while also considering the need to minimise the effects of a proposal on the local community and environment.'* Clause 52.32 sets out the matters to be considered prior to the determination of an application for a wind energy facility, which includes consideration of the Wind Energy Guidelines.

20.5 Existing Conditions

20.5.1 Function of Place

The wind farm site, transmission line corridor, off-site substation and adjoining areas are primarily improved pastoral land used for grazing. The land has been partly cleared for improved pasture, and land use surrounding the Project also includes cropping.

The primary access routes connecting the wind farm site to Woorndoo are the Mortlake-Ararat Road, Woorndoo-Dundonnell Road and Dundonnell-Streatham Road. These roads generally service local traffic such as private vehicles and school buses, as well as freight and agricultural machinery. The *Traffic Impact Assessment* (Cardno, 2014) noted that these roads currently carry low levels of traffic.

20.5.2 Access to Employment Opportunities

The labour force of Moyne Shire comprises 51% of the population or an estimated 8,260 people. There are approximately 5,900 jobs in the Shire, which when compared against the municipal labour force, suggests there is a job deficit in the municipality. Residents may therefore be required to travel to adjoining municipalities for work.

The agriculture, forestry and fishing industry sector was the largest employment sector within the local area and across Moyne Shire, accounting for 27.6% (or 2,070 jobs) of the local workforce (ABS, 2011). This sector experienced a significant decline between 2006 and 2011.

20.5.3 Capacity of Support Functions in the Region

There are a number of current extractive industry tenements in the region. These tenements include Salt Creek Quarry, which is located approximately 15km south west of the site, and Mt Shadwell Quarry, which is located approximately 3km north of Mortlake and is wholly owned by Moyne Shire Council.

There are five stone material deposits that are currently listed by DEDJTR within proximity of the Project. There are also electrical contractors, civil contractors, earth movers, fencers, truck drivers and quarry operators within the region as well as transport companies and locals who can provide support services, including accommodation, machine servicing and tyre repair, and food and beverage supply.

In addition to paid employment, Moyne Shire relies heavily on volunteers to support emergency services such as the SES and the CFA. Approximately 31% of the population reported doing some form of volunteer work in 2011; almost double that of Metropolitan Melbourne.

20.5.4 Certainty and Peace of Mind

Trustpower has adopted the *Stakeholder Engagement Strategy* prepared by NewEn (2012) and has undertaken regular communication and consultations with the local community and stakeholders to inform and address queries regarding the Project. Further details regarding the community and stakeholder engagement undertaken to date are provided at *Chapter 7* of the EES and the *Dundonnell Wind Farm EES Consultation Plan* (Wordwiz, March 2015) contained at Volume 2.

20.6 Assessment of Impacts

20.6.1 Function of Place

The construction and operation of the proposed wind farm is anticipated to result in a minor net reduction in agricultural land of approximately 2% in the long-term. However, the agricultural land loss corresponds to the introduction of new and diversified productive land uses. The development of the Project will not prohibit the land within the wind farm site, transmission line corridor and surrounding properties from continuing existing agricultural activities.

The new and diversified land uses as a result of the wind farm are likely to provide a positive offset to the overall trend of declining agricultural land uses in rural areas. In addition, whilst local traffic movements will increase during the construction stage, road upgrades required for construction and delivery vehicles will provide long-term beneficial outcomes for local residents and workers, and improved access to the site for farming and emergency services.

While the change in resident population is likely to result in a small overall population loss, the subsequent growth in construction workforce is likely to increase the overall short-term and long-term local and regional residential populations during the construction phase.

The temporary use of the site for quarrying purposes is likely to contribute to the overall loss of agricultural land, however will minimise external traffic impacts and create additional local employment during construction. Furthermore, Trustpower is committed to rehabilitating the site back to a landform capable of supporting rural activities.

20.6.2 Access to Employment Opportunities

In addition to providing short-term employment, the Project offers the opportunity to train and up-skill workers, which can create long lasting benefits and support more sustainable economic and social opportunities.

The site establishment and construction phase of the Project is expected to generate significant economic contributions and employment opportunities at the State, regional and local level. A summary of the potential total quantum of employment generated during the construction and operation phases together with the estimated contribution to the economy is provided in *Table 20-2*.

Table 20-2 Estimates of Economic Contributions and Employment Generated

Contribution to Gross State Product	Total State Employment Impact*	Contribution to Gross Regional Product	Total Regional Employment Impact*	Contribution to Local Added Value	Total Local Employment Impact*
Construction Phase					
$309 million	2,870 or 960 per annum	$79 million	830 or 280 per annum	$33 million	310 or 100 per annum (direct and indirect jobs)
Operational Phase					
$12 million	100 per annum	$4.7 million	51 per annum	$1.7 million	16 per annum (direct and indirect jobs)
Source: Hudson Howells, 2014 * Full time equivalent jobs					

The Project is expected to generate a range of jobs throughout the construction and operational phases of the Project, including project developers and managers, engineers, legal support, technicians, administration and office support, numerous construction-related positions and contract and sub-contract managers. Trustpower is committed to encouraging contractors to use as much labour as reasonably possible from the local labour force for the construction phase of the Project.

The construction and operational phases of the Project will not preclude continued agricultural activity in the local area and the introduction of new and diversified productive land uses will support the viability of the commercial agricultural sector into the future.

20.6.3 Capacity of Support Functions in the Region

The Project will require additional inputs including raw materials, water and contributions from the local support sector, such as logistics and manufacturing during the construction phase. Sourcing materials and resources within the region provides a range of indirect and induced benefits to the wider economy including increased employment opportunities across a diverse range of industry sectors.

The addition of traffic through the site and various construction activities (such as blasting and excavation) has the potential to alter site access or evacuation routes. Furthermore, the wind farm assets will modify the local and regional utility network and will significantly increase the value of infrastructure within the local area.

The use of the on-site quarry at the wind farm site will limit the impact on local resources and given the use of the quarry is restricted to the construction phase of the Project, it will have a negligible impact on the future availability of resources.

Whilst there are potential risks to wind farms and associated infrastructure such as fires, firefighting limitations and electrical faults, these are considered low risks balanced against increased benefits resulting from the improved access for emergency services. Fire management is discussed in more detail in *Chapter 22* of the EES.

In addition, the increase in the size of the construction workforce offers an increased incentive to local residents to remain in the local area and an opportunity to grow the local membership of volunteer groups such as the SES and CFA.

Renewable wind energy generation also has significant environmental benefits through carbon emissions reduction where it replaces coal or gas generated electricity. This is discussed in more detail in *Chapter 1* of the EES.

20.6.4 Certainty and Peace of Mind

Communication

Major infrastructure projects such as the Project present a key opportunity to engage and involve the community. Trustpower is committed to an ongoing relationship with the community and has provided contributions to support local community groups and organisations that provide lasting benefits.

Trustpower has an ongoing commitment to long-term community consultation throughout the construction and operation phases of the Project in order to respond to a range of community issues as they arise. This approach to communication will ensure a degree of trust is kept amongst the community.

Property Values

Various studies have been undertaken by independent organisations around the world, which have not found a correlation between wind farms and declining property values. These studies, including the Lawrence Berkeley Study (reported in the Wind Energy the Facts, Clean Energy Council, 2013) highlight the potential positive property value impacts associated with:

- improved regional amenities and infrastructure, including local roads and firefighting access road;
- increased regional incomes, jobs and property demand;
- additional rental income from hosting towers;
- provision of drought-proofing income streams;
- provision of post-retirement income for farmers;
- improved biodiversity via less intensive farm activity; and
- erosion control and passive wind protection for stock from substations and WTGs.

In addition, the Project may also result in less subdivision of large land parcels, which can protect the viability of the commercial agricultural sector.

Based on a report by the CSIRO, rural landholders with WTGs on their properties stood to gain from such benefits (Wind Energy the Facts, Clean Energy Council, 2013). Furthermore, the EIA indicates that the visual impacts on non-participating properties had no apparent impact on property values when assessed against comparable areas with no WTGs.

Based on independent studies, it was determined that wind farms have no long-term detrimental impact on overall property values.

Concerns Relating to Amenity Impacts and Human Health

Concerns have previously been expressed in relation to other wind farm projects with regards to the potential to create adverse impacts on human health. These concerns are generally a result of operational noise (including low frequency and infrasound emissions), shadow flicker or electromagnetic radiation. Potential health effects have been reported to cover a wide array of physical and mental health outcomes, sleep disturbance, annoyance and 'quality of life' impacts.

The AMA recently prepared a media release on the findings of wind farms and human health, concluding that although there is no evidence that wind farms harm health, there is a need to keep communities informed of these projects to avoid anxiety and misinformation about the health implications (AMA, 2014). This information has been made available by Trustpower as part of the community consultation activities undertaken to date.

The Project will avoid adverse amenity impacts on nearby residents and local communities by complying with the relevant assessment criteria applicable to operational wind farm noise, shadow flicker and electromagnetic radiation. Potential impacts are discussed in *Chapters 14, 15* and *16* within this EES.

20.7 Impacts and Mitigation Measures

The socio-economic impacts of the Project and an initial impact rating are summarised in *Table 20-3.* The assessment only considers positive and negative impacts, not the scale of impact. Mitigation measures and the residual impact rating after environmental mitigation measures have been applied are also provided in *Table 20-3*.

Table 20-3 Socio-Economic Impacts, Mitigation Measures and Residual Impacts

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
20-01	Significant contributions to the State, regional and local economy.	Positive	• No mitigation measures required.	Positive
20-02	Potential impact of the Project on existing land uses and public infrastructure.	Positive	• The mitigation measures outlined in the various technical assessments at Volume 2 of the EES will be implemented, including the use of EMPs to minimise issues relating to the negative impacts with respect to increased noise, dust and traffic. • Local roads will be upgraded for construction and delivery vehicles prior to commencement of construction of the Project. • Evidence will be made available to demonstrate that the Project is meeting approval requirements and additional commitments, such as a *Traffic Management Plan*. • During the decommissioning of the wind farm, the land will be returned to its original state where possible, to ensure it is capable of supporting future agricultural activity.	Positive
20-03	Increased direct and indirect employment opportunities at the State, regional and local level during the construction and operational phases.	Positive	• Opportunities will be investigated to cooperate with other wind farms in the region to support the development of an industry cluster for wind farm sustainable long-term workforce. • Work will be undertaken closely with existing local communities and local employment agencies to maximise local job opportunities.	Positive
20-04	Increased size of the construction workforce offers incentives to local residents to remain in the local area and support local membership to volunteer groups.	Positive	• No mitigation measures required.	Positive
20-05	Demand for services/positions within existing local businesses creates short-term job opportunities and provision of a broader	Positive	• Work will be undertaken closely with existing local industries to maximise local business opportunities. • Ongoing communication will be undertaken with the emergency service sector to ensure road layout meets their needs and maximises the benefits for improved road infrastructure access for emergency services.	Positive

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
	knowledge base and range of experiences.		• Volunteer membership opportunities with all staff to support growth in local membership will be actively promoted. • Evidence will be made available to demonstrate that the Project is meeting approval requirements, such as approvals relating to the establishment of a dedicated on-site quarry.	
20-06	Increased revenue for participating landholders of the Project and ongoing opportunities to contribute to community benefit programs.	Positive	• No mitigation measures required.	Positive
20-07	Potential impacts on the certainty and peace of mind of members of the community.	Negative	• Regular reviews and updates will be undertaken of the *Stakeholder Engagement Strategy* including methodology and platform. • A complaints register and management process will be established and implemented. • Evidence will be made available to demonstrate that the Project is meeting approval requirements and additional commitments. • Mitigation measures outlined in the technical assessments in relation to noise, shadow flicker and EMI impacts will be implemented. • Ongoing community consultations and communication such as monthly newsletters or on-going hotline number will be undertaken. • The necessary licenses and approvals required by Trustpower will be obtained, including (but not limited to) the on-site quarry and extraction of groundwater, will be obtained at the appropriate time following the EES submission.	Positive

20.8 Impact Assessment Conclusions

The Project will result in a range of economic and social benefits for the broader State, regional and local community, particularly in the provision of a range of employment opportunities for the region, upgrades to local infrastructure and increasing value to agricultural land.

Management and mitigation measures have been identified to minimise potentially negative impacts of the Project and provide support for local employment opportunities, local businesses and the existing agricultural sector as well as a commitment to ongoing community engagement and consultation.

It is concluded that the overall residual socio-economic impact as a result of the construction and operation of the Project would be positive.

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 21 - AVIATION

This page is intentionally blank

Contents

Tables

This page is intentionally blank

21 AVIATION

This Chapter describes the potential impacts to aviation safety and risk to aviation activities in the vicinity of the Project and the mitigation measures designed to manage the potential impacts on aviation safety.

An *Aeronautical Impact and Night Lighting Assessment* has been undertaken to assess the potential impacts on aviation activities in the vicinity of the Project and concluded as follows:

- Consultation was undertaken with relevant authorities and this determined that the Project will not impact on radar systems or communication services within its vicinity.
- There is no regulatory obligation to install obstacle lighting on the proposed WTGs.
- The Project is likely to prevent fixed-wing agricultural operations being undertaken on the wind farm site. The viability of conducting aerial agricultural applications on adjacent properties would have to be assessed on a case by case basis.
- Aerial firefighting operations will potentially be restricted in the vicinity of the Project, however valid ground-based access will be provided to and near the properties within the wind farm site.
- The Project is not expected to result in any significant risk to normal flying operations provided notification of its location is provided to operators, and aircraft are operated in compliance with applicable regulatory and operational control requirements.

21.1 EES Objectives

The EES evaluation objective most relevant to aviation is:

Land use and Socio-Economic - To avoid or minimise disruption and other adverse effects on local infrastructure (including roads), land use (including agricultural and residential) and to neighbouring landowners and road users during construction and operation of the Project.

This Chapter is based on the *Aeronautical Impact and Night Lighting Assessment* undertaken by Aviation Projects Pty Ltd, dated May 2014, contained in Volume 2. This Chapter and the *Aeronautical Impact and Night Lighting Assessment* address the EES Scoping Requirements by:

- identifying potential long and short-term effects of the Project on existing and potential proposed land uses (such as aerial spraying and other agricultural activities) and public infrastructure (such as transport routes, transmitters and receivers); and
- identifying and evaluating any proposed measures designed to manage effects on aviation operations.

21.2 Study Area

The study area for the *Aeronautical Impact and Night Lighting Assessment* included the wind farm site and the 38km transmission line corridor.

21.3 Assessment Methodology

The methodology for the *Aeronautical Impact and Night Lighting Assessment* included:

- a site visit conducted on 28 October 2013;
- desktop review of supplied wind farm layout and materials;
- review of relevant regulatory requirements and information sources;

- preparation of an Aviation Impact Statement in accordance with Airservices Australia guidance;
- preparation of a qualitative risk assessment, considering the requirements for aviation obstacle lighting; and
- consultation by writing and/or telephone interview as practicable with relevant stakeholders, including the Aerial Agriculture Association of Australia, CASA, Commonwealth Department of Defence and representatives of nearby aerodromes and aircraft operators.

21.4 Legislation and Policy

The relevant legislation and government policies for aviation are outlined in *Table 21-1*. The key documentation relied upon in the preparation of the assessment was the *Manual of Standards (MOS) Part 139 – Aerodromes* (CASA, 2012).

Table 21-1 Relevant Aviation Legislation and Policies

Legislation / Policy	Description
Commonwealth	
Civil Aviation Safety Regulations (CASA, 1998) and Manual of Standards Part 139 – Aerodromes (CASA, 2012)	The *Civil Aviation Regulations* require the owner (or proponent) of a structure that will be 110m or more above ground level (ABL) AGL to inform CASA. This will allow CASA to undertake a safety assessment of the proposal and make a determination in regards to the need for any obstacle lighting. Standards for obstacle marking and lighting are set out in the *MOS Part 139 - Aerodromes*.
Principles for a National Airports Safeguarding Framework - Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/ Wind Monitoring Towers (Department of Infrastructure and Regional Development, 2012)	The *Principles for a National Airports Safeguarding Framework* provides guidance to State/Territory and local government decision makers, airport operators and developers of wind farms to jointly address the risk to civil aviation arising from the development, presence and use of wind farms and wind monitoring towers.
State	
Policy and planning guidelines for development of wind energy facilities in Victoria (DELWP, 2015)	The Wind Energy Guidelines are for responsible authorities, proponents and the community to provide guidance about wind farms and inform planning decisions about wind energy facility proposals. The Guidelines also set out the information requirements for a wind energy development. The Wind Energy Guidelines note that the height of WTGs can be substantial, resulting in potential impacts on nearby airfields and air safety navigation. Referral to CASA is recommended to ensure appropriate consultation in relation to aircraft safety and navigation.
Local	
Moyne Planning Scheme	The Moyne Planning Scheme is implemented via the P&E Act. Clause 18.04-2 'Planning for airports' includes a strategy to *'protect airports from incompatible land-uses.'* Clause 52.32 of the Planning Scheme also sets out the matters to be considered prior to the determination of an application for a wind energy facility, which includes consideration of the Wind Energy Guidelines.

Legislation / Policy	Description
Other	
Draft National Wind Farm Development Guidelines (EPHC, 2010)	The purpose of the Draft National Guidelines is to provide a nationally consistent set of best-practice methods for assessing the impacts associated with wind farm developments and operations, including EMI. The Draft National Guidelines recommend that a radial distance of 50-60km from the centre of the wind farm would normally capture all of the potentially affected services in the area.

21.5 Aviation Existing Conditions

The *Aeronautical Impact and Night Lighting Assessment* identified that there are no registered or certified aerodromes with Instrument Approach Procedures (IAP) or designated Obstacle Limitations Surfaces (OLS) within 30 nautical miles (nm) (55.6km) of the proposed wind farm site boundary.

The nearest registered airport is Warrnambool Airport, which is located approximately 32.3nm (59.3km) south-west of the proposed wind farm site.

Although Cobden Airfield is 25.8nm (47.7km) from the proposed wind farm boundary, this airfield does not have an OLS or Procedures for Air Navigation Services – Operations (PANS-OPS) surfaces. Therefore, take-off and landing operations are not affected by the Project and the airfield is not equipped for night flying.

There may be other private airstrips and landing grounds located within 30nm of the proposed wind farm boundary, none of which require OLS and are not included in aeronautical charts or documents for the region. Pilots operating at such private airstrips are responsible for ensuring that they are aware of the conditions on and surrounding these landing sites.

The surrounding aerodromes and the approximate distances to the boundary of the wind farm site are identified in *Table 21-2.*

Table 21-2 Registered Aerodromes Detected

Aerodrome	Status	Approximate distance to Project	IAPs available
Ararat	Registered	32nm (59.3km)	No
Ballarat	Registered	41.9nm (77.6km)	Yes
Hamilton	Registered	43.4nm (80.3km)	Yes
Stawell	Registered	47.5nm (87.9km)	No
Warrnambool	Registered	32.3nm (59.8km)	Yes
Cobden	Uncertified	25.8nm (47.7km)	No
For departure and approach procedures (DAP) effective 14 November 2013. 1 Stawell IFPs are currently being designed, are not yet published for public use and do not affect proposal (Aviation Projects, 2014).			

21.6 Consultation with Operators

Consultation has been undertaken with relevant operators in the area. These consultation activities are summarised in *Table 21-3.*

Table 21-3 Operator Consultation

Agency	Activity / Date	Response / Date	Issues summary	Action proposed
Aerial Agricultural Association of Australia (AAAA)	17/2/14 Telecon with Chief Executive Officer	17/2/14 Telecon with Chief Executive Officer	AAAA opposes all wind farm developments in areas of agricultural production or elevated bushfire risk.	Nil. This is an AAAA published policy. This assessment acknowledges the impact on aerial agricultural activities as a result of the wind farm, refer *Section 21.7*.
Airservices Australia	16/12/13 Letter to Airport Development Manager	13/1/14 Email from Airport Development Assistant	With respect to procedures promulgated by Airservices in accordance with the International Civil Aviation Organization (ICAO) PANS-OPS and Document 9905 at a maximum height of 416m AHD, Dundonnell Wind Farm will not adversely impact the performance of Precision/Non-precision Nav Aids, HF/VHF Comms, Advanced Surface Movement Guidance and Control System (A-SMGCS), Radar, Precision Runway Monitor (PRM), Automatic Dependent Surveillance Broadcast (ADS-B), Wide Area Multilateration (WAM) or Satellite/Links.	Nil.
Commonwealth Department of Defence	16/12/13 Letter to Director, External Land Planning	11/2/14 Letter from Director Estate Planning – QVT Department of Defence	Defence assessed the information provided and advised that it has no objection to the proposed development.	Notify RAAF AIS of 'as-constructed' details. Prepare an aeronautical risk assessment and submit to CASA (this has been completed).
Civil Aviation Safety Authority	16/12/13 Letter to Manager, Airways and Aerodromes	18/12/13 Letter from Aerodromes Standards Engineer	The development is outside the obstacle limitation surfaces for any Certified or Registered Aerodromes and therefore CASA does not have the regulatory authority to require lighting of these towers. The final decision remains with the planning authority as to whether lights should be installed to mark the wind farm's location.	CASA does not require obstacle lighting. Planning authority to determine the requirement for obstacle lighting. Notify RAAF AIS once the design is finalised (prior to construction) and 'as-constructed' details.

Agency	Activity / Date	Response / Date	Issues summary	Action proposed
Western Aerial	19/2/2014	20/2/2014	Potential impacts for Western Aerial to conduct operations in and adjacent the proposed wind farm site. In some instances, this potential impact can be avoided by changing the direction of application. However, this results in an operationally less efficient wind farm.	Notify Western Aerial prior to, during and following construction of the Project.

21.7 Assessment of Impacts

21.7.1 Aeronautical Impacts

The Project is not expected to result in any significant risk to normal flying operations provided aircraft are operated in compliance with applicable regulatory and operational control requirements and with the application of good airmanship. The aeronautical assessment of the Project concluded:

- no adverse impact on OLS;
- no adverse impact on PANS-OPS surfaces;
- no adverse effect on any Lowest Safe Altitudes (LSALTs) for air routes in the area;
- with regard to aircraft operating heights, aircraft will have to fly at a higher altitude or divert around the wind farm;
- no adverse impact on Defence or Airservices Australia radar systems;
- no adverse impact on aviation-related communications systems; and
- no adverse impact on aviation-related electric and magnetic fields.

Aerial Application of Agricultural Fertilisers and Pesticides

The Project is likely to prevent fixed wing agricultural operations on the wind farm site. It is reasonable to conclude that safe aerial application operations would be possible on properties neighbouring the wind farm site with some operational or cost impacts, subject to final WTG locations, and subject to a case by case assessment.

Bushfires

Aerial firefighting operations will potentially be restricted in the vicinity of the Project.

21.7.2 Obstacle Lighting and Marking

The obstacle lighting requirements risk assessment of the Project concluded:

- there is no regulatory requirement for lighting of obstacles lower than 150m AGL that are not within the vicinity of an aerodrome;
- there is a relatively low rate of aircraft activity in the vicinity;
- there are no known aerial agriculture operations conducted at night in the vicinity;
- the wind farm will be clear of the obstacle limitation surfaces at Warrnambool aerodrome and other nearby aerodromes;
- no wind farms in relatively close proximity to the Project with WTGs greater than 110m AGL blade tip height are planned to have obstacle lighting;
- the risk of an aircraft collision with a WTG without obstacle lighting is considered acceptable; and
- if obstacle lights are to be installed, they can be designed so that there is an acceptable level of visual impact to neighbours.

21.8 Impacts and Mitigation Measures

The aeronautical impacts of the Project and an initial impact rating are summarised in *Table 21-4*. Mitigation measures and the residual impact rating after environmental mitigation measures have been applied are also provided in *Table 21-4.*

Table 21-4 Impacts and Mitigation Measures

Impact Number	Impact	Impact rating	Mitigation measures	Residual impact rating
21-01	Alteration to aircraft operating heights within the vicinity of the wind farm site	Minor	The location of the WTGs and wind monitoring masts will be made available to local and regional aircraft operators prior to, during and following construction. To avoid the wind farm, aircraft will have to fly at a higher altitude or divert around it.	Minor
21-02	Wind farm prevents fixed wing agricultural operations within the wind farm site, and impacts the viability of conducting such operations on adjacent properties	Moderate	Details of the wind farm (WTG locations and location of wind monitoring masts) will be communicated to local and regional aircraft operators prior to, during and following construction of the Project so that they can plan their operations accordingly. The use of helicopters will enable aerial application operations to be conducted in closer proximity to obstacles than would be possible with fixed wing aircraft due to their greater manoeuvrability.	Minor
21-03	Wind farm restricts aerial firefighting operations within the wind farm site and in the vicinity of the Project	Major	The location of WTGs and wind monitoring masts will be provided to emergency services operating in the vicinity of the Project. Although aerial fire-fighting activities may be restricted, valid ground-based access will be provided to and near the properties within the wind farm site. The design of the Project has taken into consideration the *Emergency Management Guidelines for Wind Energy Facilities* (CFA, 2012), which provide principles for the design and planning stages of a wind energy project. Consultation has also been undertaken with the CFA Barwon South West Region Fire Safety Officer. Refer to *Chapter 22* for further discussion of fire management procedures.	Moderate
21-04	Potential aircraft collision with WTG resulting in harm to people and damage to property	Major	The location of the WTGs and wind monitoring masts will be made available to local and regional aircraft operators prior to, during, and following construction, so that they can plan their operations accordingly.	Moderate

Impact Number	Impact	Impact rating	Mitigation measures	Residual impact rating
21-05	Potential aircraft collision with wind monitoring tower resulting in harm to people and damage to property	Major	Within the current regulatory regime, the level of impact risk is considered acceptable without further treatment, however the following measure may be implemented to provide an additional margin of safety: The location of the WTGs and wind monitoring masts will be made available to local and regional aircraft operators prior to, during and following construction so that they can plan their operations accordingly. Consideration could be given to marking the wind monitoring towers with bands of contrasting colour according to the requirements set out in *MOS 139 Section 8.10 - Obstacle Markings*.	Moderate
21-06	Aircraft colliding with terrain as a result of harsh manoeuvring to avoid colliding with a WTG, resulting in harm to people and damage to property	Major	The location of the WTGs and wind monitoring masts will be made available to local and regional aircraft operators prior to, during and following construction so that they can plan their operations accordingly.	Moderate
21-07	Installation and operation of obstacle lighting on WTGs diminishes neighbours' visual amenity	Moderate	As a result of the aeronautical assessment, obstacle lighting is not considered to be required. If obstacle lighting is ultimately installed it will be designed to reduce visual impact. The potential for visual impacts is discussed further in *Chapter 17* of this EES and within the LVIA report included at Volume 2.	Moderate

21.9 Impact Assessment Conclusions

No significant risk to normal flying operations is anticipated as a result of the Project, provided notification of the wind farm is communicated to operators. The Project will not impact on registered flight routes or registered aerodromes. Consultation was undertaken with relevant authorities, which indicated that the Project will not impact on radar systems or communication services within its vicinity.

It is acknowledged that aerial agricultural and aerial fire-fighting opportunities will potentially be restricted in the vicinity of the Project, given the potential for collision between aircraft and the WTGs and wind monitoring masts. Management and mitigation measures have been identified to address these issues.

It is concluded that the overall residual impact to aeronautical safety and activities as a result of the construction and operation of the Project would be moderate to minor.

This page is intentionally blank

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 22 – FIRE MANAGEMENT

This page is intentionally blank

Contents

Tables

This page is intentionally blank

22 FIRE MANAGEMENT

This Chapter discusses the potential bushfire risks associated with the Project and provides the necessary management measures to mitigate the potential risks.

An evaluation of potential bushfire risks associated with the Project has been undertaken as part of the EES. This Chapter forms the assessment and provides recommendations for fire risk management measures, and has concluded as follows.

- The wind farm site, transmission line corridor and off-site substation are not affected by a Bushfire Management Overlay under the Moyne Planning Scheme. The land however, has been designated 'bushfire prone' by the Victorian Government pursuant to the *Building Regulations 2006*.
- A Wildfire Prevention and Emergency Response Plan (WPER) will be developed for implementation during the construction and operational phases of the Project. The WPER will be prepared in consultation with the Country Fire Authority (CFA) of Victoria.
- There may be an increased bushfire risk within the wind farm site and transmission line corridor during construction, however these impacts are considered low and will be reduced through the implementation of standard construction management measures and restrictions on certain activities (i.e. external use of welders and angle grinders).
- Monitoring systems installed in the WTGs detect temperature increases and automatically slow or shut down the WTG if the temperature exceeds the assigned threshold.
- Whilst the transmission line corridor avoids large tracts of vegetation, a cleared easement will be established along the alignment and vegetation will be regularly maintained to reduce fire risk.

22.1 EES Objective

The EES evaluation objective most relevant to fire management is:

Land use and Socio-economic - To avoid or minimise disruption and other adverse effects on local infrastructure (including roads), land use (including agricultural and residential) and to neighbouring landowners and road users during construction and operation of the project.

This Chapter considers bushfire risks relating to the Project. These include the risk of a bushfire igniting and causing damage to wind farm infrastructure and to surrounding properties. The risk of Project construction activities starting or influencing a fire, or Project operations impacting on fire-fighting capabilities has also been considered.

The assessment aims to demonstrate that the proposed wind farm will be designed, constructed and operated to minimise ignition risks, provide for asset protection and provide for necessary emergency management. The objectives of the resulting bushfire management controls are that:

- no human life is lost, or person injured, as a result of bushfire arising from the construction, operation and maintenance of the wind farm; and
- infrastructure and property off-site is not significantly damaged from bushfire arising from the construction, operation and maintenance of the wind farm.

This scope of work was developed with consideration for the EES Scoping Requirements, the requirements of the Moyne Planning Scheme and the Wind Energy Guidelines. This Chapter addresses these requirements by:

- identifying the existing bushfire risk in the study area;
- considering the potential for Project infrastructure to be damaged by bushfire;

- considering the potential for Project construction activities to start or influence the spread of a bushfire;
- considering the impact of the Project on fire-fighting capabilities, including on aerial fire-fighting capability; and
- identifying proposed measures to mitigate any potential effects, including any relevant design features or preventative techniques to be employed during construction and operation.

22.1 Study Area

The study area for the assessment included the wind farm site and the transmission line corridor, and the land immediately adjoining these areas.

22.2 Assessment Methodology

The methodology used for the fire management assessment included:

- a desktop review of publicly available information relating to bushfire in the study area;
- consultation with the Barwon Branch of the CFA;
- consideration of the Project infrastructure layout including the WTGs, quarry, concrete batching plant, access tracks and the proposed transmission line corridor;
- consideration of *the Aeronautical Impact and Night Lighting Assessment – Dundonnell Wind Farm* prepared by Aviation Projects, dated 2014, with regard to aerial fire-fighting capability; and
- consideration of the Emergency Management Guidelines for Wind Energy Facilities (CFA, 2012) (CFA Guidelines).

No fieldwork was conducted for this assessment.

22.3 Legislation and Policy

The relevant legislation and government policies for fire management are outlined in *Table 22-1*. The key documentation used to inform the preparation of the fire management assessment were the Wind Energy Guidelines and CFA Guidelines.

Table 22-1 Relevant Fire Management Legislation and Policies

Legislation / Policy	Description
State	
Policy and planning guidelines for development of wind energy facilities in Victoria (DELWP, 2015)	The Wind Energy Guidelines have been prepared for responsible authorities, proponents and the community to provide guidance about wind farms and inform planning decisions about wind energy facility proposals. The Guidelines set out information requirements for wind farm developments; including the requirement to prepare a Wildfire Prevention and Emergency Response Plan addressing fire-fighting capability and response.
Emergency Management Guidelines for Wind Energy Facilities (CFA, 2012)	The CFA Guidelines set out the preferred safety measures to be considered when constructing and operating a wind energy facility, and should be considered at the design and planning stages.

Legislation / Policy	Description
Local	
Moyne Planning Scheme	The Moyne Planning Scheme is implemented via the P&E Act. Clause 13.05 'Bushfire' encourages the application of *'the precautionary principle to planning and decision-making when assessing the risk to life, property and community infrastructure from bushfire.'* In addition, Clause 22.03-8 'Fire Protection Local Policy' applies to all land in the Farming Zone and has the objectives to ensure *'that land use and development does not increase the level of fire risk'* and '*that adequate fire protection measures are considered.'* Clause 52.32 of the Planning Scheme sets out the matters to be considered prior to the determination of an application for a wind energy facility, which includes consideration of the Wind Energy Guidelines.

22.4 Existing Conditions

The wind farm site and adjoining land is primarily improved pasture used for grazing and the surrounding area also includes land used for cropping. Remnant native vegetation occurs in patches, particularly along the roadside. The wind farm site and proposed transmission line corridor are located within the South West Fire District. In this area, the typical fire season is from December to May. Longer fire seasons are experienced when rainfall is lower than average. The major sources of ignition in the area are arson, lightning strike, and escapes from legal burning operations on private property.

Whilst the wind farm site is not affected by a Bushfire Management Overlay under the Moyne Planning Scheme, the site has been designated 'bushfire prone' by the Victorian Government pursuant to the *Building Regulations 2006*.

Preliminary consultation has been undertaken with the Barwon Branch of the CFA, including referring the wind farm site layout and a plan of the proposed transmission line corridor to it for review. The CFA advised that the wind farm site layout should be developed with consideration for the design requirements to mitigate bushfire risk set out in CFA Guidelines. The CFA Guidelines address matters such as the spacing of WTGs, provision of access for fire-fighting, water supply and fire prevention measures to be employed during construction.

Further consideration of the Project in relation to the CFA Guidelines will be included in the EMP prepared for the construction phase of the Project.

22.5 History of fire and wind farms in Australia

The risk of fire from wind farms is considered low, and based on a literature review, there have been four reported fires involving wind farms within Australia, as follows:

- Ten Mile Lagoon in Western Australia in the mid-1990s. Damage limited to the relevant WTGs, no damage to surrounding environment. This fire involved technology that is now redundant;
- Lake Bonney in South Australia in 2006. This fire was related to maintenance works during a shutdown. Damage limited to the relevant WTGs, no damage to surrounding environment;
- The Star Fish Hill Wind Farm near Cape Jervis in South Australia experienced a WTG fire in 2010. The WTG was damaged and surrounding spot fires were extinguished; and
- The Cathedral Rocks Wind Farm, South Australia, in February 2009. A WTG fire occurred at with the WTG damaged and surrounding spot fires required extinguishing (Parsons Brinkerhoff, 2012).

The Australia Institute (2006) describes the fire risk associated with wind farms as minuscule provided the wind farm is properly constructed and managed. They determine fires caused by WTGs are very rare and pose little risk to surrounding property. While it is possible for a catastrophic failure of the WTG mechanism to cause fire, the system is designed to contain fire and the likelihood of fire commencing from a tower equipment failure is much lower than from a faulty header or other farm machinery.

The Government of South Australia (2004) also concluded that with normal maintenance and servicing practices in place, a wind farm will not pose an increased fire hazard to the host community and further that there has never been a fire incident involving a member of the public during normal operation.

As indicated by CFA (2007) and The Australian Institute (2006), the low incidence of fire is likely to be attributable to a number of factors. These factors are:

- WTGs are a relatively passive technology that uses few flammable materials;
- although WTGs do attract lightning, their design minimises the associated fire risks. WTG lightning protection systems are now used that extend from the blade to the bottom of the tower and dissipate lightning into the ground;
- WTGs are generally placed in open areas, limiting the chance of fires spreading when they do occur; and
- due to the financial cost associated with wind farm developments, operators generally manage the sites in a manner that minimises the risk to the WTGs and surrounding property.

The method of dealing with fire in a WTG nacelle is to isolate it electrically, immobilise it mechanically, and wait for fire to burn out before replacing the damaged or defective parts. There is limited material available to burn, but the role of the CFA would be to attend the fire site and contain/extinguish fires arising from burning material striking the ground below and downwind of the tower (Fenwick, undated).

Monitoring technology is utilised to ensure that electrical, mechanical and hydraulic systems are functioning correctly and to isolate equipment if operating thresholds such as temperature or blade speed are reached (Government of South Australia, 2004). Fire hazards can present when WTG bearings wear out, crankcases run out of lubricant, cables are damaged during rotation or there are electrical shorts or electrical arcing occurs in the transmission and distribution facilities (Government of South Australia, 2004). This highlights the importance of scheduled and preventative maintenance routines for the WTGs as well as monitoring systems.

22.6 Assessment of Impacts

22.6.1 Construction

There may be increased risk of bushfire on the wind farm site and on the alignment of the proposed transmission line corridor during construction, due to activities such as:

- the presence of flammable materials and ignition sources such as fuel stores on-site;
- welding activities;
- sparks from vehicle exhausts;
- faulty equipment; and
- lightning strike.

These impacts are considered low and able to be reduced through the application of standard construction management measures and restrictions on certain activities (such as the external use of welders and angle grinders) during high fire-risk periods.

22.6.2 Operation

Ignition Sources

Electrical equipment and flammable oils associated with the WTGs and the substation are potential ignition sources.

To reduce the risk of fire arising from WTG ignition, the WTGs will be fitted with a monitoring system which will ensure that electrical, mechanical and hydraulic systems are functioning correctly. The system will enable remote slow down or shut down of WTGs in the event that operating thresholds such as temperature or blade speed are reached, or an electrical fault is discovered. Lightning conductors will also be installed in WTGs to ground lightning strikes and to minimise the risk of wildfire ignition and damage to the WTGs.

The proposed transmission line corridor avoids large tracts of vegetation. A cleared easement will be established along the transmission line corridor and vegetation within the easement will be regularly maintained.

Impacts on Fire-Fighting Operations

The CFA does not have a policy relevant to the conduct of aerial fire-fighting activities within the vicinity of WTGs. Consultation with the CFA (pers comm 11 March 2014) confirms that in firebombing situations, WTGs would be identified as another obstacle in the aerial environment, along with other fixed infrastructure such as radio masts and transmission lines. The location of the WTGs and monitoring masts will be provided to emergency services agencies following Project approval. In the event of a fire, pilots deploying to the area will be advised of the location of the WTGs.

Fire suppression aircraft only operate in areas where there is no smoke and during daylight hours. WTGs, similar to high voltage transmission lines, are part of the landscape and would be considered in the incident action plan, thus not resulting in any increased risk to aerial fire fighters.

While installation of WTGs may remove the opportunity of aerial suppression of fires over the wind farm site itself, the Project will not prevent ground based fire-fighting activities on the wind farm site and surrounding areas. The network of internal access tracks will improve vehicle access within and across the wind farm site and potentially enhance ground based means of fighting bushfire. In the unlikely event that a fire did spread from the wind farm site to surrounding properties, the WTGs would not limit aerial fire-fighting capabilities on other properties in the surrounding area.

Appropriate location of water access points will assist safe, effective and timely fire suppression activities. To ensure adequate access to water for the CFA and firefighting crews, the allocation of static water supplies is necessary and will be further detailed in the Wildfire Prevention and Emergency Response Plan that will be required to be prepared for the Project.

22.6.3 Bushfire Impact to the Project

The risk of bushfire damaging the Project is considered to be low. The wind farm site and surrounds predominantly consist of cleared grassland and are not identified as being at high risk of bushfire. Each WTG will be situated next to a cleared construction pad further reducing the available fuel load and the internal access tracks will act as firebreaks.

Furthermore, the grassland environment within and surrounding the wind farm site provides a low availability of fuel and unlikely to sustain a fire capable of damaging the Project infrastructure. Grass fires tend to burn quickly and are unlikely to burn for long enough to impact the proposed underground 33kV transmission line or the underground cables. WTGs are a relatively passive technology that use few flammable materials and combined with the height of the WTGs it is therefore unlikely the flames will damage the structure. The substations and compounds are also constructed of non-flammable materials and have defendable space (cleared easement).

22.7 Impacts and Mitigation Measures

The environmental impacts in relation to bushfire and an initial impact rating are summarised in *Table 22-2.* Mitigation measures, and the residual impact rating after environmental mitigation measures have been applied, are also provided in *Table 22-2.*

Table 22-2 Bushfire Impacts, Mitigation Measures and Residual Risk

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
22-01	Increased risk of bushfire during construction of the wind farm	Moderate	Project activities will be undertaken in accordance with a Wildfire Prevention and Emergency Response Plan (WPER) prepared in consultation with the CFA, DELWP and the proponents of surrounding wind farm projects. The WPER will outline bushfire prevention measures and management procedures to be applied during construction, including: • a requirement to supply appropriate fire-fighting equipment on-site during construction; • hot work procedures and response protocols; • maintenance of fuel reduced zones around construction activities that may result in ignition of a fire i.e. welding; • procedures to manage any flammable materials that will be brought on-site; • requirement to use only diesel operated vehicles within the wind farm site during high fire risk season; • all site vehicles during the construction phase will use the site access tracks to minimise the likelihood of igniting dry grass; and • notification to the Barwon branch of the CFA when high fire risk construction work is being carried out.	Minor
22-02	Operation of the wind farm increases risk of bushfire ignition or spread	Minor	Project activities will be undertaken in accordance with a WPER, which will include the following measures to prevent fire during operation: • WTGs will be fitted with a monitoring system which will enable remote slowing or shut down in the event that a threshold temperature is reached or an electrical fault is discovered; • lightning conductors will also be installed in WTGs; • criteria for the provision of static water supply tanks solely for fire-fighting purposes, including minimum capacities, appropriate connections and signage; • procedures for vegetation management, ignition source control;	Minor

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
			• a requirement that, within three months after the commencement of the operation of the wind energy facility, the operator of the wind energy facility facilitates a familiarisation visit to the site and explanation of emergency services procedures for: ○ the CFA (including headquarters level, the CFA Regional Office and local volunteer brigade); ○ subsequent familiarisation sessions for new personnel of the CFA; and ○ if requested, training of personnel of the CFA, in relation to suppression of wind energy facility fires.	
22-03	Bushfire damages wind farm infrastructure	Minor	Internal access tracks will be maintained and available for access by the local CFA. A map showing the location of the access tracks is to be provided to the CFA within three months after the commencement of the operation of the wind energy facility and appropriate signage will be installed at the main access to the wind farm site with details of the access tracks.	Minor
22-04	Aerial-fighting capabilities are constrained within the wind farm site and in the vicinity of the wind farm	Major	To reduce impacts on aerial fire-fighting capabilities the following measures will be employed: • upon construction, co-ordinates and heights of all WTGs will be provided to the CFA; • WTGs will be fitted with a monitoring system which will enable remote de-rating or shut down in the event that a threshold temperature is reached; and • internal access tracks will be maintained and available for access by the local CFA. Matters relating to aerial firefighting capabilities are discussed further in *Chapter 21*.	Moderate

22.8 Impact Assessment Conclusions

The Project is not expected to result in significantly increased risk of bushfire in the area. Whilst there may be an increased bushfire risk within the wind farm site and transmission line corridor during construction, potential impacts will be reduced through the implementation of standard construction management measures and restrictions on certain activities.

Installation of WTGs may remove the option of aerial suppression of fires over the wind farm itself, however alternative management practices are available that will take advantage of some of the wind farm infrastructure features which will improve the overall fire control capabilities. To manage residual bushfire risk, a Wildfire Prevention and Emergency Response Plan will be prepared in accordance with the WPER and will be developed in conjunction with relevant stakeholders, including local fire services, DELWP and the proponents of surrounding wind farm projects.

The above assessment concludes that the overall residual bushfire impacts as a result of the construction and operation of the Project will be predominantly minor, with the exception of aerial firefighting capabilities, where the residual impact will be moderate.

This page is intentionally blank

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 23 – CUMULATIVE IMPACTS

This page is intentionally blank

Contents

Figures

Tables

This page is intentionally blank

23 CUMULATIVE IMPACTS ASSESSMENT

This Chapter describes the potential cumulative impacts of the Project together with the proposed mitigation and monitoring measures that are designed to ensure that the Project minimises any adverse cumulative impacts.

23.1 EES Scoping Requirements

The EES Scoping Requirements require the EES to provide an assessment of the cumulative impacts of the Project on individual environment categories, in combination with existing and other publicly proposed wind farms in the region. Whilst the EES Scoping Requirements make specific mention of the cumulative effects in relation to biodiversity and geoscience values, for the purpose of this assessment, other environmental, social and economic factors have also been considered.

This Chapter draws on other relevant assessments in the EES including Geomorphology and Soils (*Chapter 8*); Flora and Fauna (*Chapter 12*), Brolga (*Chapter 13*), Noise and Vibration (*Chapter 14*), Electromagnetic Interference (*Chapter 16*), Landscape and Visual (*Chapter 17*), Traffic and Transport (*Chapter 19*), Socio-Economic (*Chapter 20*) and Aviation (*Chapter 21*), as well as the specialist reports that inform each of these chapters.

23.2 Existing and Proposed Wind Farms

In order to assess cumulative impacts, the EES Scoping Requirements state that the EES needs to identify surrounding wind energy facilities that:

- are operational;
- have been approved;
- have been referred under the EE Act; and/or
- are the subject of planning permit applications under the P&E Act.

Given the suitability of the area for wind energy projects, there are several operational, approved or proposed wind farms within the vicinity of the proposed site for the Dundonnell Wind Farm. These are described in *Table 23-1* and identified in *Figure 23-1.*

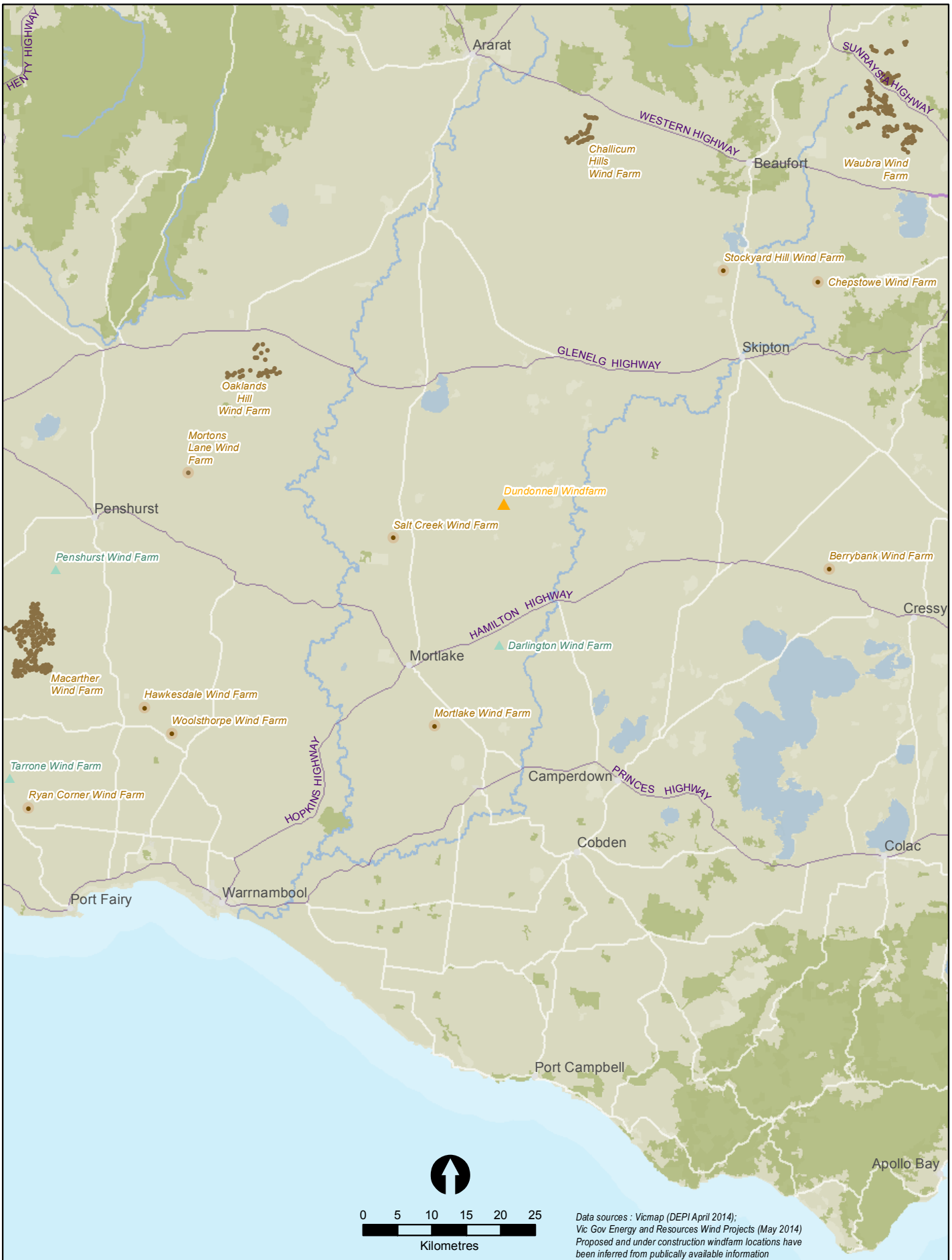
Some of these projects are operating (i.e. Macarthur and Oaklands Hill) and as such it has been possible to draw on their operating experience in undertaking this cumulative assessment. It has also been possible to draw on available information for some of the projects under construction, or approved, to assist with this assessment.

A number of projects are in the early stages of their feasibility investigations (e.g. Darlington 1 and Penshurst) and therefore limited information is available for use in the cumulative impact assessment.

The majority of the wind farms identified in *Table 23-1* are a considerable distance from the Project. Apart from the potential economic benefits of developing a strong renewable energy industry in the region, there are unlikely to be any other cumulative impacts associated with these projects, as they are more than 50km from the Project.

Table 23-1 Operational, Approved and Proposed Wind Farms in Proximity to the Project

Wind Farm	Approximate distance and direction from wind farm site	Status
Stockyard Hill	45km north-east	Approved
Morton's Lane	45km west	Operational
Berrybank	50km south-east	Under construction*
Salt Creek	15km south-west	Under construction*
Darlington 1	6km south	EES referral in preparation
Mortlake South	35km south	Under construction*
Macarthur	70km south-west	Operational
Oaklands Hill	37km north-west	Operational
Penshurst	65km west	Preparing EES
Challicum Hills	55km north	Operational
Waubra	75km north-east	Operational
Chepstowe	55km north-east	Approved
Hawkesdale	60km south-west	Under construction*
Ryans Corner	80km south-west	Under construction*
Tarrone	80km south-west	Planning approval stage
Woolsthorpe	60km south-west	Under construction*
* It is understood that substantial construction has not yet commenced at these projects, i.e. WTG suppliers have not been selected and full construction contracts have not been awarded or offtake agreements been reached.		



Client:	Trustpower	
Drawing No:	0107773_023G_R3_EES_Fig23_1_CmvLVIA_141107.mxd	
Date:	07/11/2014	Drawing Size: A4
Drawn By:	GR	Reviewed By: DB

This figure may be based on third party data or data which has not been verified by ERM and it may not be to scale. Unless expressly agreed otherwise, this figure is intended as a guide only and ERM does not warrant its accuracy.

Figure 23-1 - Existing and Proposed Wind Farms Surrounding the Dundonnell Wind Farm

Dundonnell Wind Farm
EES

Environmental Resources Management ANZ

Auckland, Brisbane, Canberra, Christchurch, Melbourne, Newcastle, Perth, Port Macquarie, Sydney

ERM

23.3 Potential Cumulative Impacts

The previous chapters of the EES have identified the existing conditions and potential environmental impacts of the Project, along with proposed mitigation and management measures that will assist in minimising any impacts.

Cumulative impacts are an additional way in which a specific environmental element may be affected by a new wind farm project. Cumulative impacts have two key characteristics:

- they occur over a geographical area; and
- they occur over time.

There is the potential for some impacts to overlap between various wind farm projects, including the Dundonnell Wind Farm, and on this basis, a cumulative assessment has been undertaken for the following key environmental categories:

- flora and fauna impacts;
- landscape and visual impacts;
- geoscience impacts;
- traffic impacts;
- noise impacts;
- EMI impacts;
- aviation impacts; and
- socio-economic impacts.

An assessment of the potential cumulative impacts on cultural heritage, shadow flicker and blade glint, surface water and hydrogeology, and planning and land use has not been undertaken as these impacts are predominantly contained on-site.

In considering cumulative impacts, there is the need to consider the timing of other projects, as some of the potential impacts are time dependent (e.g. construction traffic). For the other wind farm projects that have been approved, are currently going through an EES process or where initial construction has commence, it is assumed (in relation to traffic considerations) on a worst-case basis that construction could be undertaken at the same time as the Dundonnell Wind Farm.

23.3.1 Cumulative Flora and Fauna Impacts

Flora and Fauna (excluding Brolga)

The cumulative impacts of wind farms are primarily associated with potential impacts on bird and bat populations, although it is recognised that there is also the potential for cumulative impacts on flora and ground dwelling fauna through incremental habitat modification over time.

No significant impacts are expected for threatened flora and fauna species and only small areas of native vegetation or fauna habitat are proposed to be removed for the proposed Dundonnell Wind Farm as discussed in *Chapter 12*. Therefore, the incremental contribution of the Project to the cumulative impacts of the wind farms identified in *Table 23-1* is expected to be negligible.

Brolga

The Brolga Guidelines state that there is a requirement to avoid cumulative impacts of the wind farm industry on the Victorian Brolga population. Cumulative impacts on the Brolga are addressed earlier in *Chapter 13* of the EES and in detail in the *Brolga Assessment* (BL&A, 2014) contained at Volume 2.

The Dundonnell Wind Farm is the first Victorian wind farm to be assessed under the new Brolga Guidelines and therefore, it has been possible to apply the required assessment approach and minimise population impacts. As discussed in the *Brolga Assessment*, it is considered that the application of the Brolga Guidelines will result in the Project having a zero net impact on Brolga populations over the life of the Project, based on the following:

- the adoption of well-researched WTG-free buffers to mitigate impacts;
- rigorous estimates of population impacts through collision risk modelling and population viability assessment; and
- commitment by Trustpower to a scale of impact offset that compensates the estimated residual effects of the wind farm through enhanced breeding success of the Brolga for the duration of the Project.

Having regard to the above, the Project is not expected to contribute to the cumulative impact of wind farms on the Victorian Brolga population.

23.3.2 Landscape and Visual Impacts

The presence of multiple wind farms has the potential to result in cumulative visual impacts. This can occur when either simultaneous and/or sequential views to WTGs from publicly accessible viewpoints or from private viewing locations lead to a change in perception of a region. Simultaneous views are those where more than one wind farm is visible from the same location. Sequential views are those that occur when a viewer observes a wind farm and then, from a different location, another wind farm.

The cumulative visual impact of wind farms in the surrounding region is addressed at *Section 17.6.5* of the EES and in the *Landscape and Visual Impact Assessment* (ERM, 2014) contained at Volume 2. This assessment concluded as follows.

- The cumulative visual impact as a result of simultaneous views was assessed as low, with only one publicly accessible, elevated lookout within the viewshed of the Project. This lookout (at Mt Elephant) is over 18km to the south-east of the Project and visibility of the Project together with the Salt Creek, Mortlake South and Darlington wind farms would be limited to clear days only and would be viewed in the context of other constructed elements.
- The cumulative visual impact brought about by sequential views along the Hamilton Highway and Glenelg Highway was assessed as low, given views along these roadways are over distances greater than 10km from the WTGs. In addition, whilst Mortlake-Ararat Road is within the viewshed of the Project and Salt Creek Wind Farm, the distance to the Project is 8km and there will be minimal change to views and impacts are assessed as low.
- Cumulative visual impacts from regional and local roads are assessed as negligible.

Having regard to the above, the Project is not expected to contribute significantly to cumulative visual impacts.

23.3.3 Geoscience Values Impacts

The Project is not expected to significantly impact on the geoscience values of the area as the Project layout, including the location of the quarry pits and the transmission line corridor and off-site substation, has been designed taking into account the constraints imposed by identified geoheritage sites. On the basis that potential impacts are confined to the Project area, the Dundonnell Wind Farm is not expected to contribute to cumulative impacts on identified geoscience values within the wider area.

23.3.4 Traffic Impacts

Once operational, wind farms are generally low generators of traffic and therefore, they are not expected to have a noticeable impact on the existing road network. However, if multiple wind farms were constructed concurrently, there is the potential that the transportation of equipment and construction materials could have an impact on local roads.

Subject to obtaining relevant approvals from VicRoads, it is proposed that OD vehicles will haul equipment from the Port of Portland and Port of Geelong using the haulage routes previously approved for the Salt Creek Wind Farm

(under construction) and the Mortlake Power Station (operational). It is acknowledged that there is an opportunity for the Project to commence construction concurrently with the Salt Creek Wind Farm, however traffic impacts associated with both projects will be limited to Mortlake-Ararat Road and other arterial routes.

As discussed in *Chapters 19* and *25*, it is expected that a Traffic Management Plan (TMP) will be required as a condition of any planning permit issued for the Project and surrounding wind farm projects. These TMPs would be developed in conjunction with Moyne Shire Council and VicRoads having regard to other development in the area, including additional wind farms. Council is likely to be aware of all approved TMPs for major and minor developments in the area and will therefore be the best placed authority to coordinate these plans.

Having regard to the above, it is expected that any cumulative traffic impacts associated with the Project and surrounding developments would be minimal if appropriately managed by way of a TMP. In addition, the operational impacts associated with both the existing and proposed wind farms will be negligible due to the low traffic generation rates associated with the operation and maintenance of the wind farms.

23.3.5 Noise Impacts

The results of the noise assessment summarised at *Chapter 14*, indicated that the Project complies with NZS 6808:2010 for all residential properties that require assessment in accordance with NZS 6808:2010 pursuant to the Wind Energy Guidelines.

The nearest existing or proposed WTG is part of a proposed project located approximately 6km from the Dundonnell Wind Farm. It is understood an EES referral for this site is currently being prepared, and specific details of WTG locations are not available at this time. However, based on the separating distances to surrounding projects, it is not expected that existing or proposed wind farms would significantly contribute to total operational wind farm noise levels at residential locations around the Dundonnell Wind Farm. Specifically, it is expected that compliance with NZS 6808:2010 at the residential locations around Dundonnell Wind Farm would still be achieved, irrespective of existing or proposed wind farms in the surrounding area. Cumulative operational wind farm noise is therefore, not considered to be a concern for Dundonnell Wind Farm.

There is also the potential for cumulative noise impacts arising from traffic movements associated with the construction of multiple wind farms. This however, would be highly dependent upon the timing of construction of the proposed Dundonnell Wind Farm and other projects in the area. In particular, cumulative traffic noise impacts would be dependent on the periods of peak traffic movements for each project occurring simultaneously. Furthermore, cumulative traffic noise impacts would be limited to the period of construction of the Project. The noise assessment for the Dundonnell Wind Farm demonstrated that traffic noise associated with the Project was predicted to result in a limited change (3dB), with total noise levels within relevant guidelines, accounting for peak traffic flows during construction. Cumulative construction traffic noise is therefore not considered to be a concern, however this would be considered as part of a future Construction Noise Management Plan and TMP.

23.3.6 EMI Impacts

Potential cumulative EMI impacts as a result of the Project and the two nearest wind farms; the approved Salt Creek Wind Farm and proposed Darlington Wind Farm, were addressed in the *Assessment of Electromagnetic Interference Issues for the Dundonnell Wind Farm* undertaken by GL GH and discussed in *Chapter 16*.

This assessment concluded that the Project is unlikely to cause interference to radiocommunications systems within the vicinity of the wind farm site and therefore, cumulative impacts for most services are unlikely to occur.

Notwithstanding this, it is possible that the Project will contribute to a cumulative impact on CB radio and/or mobile phones as the greater the number of WTGs that exist, the greater the potential for interference to these services. Nonetheless, it should be possible to rectify interference to these services by moving to a location where signal strength and quality are improved, or through the use of an external antenna.

In addition, the Project together with the proposed Darlington Wind Farm, located to the south, has the potential to contribute to cumulative impacts on terrestrial television for residents directly between the two wind farms. However, it will be possible to mitigate any cumulative impacts on terrestrial television signals through measures such as installing a high-gain directional antenna.

Having regard to the above, whilst the Project has the potential to contribute to cumulative EMI impacts, mitigation measures have been identified to minimise these impacts.

23.3.7 Aviation Impacts

The Project is located on a site that is generally well separated from the other known operating, approved or proposed wind farms, as outlined in *Table 23-1*. Given the Project has no impact on aviation activities other than on or within close proximity to the wind farm site, no significant cumulative impacts are anticipated from nearby existing or approved wind farms.

As discussed in *Chapter 21,* the details of the Project will be made available to local and regional aircraft operators. Therefore, provided aircraft operators are aware of the location of the Project and surrounding wind farms, there is not anticipated to be any impact on aviation in the region. In addition, night lighting is not required for the Project and on this basis, cumulative impacts with respect to lighting are not relevant.

23.3.8 Socio Economic Impacts

Wind farms can provide a significant economic boost to local communities, during both their construction and operation. The wind energy industry is already making a significant investment in the region, through the development of wind farms at Macarthur and Oaklands Hill along with the wind farms approved and under construction at Morton's Lane, Berrybank, Salt Creek, Mortlake South, Stockyard Hill and Drysdale.

The economic benefits provide flow on social benefits, particularly in the provision of a range of employment opportunities for the region, upgrades to local infrastructure and increasing value to agricultural land.

The development of additional wind farms in the region also has the potential to build the region's knowledge base and expertise in the development and operation of wind farm facilities. This capacity building would not only add strength to the local community and economy but has the potential to allow the region to 'export' its knowledge and skills to other regions over time.

At a broader social level, the development of additional wind farms reduces the community's reliance on energy derived from fossil fuels and supports the community's growing desire for renewable energy sources and a reduction in greenhouse emissions.

The Project is expected to have a positive socio-economic benefit by facilitating the economic growth of the region that is occurring through the development of the wind industry, while at the same time contributing to local, State, National and international objectives to reduce greenhouse emissions. The socio-economic impacts of the Project are discussed in *Chapter 20*.

The Project and other wind farms proposed in the region, provide an opportunity to facilitate an economic boom in the region through increased construction activity, employment and expenditure. While this will provide a net economic benefit, there is the potential that the region may struggle to meet the demands of the various projects if construction activities are conducted simultaneously. For instance, there could be intensive demand for construction labour, heavy trucks and lifting equipment, however the staggering of projects will help to off-set competing demands and cumulative needs. The proposed on-site quarry will also assist in reducing demand for raw material for the construction of access tracks and foundations.

Given the scale of the projects and the economic opportunities that they provide to the region, it is expected that the proponents and the contractors commissioned to build the various wind farms will coordinate their activities to minimise impacts and provide for the efficient construction of individual projects.

23.4 Conclusion

The south-west region of Victoria is becoming an important region for the development of wind energy facilities. Access to good wind conditions and network connectivity make it an attractive area for the development of wind farms.

With two operational wind farms (e.g. Macarthur and Oaklands Hill) within 50km of the Project and several others approved or proposed, it is important to consider the potential cumulative impacts of wind farm projects in order to refine the assessment of the Dundonnell Wind Farm and to develop a greater understanding of the context with which it is being assessed.

Like all wind farms, there are a range of potential impacts associated with the Project when considered in isolation and as part of a cumulative assessment.

An important factor when considering the potential impacts of both the Project and other wind farms is that they all require environmental approvals. Similarly, they have, or will have, their own identified safeguards, which will be developed in accordance with the relevant environmental standards and in response to any conditions of approval. This ensures that any potential adverse cumulative impacts will be minimised.

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 24 - MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

This page is intentionally blank

Contents

Tables

This page is intentionally blank

24 MATTERS OF NATIONAL ENVIRONMENTAL SIGNIFICANCE

This Chapter provides a summary of the predicted risks and impacts from the Project on Matters of National Environmental Significance (MNES) as defined in the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

The two MNES or controlling provisions (under Part 3 of the EPBC Act) identified as relevant for the assessment of impacts of the Project under the EPBC Act are 'Listed Threatened Species and Ecological Communities' and 'Migratory Species Protected Under International Agreements'. A *Flora and Fauna Assessment* has been undertaken to assess the potential impacts of the Project on flora and fauna, including on relevant MNES.

The Assessment concluded as follows:

- No EPBC Act listed flora species were found during targeted surveys in areas to be impacted by the wind farm and major access track works.
- A total of seven EPBC Act listed flora species were identified during an overview assessment of the transmission line route as having the potential to occur within the corridor. Three individuals of the Spiny Rice-flower were recorded incidentally during the overview vegetation assessment within a road reserve and will be avoided. Once the location of the access tracks and power poles have been designed targeted surveys of impact areas will inform avoidance of EPBC Act listed flora species (if found), where possible, through micro-siting of power poles and access tracks.
- Two critically endangered EPBC Act ecological communities (Natural Temperate Grassland of the Victorian Volcanic Plains (NTGVVP) and Seasonal Herbaceous Wetlands of the Temperate Lowland Plains (SHWTLP) have been recorded within the wind farm site and major access track. A total of 1.023ha of NTGVVP are proposed for removal along the major access track and will be offset accordingly. These two communities are also likely to occur within the transmission line route. In a 'worst case' scenario, 2.38ha of NTGVVP and 1.12ha of SHWTLP could be impacted by the transmission line, however with the implementation of appropriate mitigation measures this scenario is considered to be unlikely. Once the location of the access tracks and power poles have been determined, targeted surveys of impact areas will inform avoidance of EPBC Act listed communities (if found), where possible, through micro-siting of power poles and access tracks and use of existing farm tracks where available.
- Targeted migratory bird surveys identified the presence of nine EPBC Act listed migratory species in the radius of investigation. The proposed wind farm area contains only poor quality wetland habitats of limited extent and comparatively low numbers of listed migratory species. Large, open saline wetlands several kilometres to the north-east of wind farm site were more suitable and supported the largest numbers of migratory species. The risk that migratory bird species will collide with WTGs is considered low given the geographical distribution of habitats away from the elevated country on which the wind farm is to be constructed and the usual behaviour of shorebirds when flying longer distances or migrating of rapidly climbing to flight heights higher than WTGs. Hence, migratory birds are unlikely to be significantly impacted by the wind farm infrastructure, access track and transmission line.
- The Southern Bent-wing Bat, Striped Legless Lizard, Growling Grass Frog, Corangamite Water Skink and the Golden Sun Moth are all EPBC Act listed fauna species which have potential to occur, or have been recorded within the Project area. No significant impacts are expected to result from the wind farm and major access track works to these species. In a 'worst case' scenario, 2.38ha of Golden Sun Moth and Striped Legless Lizard habitat could be impacted by the transmission line, however with the implementation of appropriate mitigation measures this scenario is considered to be unlikely. Further investigations will be undertaken pre-construction to determine the occurrence of these species and detail avoidance and mitigation measures and residual impacts from the transmission line.
- The potential impacts to EPBC Act listed species will be addressed through mitigation measures as part of a robust environmental management plan covering both the construction and operational phases of the Project. With regards to the wind farm site and major access track, the assessment and targeted surveys undertaken have identified that the overall residual impact on MNES as a result of the Project is likely to be minor. Suitable offsets will be provided for the removal of 1.023ha of NTGVVP along the major access track and no impacts on MNES are expected along Woorndoo-Streatham Road. The detailed design of the transmission line is not yet confirmed and therefore, targeted surveys will be undertaken prior to construction and once pole and access track locations are determined, to assess the impact of the transmission line. These will inform detailed mitigation measures which will be adopted, such as the micro-siting of poles and access tracks as well as use of existing farm tracks where available, to ensure there will be no significant impact to threatened species or communities.

24.1 EES Objectives

Under the EPBC Act, there are nine MNES. Following referral under the EPBC Act, it was determined that the Project may affect the following two of the nine MNES: 'Listed Threatened Species and Ecological Communities' and 'Migratory Species Protected under International Agreements'. These are the relevant controlling provisions under Part 3 of the EPBC for the assessment and approval of the Project under the EPBC Act.

These MNES and their relevance to the Project are summarised in *Table 24-1*.

Table 24-1 Nine Matters of National Environmental Significance

Matters of NES	Relevance to the Project
World heritage properties	There are no World heritage properties that would be impacted by the Project.
National heritage places	There are no National heritage properties that would be impacted by the Project.
Wetlands of international importance (listed under the Ramsar Convention)	The following Ramsar wetlands are part of the Western District Lakes and occur within 50km of the Project site: • Lake Bookar – 27km SE of wind farm; • Lake Colongulac – 32km SE of wind farm; • Lake Milangil – 30km SE of wind farm; • Lake Teragnpom – 39km SE of wind farm; • Lake Corangamite – 42km ESE of wind farm; and • Lake Gnarpurt – 37km ESE of wind farm. No significant impacts are expected on these wetlands due to their distance to the proposed wind farm site.
Listed threatened species and ecological communities	Two EPBC Act ecological communities (both critically endangered) occur within the wind farm site: • Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (SHWTLP); and • Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP). The Southern Bent-wing Bat (critically endangered) was recorded flying over the wind farm site. Areas of potential habitat for EPBC listed species are present for Adamson's Blown-grass (endangered), Basalt Rustyhood (endangered), Spiny Rice-flower (critically endangered), Striped Legless Lizard (vulnerable), Growling Grass Frog (vulnerable), Corangamite Water Skink (endangered), and the Golden Sun Moth (critically endangered). However these species were not recorded on the wind farm site or if they did occur, impacts on potential habitats are to be avoided. Spiny Rice-flower was recorded along the proposed transmission line and will be avoided. Once the location of the access tracks and power poles for the transmission line have been designed targeted surveys of impact areas will inform avoidance of EPBC Act listed flora species and communities if found where possible through micro-siting of power poles and access tracks and use of existing farm tracks where available. A summary of the potential impacts associated with this MNES is provided within this Chapter.
Migratory species protected under international agreements	Several listed migratory birds were recorded within the Project Area. It is considered unlikely that listed migratory species would be significantly impacted by the Project as the proposed wind farm area only contains poor quality wetland habitats of limited extent and comparatively low numbers of

Matters of NES	Relevance to the Project
	listed migratory species were recorded. Large open saline wetlands several kilometres to the north-east of wind farm site were more suitable and supported the largest numbers of migratory species. The risk that migratory bird species will collide with the WTGs is considered low given the geographical distribution of habitats away from the elevated country on which the wind farm is to be constructed (main movement likely to be north-south within these habitats rather than across the wind farm site) and the usual behaviour of shorebirds flying longer distances (i.e. >1-2km) or when migrating of rapidly climbing to flight heights higher than WTGs.
Commonwealth marine areas	The Project does not impact on any Commonwealth marine areas.
The Great Barrier Reef Marine Park	As the Project is located in Victoria, it does not impact on the Great Barrier Reef Marine Park.
Nuclear actions (including uranium mines)	The Project does not propose any nuclear actions nor any activity in relation to uranium mines.
A water resource, in relation to coal seam gas development and large coal mining development	The Project does not involve coal seam gas nor is it a large coal mining development.

The EES evaluation objective most relevant to the nine MNES assessment is:

> *To avoid or minimise adverse effects on native vegetation and listed flora and fauna species and ecological communities, including those listed under the EPBC Act, and address opportunities for offsetting potential losses consistent with relevant policy.*

This Chapter is based on the *Flora and Fauna Assessment* undertaken by BL&A, dated February 2015 which discusses relevant flora and fauna issues with the exception of Brolga, which is discussed in *Chapter 13* and the *Brolga Assessment* undertaken by BL&A, dated September 2014. The *Flora and Fauna Assessment* and *Brolga Assessment* are contained in Volume 2.

The EES Scoping Requirements ensure that MNES are addressed separately. This Chapter addresses the EES Scoping requirements by:

- describing the loss of native vegetation and associated listed vegetation communities and flora, and in particular the Spiny Rice-flower, Basalt Rustyhood Button Wrinklewort, Fragrant Leek-orchid, Small Golden Moths, Clover Glycine, and Natural Temperate Grassland of the Victorian Volcanic Plains, Grassy Eucalypt Woodland of the Victorian Volcanic Plain and Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains;
- describing the loss of, or degradation to, habitat for species of fauna listed under the EPBC Act, in particular Latham's Snipe, Corangamite Water Skink, Growling Grass Frog, Striped Legless Lizard, Southern Bent-wing Bat and relevant migratory species;
- identifying the existence or likely existence of any species or communities listed under the EPBC Act;
- assessing the direct and indirect effects of the Project on listed ecological communities and flora species and listed threatened and migratory fauna species; and
- identifying and describing the potential and proposed design and mitigation measures, which can be implemented to avoid or minimise significant effects on native vegetation, and/or any listed flora, fauna and ecological communities.

24.2 Study Area

The study area broadly covers the wind farm site, Woorndoo-Streatham Road and the transmission line, as detailed following.

The study area for the wind farm site refers to all land within the boundary of the wind farm site and the major site access track from the public road network to the wind farm site.

The study area for Woorndoo-Streatham Road comprises the road reserves within a 7.5km stretch of Woorndoo-Streatham Road, Bolac Plains Road and Woorndoo-Ararat Road between Woorndoo and the proposed wind farm site entrance. This was included as a precautionary measure, should a widening of this road section be unavoidable, as detailed in *Chapter 19* and shown in *Figure 19-3*.

As the final design detail of the transmission line is not yet confirmed, a conservative approach has been undertaken for the study area for the transmission line corridor. The study area comprises a corridor 50m to each side of the proposed 38km route. Given that each mono-pole is expected to have a footprint of approximately 4m², the 50m corridor is considered sufficient to allow for a flexible layout of the poles, if required, to avoid significant impacts to flora and fauna. In addition, the study area was increased to 80m north and south of the existing Mortlake transmission line at the southern end of the proposed route, where it would be located next to the existing transmission line to enable greater flexibility in the final transmission line siting.

More specifically, the study area for the transmission line was based on the following dimensions of the potential disturbance footprint:

- Power pole disturbance area: 100m² per pole (building footprint of approximately 4m²);
- Power pole location: 200m apart; and
- Access/construction track: 5m wide track underneath the transmission line except in sections with an adjacent road (road reserves).

The above disturbance footprint forms a 'worst case' scenario. It is expected that this footprint will be further reduced by locating poles in already disturbed areas where possible and by minimising the construction footprint of power poles to less than the conservative 100m² estimated above.

For some EPBC Act listed species investigated, differing study areas were used, for example a 10km buffer around the wind farm site was investigated for migratory bird species. Further detail of the study areas for each species is provided in the *Flora and Fauna Assessment* contained at Volume 2.

24.3 Assessment Methodology

The following guidelines, as relevant to this Chapter, were used to inform the methodologies for the flora and fauna assessments:

- *Wind Farms and Birds: Interim Standards for Risk Assessment*. (BL&A and AIRA Professional Services, Report No. 2003.35(2.2), 2005);
- *Significant impact guidelines for 36 migratory shorebird species - Migratory species: EPBC Act policy statement 3.21 (Draft)* (Department of the Environment, Water, Heritage and the Arts (DEWHA), 2009);
- *Permitted clearing of native vegetation: Biodiversity assessment guidelines* (DEPI, 2013);
- *Background Paper to EPBC Act Policy Statement 3.12 – Nationally threatened Species and Ecological Communities, Significant Impact Guidelines for the Critically Endangered Golden Sun Moth (Synemon plana) (*DEWHA, 2009a);
- *Significant impact guidelines for the vulnerable Growling Grass Frog - Nationally threatened species and ecological communities EPBC Act Policy Statement 3.14* (DEWHA, 2009b);
- *Policy and planning guidelines for development of wind energy facilities in Victoria (*DPCD, 2012);

- *Native Vegetation: sustaining a living landscape, Vegetation Quality Assessment Manual – guidelines for applying the Habitat Hectare scoring method (Version 1.3)* (DSE, 2004a);
- *Guidelines for managing the endangered Growling Grass Frog in urbanising landscapes: A report for the Victorian Department of Sustainability and Environment* (Arthur Rylah Institute for Environmental Research, 2010);
- *Referral guidelines for the Striped Legless Lizard, Delma impar* (DSEWPAC, 2011); and
- Visual encounter surveys in *Measuring and Monitoring Biological Diversity: standard methods for amphibians* (Eds. W.R. Heyer, M.A. Donnelly, R.W. McDiarmid, L.C. Hayek and M.S. Foster., pp. 84-91) (Smithsonian Institution Press, Washington) (Crump, M.L. and Scott, N.J., 1994).

The key elements of the assessment work included:

- initial vegetation mapping and flora assessment;
- an overview fauna assessment to define and locate potential habitats and detail further investigations required;
- targeted Striped Legless Lizard, Growling Grass Frog, bird and bat investigations of the wind farm site and the major access track;
- targeted surveys for threatened flora species;
- detailed vegetation mapping;
- habitat mapping for Golden Sun Moth and Corangamite Water Skink;
- a vegetation assessment along Woorndoo-Streatham Road and the transmission line corridor; and
- the identification of measures in relation to construction and operational management to avoid and/or minimise impacts on flora and fauna.

An overview flora and fauna assessment was undertaken for each element of the Project. Targeted surveys were then undertaken for the wind farm site and Woorndoo-Streatham Road to confirm the impact of the Project infrastructure on threatened species. Targeted surveys were not undertaken for the transmission line corridor as the detailed design, specifically the exact location of the power poles, is not yet confirmed. Targeted surveys will be undertaken prior to construction for this element of the Project. These will inform the final layout of the transmission line in the aim of avoiding and minimising impact to threatened species.

Wherever appropriate, a precautionary approach has been adopted in the discussion of implications. Where insufficient evidence is available on the occurrence or likelihood of occurrence of a species, it is assumed that it could be in an area of habitat, if suitable, and the implications under legislation and policy are considered accordingly.

24.4 Legislation and Policy

The legislation relevant to MNES is detailed in *Table 24-2*.

Table 24-2 Relevant Flora and Fauna Legislation and Policies

Legislation / Policy	Description
Commonwealth	
Environment Protection and Biodiversity Conservation Act 1999	The EPBC Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places, defined in the EPBC Act as Matters of National Environmental Significance.

Legislation / Policy	Description
Commonwealth Guidelines and Policy	In addition to the EPBC Act, the following Commonwealth Guidelines and Policy apply to the Project: • Significant impact guidelines 1.2 - Actions on, or impacting upon, Commonwealth land and Actions by Commonwealth Agencies Commonwealth significant impact guidelines (Department of Environment (DoE), 2013) • Significant impact guidelines for 36 migratory shorebird species - Migratory species: EPBC Act policy statement 3.21 (Draft) (Department of the Environment, Water, Heritage and the Arts (DEWHA), 2009). • Background Paper to EPBC Act Policy Statement 3.12 – Nationally threatened Species and Ecological Communities, Significant Impact Guidelines for the Critically Endangered Golden Sun Moth (Synemon plana) (DEWHA, 2009a). • Significant impact guidelines for the vulnerable Growling Grass Frog - Nationally threatened species and ecological communities EPBC Act Policy Statement 3.14 (DEWHA, 2009b). • Guidelines for managing the endangered Growling Grass Frog in urbanising landscapes: A report for the Victorian Department of Sustainability and Environment (Arthur Ryhla Institute for Environmental Research, 2010). • Referral Guidelines for the Striped Legless Lizard, Delma impar (DSEWPAC, 2011). • Environment Protection and Biodiversity Conservation Act 1999 – Environmental Offsets Policy, Australian Government, Canberra (DSEWPAC, 2012).

24.5 Existing Conditions

The proposed wind farm and associated infrastructure (WTGs, access tracks, underground cabling, batching plant, temporary site office, quarry pits and substation) has been designed to avoid the majority of native vegetation on the site. Furthermore, where possible, potential areas of impact have been avoided and buffer areas introduced to minimise potential impacts to flora and fauna.

For example, the proposed major access track was relocated around a wetland qualifying as the EPBC Act listed community Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (see *Figure 2-9* in the *Flora and Fauna Assessment* at Volume 2) and WTGs and access tracks have also been re-located so as to not impact on potential Golden Sun Moth habitat at the wind farm site (see *Figure 10-4* in the *Flora and Fauna Assessment*). The quarry pits, substation, temporary site office and batching plant have been placed in areas with no native vegetation or fauna habitat. All access tracks, WTGs and turbine construction pads on the wind farm site have been located in areas without native vegetation except for one WTG and construction pad on the stony rises in the centre of the wind farm site (see *Figure 2-11* in the *Flora and Fauna Assessment*). Disturbance-free buffers of 55m have also been placed around drainage lines potentially suitable for Corangamite Water Skink and Growling Grass Frog and WTGs have been placed at least 120m from potential bat foraging habitat.

The following section contains a summary of the existing conditions for EPBC listed flora and fauna. The likely significant impact on MNES, mitigation measures and the 'worst case' scenario if no mitigation measures are implemented for each MNES are detailed in *Table 24-3*. The MNES with potential to occur are highlighted in blue in the Table.

It is noted that MNES that do not have potential to occur in one or more of the three areas of impact (wind farm site and major access track, Woorndoo-Streatham Road and the transmission line) have not been addressed for the areas in *Table 24-3.*

Table 24-3 Summary of MNES for the Project

Matters of National Environmental Significance (MNES) deemed to potentially occur in the broader wind farm study area		EPBC Act conservation status	Relevant component/s of the broader wind farm study area	Level of assessment for Matters of NES	Status of Matters of NES in the study area	Proposed mitigation measures	Likely significant impact on Matters of NES (Yes/No)	Relevant section/s of the Flora and Fauna Assessment (BL&A, 2015)
Common name	**Scientific name**							
Flora species								
Adamson's Blown-grass	*Lachnagrostis adamsonii*	EN	Wind farm site & major access track	Targeted surveys	Not recorded during targeted surveys - **unlikely to occur**	Not necessary	No	Section 2
			Woorndoo-Streatham Road					Section 11
			Transmission line	Overview vegetation field assessment	**Potential to occur**	Micro-siting of power poles and access tracks to avoid this species, if recorded during targeted surveys in impact areas	Dependant on results of future targeted surveys	Section 12
Basalt Rustyhood	*Pterostylis basaltica*	EN	Wind farm site & major access track	Targeted survey	Not recorded during targeted survey - **unlikely to occur**	Not necessary	No	Section 2
			Transmission line	Overview vegetation field assessment	**Potential to occur**	Micro-siting of power poles and access tracks to avoid this species, if recorded during targeted surveys in impact areas	Dependant on results of future targeted surveys	Section 12

Matters of National Environmental Significance (MNES) deemed to potentially occur in the broader wind farm study area		EPBC Act conservation status	Relevant component/s of the broader wind farm study area	Level of assessment for Matters of NES	Status of Matters of NES in the study area	Proposed mitigation measures	Likely significant impact on Matters of NES (Yes/No)	Relevant section/s of the Flora and Fauna Assessment (BL&A, 2015)
Common name	Scientific name							
Button Wrinklewort	*Rutidosis leptorhynchoides*	EN	Woorndoo-Streatham Road	Targeted survey	Not recorded during targeted survey - **unlikely to occur**	Not necessary	No	Section 11
			Transmission line	Overview vegetation field assessment	**Potential to occur**	Micro-siting of power poles and access tracks to avoid this species, if recorded during targeted surveys in impact areas	Dependant on results of future targeted surveys	Section 12
Clover Glycine	*Glycine latrobeana*	VU	Woorndoo-Streatham Road	Targeted survey	Not recorded during targeted survey - **unlikely to occur**	Not necessary	No	Section 11
			Transmission line	Overview vegetation field assessment	**Potential to occur**	Micro-siting of power poles and access tracks to avoid this species, if recorded during targeted surveys in impact areas	Dependant on results of future targeted surveys	Section 12

Matters of National Environmental Significance (MNES) deemed to potentially occur in the broader wind farm study area		EPBC Act conservation status	Relevant component/s of the broader wind farm study area	Level of assessment for Matters of NES	Status of Matters of NES in the study area	Proposed mitigation measures	Likely significant impact on Matters of NES (Yes/No)	Relevant section/s of the Flora and Fauna Assessment (BL&A, 2015)
Common name	Scientific name							
Fragrant Leek-orchid	*Prasophyllum suaveolens*	EN	Woorndoo-Streatham Road	Targeted survey	**Recorded**	All areas of known or potential habitat avoided	No	Section 11
			Transmission line	Overview vegetation field assessment	**Potential to occur**	Micro-siting of power poles and access tracks to avoid this species, if recorded during targeted surveys in impact areas	Dependant on results of future targeted surveys	Section 12
Metallic Sun-orchid	*Thelymitra epipactoides*	EN	Woorndoo-Streatham Road	Targeted survey	Not recorded during targeted survey - **unlikely to occur**	Not necessary	No	Section 11
Small Golden Moths	*Diuris basaltica*	EN	Woorndoo-Streatham Road	Targeted survey	Not recorded during targeted survey - **unlikely to occur**	Not necessary	No	Section 11

Matters of National Environmental Significance (MNES) deemed to potentially occur in the broader wind farm study area		EPBC Act conservation status	Relevant component/s of the broader wind farm study area	Level of assessment for Matters of NES	Status of Matters of NES in the study area	Proposed mitigation measures	Likely significant impact on Matters of NES (Yes/No)	Relevant section/s of the Flora and Fauna Assessment (BL&A, 2015)
Common name	Scientific name							
Spiny Rice-flower	*Pimelea spinescens subsp. spinescens*	CE	Wind farm site & major access track	Targeted surveys	Not recorded during targeted surveys - **unlikely to occur**	Not necessary	No	Section 2
			Woorndoo-Streatham Road					Section 11
			Transmission line	Overview vegetation field assessment	**Recorded**	Recorded individuals will be avoided, Micro-siting of power poles and access tracks to avoid this species, if additional plants recorded during targeted surveys in impact areas	Dependant on results of future targeted surveys	Section 12
Hoary Sunray	*Leucochrysum albicans var. tricolor*	EN	Woorndoo-Streatham Road	Targeted survey	**Recorded**	All areas of known or potential habitat avoided	No	Section 11
			Transmission line	Overview vegetation field assessment	**Potential to occur**	Micro-siting of power poles and access tracks to avoid this species, if recorded during targeted surveys in impact areas	Dependant on results of future targeted surveys	Section 12

Matters of National Environmental Significance (MNES) deemed to potentially occur in the broader wind farm study area		EPBC Act conservation status	Relevant component/s of the broader wind farm study area	Level of assessment for Matters of NES	Status of Matters of NES in the study area	Proposed mitigation measures	Likely significant impact on Matters of NES (Yes/No)	Relevant section/s of the Flora and Fauna Assessment (BL&A, 2015)
Common name	Scientific name							
Fauna species								
Cattle Egret	*Ardea ibis*	M (JAMBA, CAMBA)	Wind farm site & major access track	Migratory bird survey	Not recorded during migratory bird survey - **unlikely to be regular visitor to study area**	Not considered necessary, as impacts would be minimal. This species is abundant in Victoria and adaptable to modified environments.	No	Sections 3 & 5
			Transmission line	Desktop assessment	**Potential to occur**			Section 12
Common Greenshank	*Tringa nebularia*	M (JAMBA, CAMBA, ROKAMBA, Bonn Convention (A2H))	Wind farm site & major access track	Migratory bird survey	**Recorded**	Proposed WTGs located approximately 400m from suitable habitat for this species	No	Sections 3 & 5
			Transmission line	Desktop assessment	**Potential to occur**	Not considered necessary, as impacts would be minimal due to the ephemeral nature and paucity of suitable habitat		Section 12

Matters of National Environmental Significance (MNES) deemed to potentially occur in the broader wind farm study area		EPBC Act conservation status	Relevant component/s of the broader wind farm study area	Level of assessment for Matters of NES	Status of Matters of NES in the study area	Proposed mitigation measures	Likely significant impact on Matters of NES (Yes/No)	Relevant section/s of the Flora and Fauna Assessment (BL&A, 2015)
Common name	Scientific name							
Curlew Sandpiper	*Calidris ferruginea*	M (JAMBA, CAMBA, ROKAMBA, Bonn Convention (A2H))	Wind farm site & major access track	Migratory bird survey	Not recorded during migratory bird survey - **unlikely to be regular visitor to study area**	Proposed WTGs located approximately 400m from suitable habitat for this species	No	Sections 3 & 5
			Transmission line	Desktop assessment	**Potential to occur**	Not considered necessary, as impacts would be minimal due to the ephemeral nature and paucity of suitable habitat		Section 12
Eastern Great Egret	*Ardea modesta*	M (JAMBA, CAMBA)	Wind farm site & major access track	Migratory bird survey	**Recorded**	Proposed WTGs located approximately 105m from suitable habitat for this species	No	Sections 3 & 5
			Transmission line	Desktop assessment	**Potential to occur**	Not considered necessary, as impacts would be minimal due to the ephemeral nature and paucity of suitable habitat.		Section 12

Matters of National Environmental Significance (MNES) deemed to potentially occur in the broader wind farm study area		EPBC Act conservation status	Relevant component/s of the broader wind farm study area	Level of assessment for Matters of NES	Status of Matters of NES in the study area	Proposed mitigation measures	Likely significant impact on Matters of NES (Yes/No)	Relevant section/s of the Flora and Fauna Assessment (BL&A, 2015)
Common name	Scientific name							
Fork-tailed Swift	*Apus pacificus*	M (JAMBA,CAMBA, ROKAMBA)	Wind farm site & major access track	Migratory bird survey	Unlikely	Not considered necessary	No	Sections 3 & 5
			Transmission line	Desktop assessment	**Potential to occur** - a few days per year in summer and early autumn	Not considered necessary, as impacts would be minimal		Section 12
Glossy Ibis	*Plegadis falcinellus*	M (CAMBA, Bonn (A2S))	Wind farm site & major access track	Migratory bird survey	Not recorded during migratory bird survey - **unlikely to be regular visitor to study area**	Not considered necessary	No	Sections 3 & 5
			Transmission line	Desktop assessment	**Potential to occur**	Not considered necessary, as impacts would be minimal due to the ephemeral nature and paucity of suitable habitat.		Section 12

Matters of National Environmental Significance (MNES) deemed to potentially occur in the broader wind farm study area		EPBC Act conservation status	Relevant component/s of the broader wind farm study area	Level of assessment for Matters of NES	Status of Matters of NES in the study area	Proposed mitigation measures	Likely significant impact on Matters of NES (Yes/No)	Relevant section/s of the Flora and Fauna Assessment (BL&A, 2015)
Common name	Scientific name							
Latham's Snipe	*Gallinago hardwickii*	M (JAMBA, CAMBA, ROKAMBA, Bonn A2H)	Wind farm site & major access track	Migratory bird survey	**Recorded**	Proposed WTGs located approximately 105m from suitable habitat for this species	No	Sections 3 & 5
			Transmission line	Desktop assessment	**Potential to occur**	Not considered necessary, as impacts would be minimal due to the ephemeral nature and paucity of suitable habitat.		Section 12
Marsh Sandpiper	*Tringa stagnatilis*	M (JAMBA, CAMBA, ROKAMBA, Bonn Convention (A2H))	Wind farm site & major access track	Migratory bird survey	Not recorded during migratory bird survey - **unlikely to be regular visitor to study area**	Proposed WTGs located approximately 400m from suitable habitat for this species	No	Sections 3 & 5
			Transmission line	Desktop assessment	**Potential to occur**	Not considered necessary, as impacts would be minimal due to the ephemeral nature and paucity of suitable habitat.		Section 12

Matters of National Environmental Significance (MNES) deemed to potentially occur in the broader wind farm study area		EPBC Act conservation status	Relevant component/s of the broader wind farm study area	Level of assessment for Matters of NES	Status of Matters of NES in the study area	Proposed mitigation measures	Likely significant impact on Matters of NES (Yes/No)	Relevant section/s of the Flora and Fauna Assessment (BL&A, 2015)
Common name	**Scientific name**							
Red-necked Stint	*Calidris ruficollis*	M (JAMBA, CAMBA, ROKAMBA, Bonn Convention (A2H))	Wind farm site & major access track	Migratory bird survey	Recorded in wetlands adjacent study area, although **unlikely to be regular visitor to study area**	Proposed WTGs located approximately 400m from suitable habitat for this species	No	Sections 3 & 5
			Transmission line	Desktop assessment	**Potential to occur**	Not considered necessary, as impacts would be minimal due to the ephemeral nature and paucity of suitable habitat.		Section 12
Sharp-tailed Sandpiper	*Calidris acuminata*	M (JAMBA, CAMBA, ROKAMBA, Bonn Convention (A2H))	Wind farm site & major access track	Migratory bird survey	Recorded in wetlands adjacent study area, although **unlikely to be regular visitor to study area**	Proposed WTGs located approximately 400m from suitable habitat for this species	No	Sections 3 & 5
			Transmission line	Desktop assessment	**Potential to occur**	Not considered necessary, as impacts would be minimal due to the ephemeral nature and paucity of suitable habitat.		Section 12

Matters of National Environmental Significance (MNES) deemed to potentially occur in the broader wind farm study area		EPBC Act conservation status	Relevant component/s of the broader wind farm study area	Level of assessment for Matters of NES	Status of Matters of NES in the study area	Proposed mitigation measures	Likely significant impact on Matters of NES (Yes/No)	Relevant section/s of the Flora and Fauna Assessment (BL&A, 2015)
Common name	Scientific name							
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	M (CAMBA)	Wind farm site & major access track	Migratory bird survey	**Recorded, although unlikely to be regular visitor to study area**	Not considered necessary	No	Sections 3 & 5
			Transmission line	Desktop assessment	**Potential to occur, but unlikely to be a regular visitor to study area**	Not considered necessary, as impacts would be minimal		Section 12
White-throated Needletail	*Hirundapus caudacutus*	M (JAMBA, CAMBA, ROKAMBA)	Wind farm site & major access track	Migratory bird survey	Unlikely	Not considered necessary	No	Sections 3 & 5
			Transmission line	Desktop assessment	**Potential to occur** - a few days per year in summer and early autumn	Not considered necessary, as impacts would be minimal		Section 12
Eastern Barred Bandicoot	*Perameles gunnii*	EN	Transmission line	Desktop assessment	**Potential (very low) to occur**	Not considered necessary	No	Section 12

Matters of National Environmental Significance (MNES) deemed to potentially occur in the broader wind farm study area		EPBC Act conservation status	Relevant component/s of the broader wind farm study area	Level of assessment for Matters of NES	Status of Matters of NES in the study area	Proposed mitigation measures	Likely significant impact on Matters of NES (Yes/No)	Relevant section/s of the Flora and Fauna Assessment (BL&A, 2015)
Common name	**Scientific name**							
Southern Bent-wing Bat	*Miniopterus schreibersii bassanii*	CE	Wind farm site & major access track	Anabat detector survey	**Recorded**	Proposed WTGs located at least 120m from suitable habitat for this species	No	Sections 3 & 6
			Woorndoo-Streatham Road	Desktop assessment	**Potential to occur**	Not considered necessary, as impacts would be minimal	No	Section 11
			Transmission line	Desktop assessment	**Potential to occur**	Not considered necessary, as impacts would be minimal	No	Section 12
Corangamite Water Skink	*Eulamprus tympanum marnieae*	EN	Wind farm site & major access track	Specific habitat assessment	**Potential to occur**	55m protection buffer between suitable habitat and wind farm infrastructure	No	Sections 3 & 9
			Transmission line	Desktop assessment	**Potential to occur**	Use existing roads and tracks for access where possible, micro-site access track and power pole locations away from MNES if found during targeted surveys where possible	Dependant on avoidance measures taken	Section 12

Matters of National Environmental Significance (MNES) deemed to potentially occur in the broader wind farm study area		EPBC Act conservation status	Relevant component/s of the broader wind farm study area	Level of assessment for Matters of NES	Status of Matters of NES in the study area	Proposed mitigation measures	Likely significant impact on Matters of NES (Yes/No)	Relevant section/s of the Flora and Fauna Assessment (BL&A, 2015)
Common name	**Scientific name**							
Striped Legless Lizard	*Delma impar*	VU	Wind farm site & major access track	Targeted survey	Not recorded during targeted survey - **unlikely to occur**	Implementation of salvage protocol recommended should Striped Legless Lizard be detected during construction	No	Sections 3 & 7
			Woorndoo-Streatham Road	Desktop assessment	**Potential to occur**	No habitat proposed to be removed	No	Section 11
			Transmission line	Desktop assessment	**Potential to occur**	Use existing roads and tracks for access where possible, micro-site access track and power pole locations away from MNES if found during targeted surveys where possible	Dependant on avoidance measures taken	Section 12

Matters of National Environmental Significance (MNES) deemed to potentially occur in the broader wind farm study area		EPBC Act conservation status	Relevant component/s of the broader wind farm study area	Level of assessment for Matters of NES	Status of Matters of NES in the study area	Proposed mitigation measures	Likely significant impact on Matters of NES (Yes/No)	Relevant section/s of the Flora and Fauna Assessment (BL&A, 2015)
Common name	**Scientific name**							
Growling Grass Frog	*Litoria raniformis*	VU	Wind farm site & major access track	Targeted survey	Not recorded during targeted survey - **unlikely to occur**	55m protection buffer between suitable habitat and wind farm infrastructure	No	Sections 3 & 8
			Transmission line	Desktop assessment	**Potential to occur**	Use existing roads and tracks for access where possible, micro-site access track and power pole locations away from MNES if found during targeted surveys where possible.	Dependant on avoidance measures taken	Section 12
Golden Sun Moth	*Synemon plana*	CE	Wind farm site & major access track	Specific habitat assessment	Not recorded in study area, although deemed **to potentially occur**	Area of potential occurrence avoided	No	Sections 3 & 10
			Woorndoo-Streatham Road	Desktop assessment	**Potential to occur**	No habitat proposed to be removed	No	Section 11
			Transmission line	Desktop assessment	**Potential to occur**	Use existing roads and tracks for access where possible, micro-site access track and power pole locations away from MNES if found during targeted surveys where possible	Dependant on avoidance measures taken	Section 12

Matters of National Environmental Significance (MNES) deemed to potentially occur in the broader wind farm study area		EPBC Act conservation status	Relevant component/s of the broader wind farm study area	Level of assessment for Matters of NES	Status of Matters of NES in the study area	Proposed mitigation measures	Likely significant impact on Matters of NES (Yes/No)	Relevant section/s of the Flora and Fauna Assessment (BL&A, 2015)
Common name	Scientific name							
Ecological Communities								
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (SHWTLP)	N/A	CE	Wind farm site & major access track	Specific listed ecological community assessment	**Recorded**	No areas proposed to be removed	No	Section 2
			Transmission line	Overview vegetation field assessment	**Likely to occur**	Use existing roads and tracks for access where possible, micro-site access track and power pole locations away from MNES if found during targeted surveys where possible	Dependant on avoidance measures taken, 'worst case' would be the loss of 1.12ha SHWTLP, which would be a significant impact, but is considered unlikely with implementation of mitigation measures.	Section 12
Grassy Eucalypt Woodland of the Victorian Volcanic Plain (GEWVVP)	N/A	CE	Wind farm site & major access track	Specific listed ecological community assessment	Not recorded in the study area - **unlikely to occur**	Not necessary	No	Section 2

Matters of National Environmental Significance (MNES) deemed to potentially occur in the broader wind farm study area		EPBC Act conservation status	Relevant component/s of the broader wind farm study area	Level of assessment for Matters of NES	Status of Matters of NES in the study area	Proposed mitigation measures	Likely significant impact on Matters of NES (Yes/No)	Relevant section/s of the Flora and Fauna Assessment (BL&A, 2015)
Common name	**Scientific name**							
Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP)	N/A	CE	Wind farm site & major access track	Specific listed ecological community assessment	**Recorded**	Area of removal minimised to 1.023ha	Based on the criteria of the significant impact guidelines any removal of NTGVVP would be significant.	Section 2
			Woorndoo-Streatham Road	Detailed vegetation assessment	**Likely to occur**	All areas of potential occurrence avoided		Section 11
			Transmission line	Overview vegetation field assessment		Use existing roads and tracks for access where possible, micro-site access track and power pole locations away from MNES if found during targeted surveys where possible	Dependant on avoidance measures taken, 'worst case' is the loss of 2.38ha NTGVVP, which would be a significant impact but is considered unlikely with implementation of mitigation measures...	Section 12

Source: BL&A, 2015

24.5.1 EPBC Act Flora

Wind Farm and Major Access Track

Potential habitat for three EPBC Act threatened flora species was present within the wind farm site and along the major site access track. These three species were:

- Adamson's Blown-grass (*Lachnagrostis adamsonii*) (endangered);
- Basalt Rustyhood (*Pterostylis basaltica*) (endangered); and
- Spiny Rice-flower (*Pimelea spinescens* subsp. *Spinescens*) (critically endangered).

Subsequent targeted surveys were undertaken for the three species in suitable habitat at the wind farm site potentially to be affected by the wind farm. These species were not found.

Whilst the EES scoping requirements detail the EPBC Act listed endangered Button Wrinklewort *(Rutidosis leptorrynchoides),* Fragrant Leek-orchid *(Prasophyllum suaveolens)*, Small Golden Moths *(Diuris basaltica)* and Clover Glycine *(Glycine latrobeana),* suitable habitat was not identified during field assessments for these four species and therefore no further assessment was required and no impact to these species is expected.

Woorndoo-Streatham Road

An assessment of Woorndoo–Streatham Road was commissioned to determine if the widening of some of the road sections (if required), may potentially impact regional flora. An initial overview vegetation assessment and then detailed vegetation assessment was undertaken, followed by three targeted surveys for potential threatened flora species.

During the targeted surveys 11 patches of Plains Grassland were surveyed within the road reserves of Woorndoo–Streatham Road, Bolac Plains Road and Woorndoo-Ararat Road between Woorndoo and the proposed wind farm site entrance. Existing data indicated that within the radius of investigation there were records of, or potential suitable habitat for 22 EPBC and/or FFG Act listed flora species along Woorndoo-Streatham Road. Based on field surveys, suitable habitat was found to occur on-site for 14 EPBC and/or FFG listed flora species. Of these, five species were recorded during targeted surveys, all within Habitat Zone 10, within a road reserve west of Bolac Plains Road. These species are:

- Basalt Sun-Orchid (*Thelymitra gregaria)*;
- Clumping Golden Moths (*Diuris gregaria)*;
- Fragrant Leek-orchid (*Prasophyllum suaveolens)*;
- Small Milkwort (*Comesperma polygaloides*); and
- Hoary Sunray (*Leucochrysum albicans var.* tricolor).

The Woorndoo–Streatham Road works will not require any vegetation removal from habitat zones and, as a result, no EPBC Act listed flora species will be removed or are expected to be impacted as a result of any proposed road works.

Transmission Line

An assessment of the proposed transmission line route determined that seven EPBC Act listed flora species have the potential to occur in remnant vegetation in the transmission line route. These species are:

- Adamson's Blown-grass (*Lachnagrostis adamsonii)*;
- Basalt Rustyhood (*Pterostylis basaltica)*;
- Button Wrinklewort (*Rutidosis leptorhynchoides)*;
- Clover Glycine (*Glycine latrobeana)*;
- Fragrant Leek-orchid (*Prasophyllum suaveolens)*;

- Hoary Sunray (*Leucochrysum albicans* var. *tricolor)*; and
- Spiny Rice-flower (*Pimelea spinescens* subsp. *Spinescens)*.

Three individuals of the Spiny Rice-flower (*Pimelea spinescens* subsp. *Spinescens*) (EPBC Act critically endangered) were recorded incidentally during the overview vegetation field assessment. These will be avoided as they are located away from the proposed transmission line access track and power poles (see *Figure 12-14* in the *Flora and Fauna assessment* at Volume 2). No other listed flora species were recorded during the overview assessment.

Once the detailed design of the transmission line is determined, a habitat hectare assessment and targeted surveys for threatened flora species in areas of suitable habitat will be undertaken. These assessments will confirm whether these species are present within areas impacted by the transmission line and associated infrastructure, specifically power poles and access tracks. These surveys will inform mitigation measures, such as the micro-siting of poles, if required, to avoid areas of threatened flora species and minimise impacts to significant vegetation.

24.5.2 EPBC Act Listed Ecological Communities

Wind Farm and Major Access Track

Two critically endangered (EPBC Act) ecological communities occur in the wind farm site (refer to *Figure 12-1* in *Chapter 12* for locations and *Maps 2-2* to *2-9* of the Flora and Fauna Assessment). These communities are:

- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (SHWTLP); and
- Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP).

In addition, a third critically endangered ecological community; Grassy Eucalypt Woodland of the Victorian Volcanic Plain (GEWVVP), had the potential to occur. Details of listed ecological communities are contained in *Section 2.3* and specifically, *Tables 2.2, 2.3* and *2.5* of the *Flora and Fauna Assessment* at Volume 2.

Field investigations confirmed numerous patches of remnant native vegetation in the wind farm site were found to constitute SHWTLP, with a few found to constitute NTGVVP. GEWVVP was not identified during the on-site assessments.

A total of 1.023ha of NTGVVP is proposed to be removed for the major site access track. All other areas of listed EPBC Act communities have been avoided. The Commonwealth Department of Environment (DoE) will consider the proposed removal and accordingly, appropriate offsets will be provided to improve or maintain the viability of NTGVVP.

Woorndoo-Streatham Road

One critically endangered ecological community listed under the EPBC Act was identified as potentially occurring in the proposed access road location: Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP). During field investigations, all patches of remnant native vegetation were found to potentially constitute this ecological community.

If any road widening within road reserves is required, this will not require any vegetation removal and therefore, there will be no significant impacts on this ecological community.

Transmission Line

Two critically endangered ecological communities listed under the EPBC Act are likely to occur in areas of remnant vegetation within the proposed transmission line route. These communities are:

- Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP); and
- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (SHWTLP).

The locations of Plains Grassland and wetlands potentially qualifying as these communities have been mapped in *Figures 12-2* to *12-20* in the *Flora and Fauna Assessment*. As a 'worst case' scenario, 2.38ha of NTGVVP and 1.12ha of SHWTLP could be impacted by access tracks and power poles of the transmission line if the access tracks and power poles cannot be micro-sited to avoid these areas and there are no farm tracks or roads available for alternative access.

Further detailed field assessments will be undertaken to determine the precise locations and extent of vegetation meeting the criteria for these communities once the location of transmission line poles are determined. These assessment will inform appropriate mitigation measures which will be implemented if required (such as the micro-siting of poles and access tracks) to ensure impacts to these communities are avoided or minimised where possible.

24.5.3 Migratory Birds

Wind Farm and Major Access Track

A review of background information, coupled with a review of suitable habitat, identified the potential for 18 species of EPBC Act listed migratory birds to occur within the region. Due to this potential, further investigations in the form of four surveys (in accordance with Commonwealth guidelines) were undertaken during the periods of summer 2010/11, summer 2012/13, winter 2013 and spring 2013. The targeted survey area included the wind farm site and an area comprising a 10km buffer around the proposed wind farm boundary termed the 'radius of investigation'. Within this area, focus was placed on all wetlands holding water during the survey periods where migratory birds would potentially occur or have been recorded in the past coupled with anecdotal information obtained from local landholders. Further details are provided in *Section 5* of the *Flora and Fauna Assessment* contained at Volume 2.

Within the wind farm site, targeted surveys found that migratory shorebird activity is relatively low due to the poor quality and limited extent of wetland habitats within the site (see *Figures 5-3* to *5-5* in the *Flora and Fauna Assessment* at Volume 2). Only two listed migratory birds were located within the wind farm site: the Common Greenshank *(Tringa nebularia)* and Latham's Snipe *(Gallinago hardwickii).* These two species were recorded in low numbers within the wetlands located on the western boundary, with only one individual of Common Greenshank recorded. The wetlands surveyed and the locations of migratory species are shown in *Figure 12-2* in *Chapter 12*. The Latham's Snipe was also recorded on the south-eastern corner of the wind farm site and thus, particular attention was focused on this species.

The maximum number of Latham's Snipe recorded together at Dundonnell has been 20 birds in a wetland within the western part of the wind farm site. These are considered to be an important population under the EPBC Act *Significant Impact Guidelines* (DoE, 2013). The wetland however, did not consistently hold this number. The lack of a consistently recorded high number in the Dundonnell region is due to the lack of extensive suitable habitat, as it is generally too dry to support high numbers of this species. In contrast, large concentrations of between 100 and 400 birds have been recorded historically (1980s to 2005) from favoured sites in Victoria. Thus, the wind farm site does not meet the criteria of 'important habitat' for a migratory species as defined in the Significant Impact Guidelines. Furthermore, the wetland in which the highest number of birds were recorded in within an area covered by a turbine-free buffer associated with Brolga and therefore, no infrastructure is located near this wetland with the closest proposed WTG approximately 450m south-east.

Habitats where most migratory bird species were found to occur were situated away from where WTGs and associated infrastructure is proposed, with no infrastructure located within areas where the two listed species were recorded.

Outside the wind farm site (within a 10km radius), targeted migratory bird surveys of wetlands determined the presence of nine EPBC Act listed migratory species in the radius of investigation. These species are:

- Sharp-tailed Sandpipers *(Calidris acuminata);*
- Red-necked Stints *(Calidris ruficollis);*
- Double-banded Plovers *(Charadrius bicinctus);*

- Eastern Great Egret *(Ardea alba modesta);*
- Glossy Ibis *(Plegadis falcinellus);*
- Common Sandpiper *(Actitis hypoleucos);*
- Wood Sandpiper *(Tringa glareola);*
- Common Greenshank *(Tringa nebularia);* and
- Latham's Snipe *(Gallinago hardwickii).*

Three EPBC Act listed species (Double-banded Plovers, Sharp-tailed Sandpipers and Red-necked Stints) were recorded in numbers exceeding 20 individuals. This however, is a relatively low number with these species found in much greater numbers elsewhere in south-eastern Australia.

Habitats where most migratory bird species were found to occur were situated away from areas where WTGs and associated infrastructure are proposed to be located, generally on large open saline wetlands several kilometres from the proposed wind farm. Some birds may fly between key wetlands, with the main potential for migratory birds moving across the wind farm to be from the lakes east of the site to wetlands south and west of the site.

Assuming straight line flights between wetlands, the movements of migratory birds between most wetlands in the radius of investigation would not cross the wind farm site. Moreover, migratory shorebirds are particularly strong fliers, generally flying high, with a steep climbing rate from take-off. Therefore, due to their quick ascent and the significant distance from the proposed infrastructure, collisions with WTGs are unlikely for any migratory birds that do fly across the wind farm site.

The risk that migratory bird species will collide with WTGs is considered low given the geographical distribution of habitats away from the elevated country on which the wind farm is to be constructed (main movement likely to be north-south within these habitats rather than across the wind farm site) and the usual behaviour of shorebirds when migrating of rapidly climbing to flight heights higher than WTGs. Consequently, the likely very low number of shorebirds colliding with WTGs would not represent a significant impact on the populations of the species that regularly occur.

Given the above, migratory birds will not be significantly impacted by wind farm construction and operation, and it is unlikely that individuals of these species will be disturbed.

Woorndoo-Streatham Road

No wetlands or potentially wet areas that would provide suitable habitat for wetland birds were located along the road reserves. Some stands of planted trees line the road sections, yet these do not provide suitable habitat for any threatened species. Threatened birds require higher quality habitat and connectivity to other regional quality. As such, the likelihood for migratory bird species to be disturbed from the road works is very low.

Transmission Line

Five listed migratory species were considered to potentially occur in the transmission line route. These species are:

- Cattle Egret (*Ardea ibis)*;
- Eastern Great Egret *(Ardea alba modesta)*;
- Fork-tailed Swift (*Apus pacificus)*;
- White-throated Needletail (*Hirundapus caudacutus)*; and
- Latham's Snipe *(Gallinago hardwickii)*.

The Cattle Egret is unlikely to experience any loss of overall population as a result of any casualties along the transmission line route. This is because there is no evidence of a population decrease in Australia, there is an abundance of the species and the Cattle Egret is highly adaptable to modified environments (i.e. grazed pasturelands) which are widespread and available across much of its range.

Furthermore, due to the ephemeral nature and paucity of the habitat, the transmission line corridor is not likely to be core habitat for either the Eastern Great Egret or the Latham's Snipe. Therefore, there are unlikely to be significant impacts on either species as they would occur in small numbers and infrequently.

The Fork-tailed Swift and White-throated Needletail are aerial foragers of flying insects. They might occur on a few days in summer and early autumn each year when weather conditions are suitable. It is possible that the occasional Fork-tailed Swift or White-throated Needletail may strike a transmission line, however existing data and the results of the field surveys undertaken suggests both occur rarely in the Dundonnell–Mortlake area (there are no records in the VBA database in the 10km radius search region). The open country of the Dundonnell area is suboptimal habitat for White-throated Needletail which more commonly forage over wooded habitats of the coast and ranges. Furthermore, while Fork-tailed Swifts are vulnerable to collision with transmission lines, the frequency and overall numbers of swifts occurring at Dundonnell are low relative to other parts of their range. As such, any collisions are unlikely to have a significant impact on the overall population of the Fork-tailed Swift and White-throated Needletail which are estimated to be up to 100,000 breeding pairs for each species (BirdLife International 2015).

The risk that migratory bird species will collide with the transmission line is considered low due to the ephemeral nature and paucity of wetland habitat near the transmission line and the lack of wooded habitat along the transmission line. Consequently, the likely very low number of migratory birds colliding with power lines would not represent a significant impact on the populations of these species.

Given the above, it is anticipated that the likelihood for migratory bird species to be significantly impacted as a result of the transmission line is low.

24.5.4 Bats

Wind Farm and Major Access Track

The Southern Bent-wing Bat (*Miniopterus schreibersii bassanii*) is listed as a critically endangered species under the EPBC Act. From 2009-2013, four surveys were undertaken of 29 sites across the wind farm site (consisting of various habitats as shown in *Figure 12-3* in *Chapter 12*), with a total of 833 Anabat recording nights. These surveys determined the existing presence of various species of bats on the site. The bat survey results for the Southern Bent-wing Bat are detailed in *Table 24-4.* For further details refer to *Section 6* of the *Flora and Fauna Assessment* contained at Volume 2.

Table 24-4 Bat Survey Results for the Southern Bent-wing Bat

Bat Species	November 2009	March 2011	February – April 2013	September-November 2013	Total
Southern Bent-wing Bat	0	16	5	0	21
Refer to Flora and Fauna Assessment in Volume 2 for full survey results					

A total of 21 Southern Bent-wing Bat calls were recorded over the four survey periods. These numbers represent an extremely low percentage of the overall calls recorded. For example, for the February-April 2013 results, the combined number of recordings for the Southern Bent-wing Bat is five from a total of 57,000 bat call recordings over the 8.5 week period, of which 30,350 were identified to a species.

Bat flight heights in association with RSA height were analysed in 2013 as part of the surveys. The Southern Bent-wing Bat usually flies at tree canopy heights in treed areas and within 6m of the ground in more open grassland areas such as the wind farm site. This was supported by survey findings in which all confirmed records of the Southern Bent-wing Bat were at a flying height of below 20m. In addition, six calls between 5 and 45m above the ground were recorded of the Southern Bent-wing Bat/Forest Bat complex, most of which were likely to be forest bats.

Two known caves have been investigated in the vicinity of the wind farm site, Mt Hamilton Cave, approximately seven kilometres north of the wind farm site and a small cave within the Mt Fyans Wildlife Reserve at the wind farm site. These two caves were assessed for the presence of Southern Bent-wing Bat and it was concluded that they are not suitable as roosting sites due to the structure of the cave (Mt Fyans) and cave opening being too narrow or blocked with metal and rubbish for safety reasons (Mt Hamilton). No other roosting sites where identified on or in the vicinity of the wind farm site.

The very low number of calls confirmed as the Southern Bent-wing Bat indicates a low activity level on the site for this species. In addition, these bats generally fly at low heights under the proposed RSA height, thereby minimising interactions with WTGs. Given such a small proportion of this bat population is using the site, the implications of the Project on the Southern Bent-wing Bat population are considered negligible.

Woorndoo-Streatham Road

In relation to the Woorndoo–Streatham Road works, no native vegetation that could provide bat habitat is proposed to be removed from the road reserves and therefore no significant impact to EPBC listed bat species will result from the proposed road works.

Transmission Line

There is potential for the Southern Bent-wing Bat to fly over the transmission line route at night, however it is assumed that bat activity along the transmission line corridor to the south-east of the wind farm site will be similarly low as that for the wind farm site. Records from elsewhere in south-western Victoria (BL&A unpublished data) show that Southern Bent-wing Bat activity is highest where treed habitat exists, particularly near roosting caves and over wetlands. The southern part of the transmission line corridor passes through a blue gum plantation and across some wetlands. Bat activity in these areas could be slightly higher, however overall impacts are considered to be low given the very low numbers of the Southern Bent-wing Bat recorded in the dominant habitat along the line route. Therefore the proposed transmission line is not considered likely to have a significant impact on this EPBC Act listed bat species.

24.5.5 Striped Legless Lizard

Wind Farm and Major Access Track

The Striped Legless Lizard (*Delma impar*) is listed as vulnerable under the EPBC Act. The potential presence of this species to occur within the wind farm site was considered possible within suitable habitat consisting of remnant native grassland and shrubland. Furthermore, nine recent records (in four locations) within 10km of the wind farm site have been documented. Further details are provided in *Section 7* of the *Flora and Fauna Assessment* in Volume 2.

Two tile grid surveys were undertaken in 2010 and 2013 at the wind farm site. The 2013 survey followed the EPBC Act survey guideline for the Striped Legless Lizard (the 2010 survey predated the guidelines). Habitat was considered suitable throughout the wind farm site, hence the location of tile grids were chosen to distribute them evenly over the entire wind farm site in areas proposed to be impacted by WTGs or associated infrastructure within given constraints of accessibility. For locations of these surveys refer to *Figure 12-6* in *Chapter 12*. The surveys resulted in a total of 3,900 tile checks undertaken. No Striped Legless Lizards were detected within the wind farm site during the targeted surveys, indicating a dense population of this species is unlikely to occur. For this reason, no significant impacts on this species' regional population are expected from the Project.

Woorndoo-Streatham Road

No native vegetation is proposed to be removed from the road reserves and therefore no significant impact to Striped Legless Lizards is anticipated as a result of the proposed road works.

Transmission Line

An assessment for the proposed transmission line works concluded that the Striped Legless Lizard may occur along the corridor in remnant Plains Grassland habitat and therefore, there may be an impact on this species if the access tracks or power poles remove suitable habitat. In a 'worst case' scenario, 2.38ha of the Plains Grassland mapped during the overview vegetation assessment as potential habitat for this species could be removed for the proposed access tracks and power poles. Therefore there is the potential for this species to be impacted if the Plains Grassland is removed.

Once the detailed design of the transmission line is determined, targeted pre-construction surveys will be undertaken to confirm the potential impacts on this species and mitigation measures, such as the micro-siting of poles and access tracks, will be implemented where possible to minimise any impacts to this species. The main means of avoiding impacts will be to locate poles in already disturbed locations and to minimise the construction footprint to much less than the conservative 100m^2 used in the 'worst case' analysis of impacts.

24.5.6 Growling Grass Frog

Wind Farm and Major Access Track

The Growling Grass Frog (*Litoria raniformis*) is listed as vulnerable under the EPBC Act. Some of the aquatic habitats within the wind farm site were considered to have potential to support the species. In addition, four records of the Growling Grass Frog have been recorded within 10km radius of the wind farm site, with one record located within the south-east section of the wind farm site (refer to *Figure 12-7* contained in *Chapter 12*). Details of the survey are contained in *Section 8* of the *Flora and Fauna Assessment* at Volume 2.

The survey was undertaken over three nights in five locations considered suitable for Growling Grass Frog habitat in accordance with the federal survey guidelines (DEWHA, 2009) and the *Victorian Biodiversity Precinct Planning Kit* (DSE 2010). For locations of the surveys refer to *Figure 12-8* in *Chapter 12*. Each suitable survey site was surveyed twice at a temperature not lower than 14°C by two zoologists for 45 minutes (90 person-minutes) using call playback and spotlight searches.

No Growling Grass Frogs were observed, nor calls heard, during the surveys. Furthermore, the proposed infrastructure is located to avoid dams and waterways. As a result, no significant impact on this species is expected as a result of the Project.

Woorndoo-Streatham Road

No wetlands or potentially wet areas which would provide suitable habitat for Growling Grass Frogs were located along the road reserves. As a result, no significant impact on this species is expected from the proposed road works.

Transmission Line

The Growling Grass Frog has the potential to occur near areas of permanent water with emergent and fringing vegetation or to use drainage channels for commuting between areas of suitable habitat. Wetlands along the transmission corridor appear mostly ephemeral and therefore, the Growling Grass Frog is unlikely to regularly occur in these wetlands.

The transmission line will not remove a significant area of potential habitat, nor will it lead to any serious hydrological changes in these areas. Therefore, no significant impact on this species is expected from the transmission line corridor.

24.5.7 Corangamite Water Skink

Wind Farm and Major Access Track

The Corangamite Water Skink (*Eulamprus tympanum marnieae*) is listed as endangered under the EPBC Act. Thirty-one sightings of Corangamite Water Skink have been previously documented within the radius of investigation (10km radius of the wind farm site) representing 11 populations (refer to *Figure 12-9* in *Chapter 12*). The species has been recorded in nearby wetlands to the south of the wind farm site, including in wetlands along watercourses that flow from the southern part of the wind farm site. Details of the surveys are contained in *Section 9* of the *Flora and Fauna Assessment* in Volume 2.

Detailed mapping of each potential habitat at the wind farm site was undertaken in November and December 2013. The quality of each potential habitat was assessed against the habitat assessment criteria including presence of permanent, still water bodies, deeply fissured basaltic rock piles, remnant native flora, shrub densities, large rock aggregations and connectivity with other areas of suitable habitat (see *Section 9.3.2* of the *Flora and Fauna Assessment* at Volume 2). Habitat includes wetlands, lakes, freshwater springs, swamps, wet depressions in undulating basalt rocky areas, drainage lines and small streams as well as dry stone walls close to wetlands.

Potential habitat exists in the south-eastern and north-western part of the wind farm site, however the vast majority (97%) of the site does not provide habitat for Corangamite Water Skink, as it is mostly free of waterways and wetlands. The overall likelihood of Corangamite Water Skink occurring at the wind farm site is considered low due to 95% of the potential habitat at the wind farm site being of low quality for Corangamite Water Skink, except in the one small wetland which has been determined to be of medium habitat quality.

Most of these areas are located within a WTG-free buffer zone, which was introduced during design development to minimise any impact on Brolgas. The remaining areas of potential habitat will be preserved and included within a 55m wide WTG and infrastructure free buffer zone.

A shadow flicker analysis was undertaken and concluded that the majority (over 80%) of Corangamite Water Skink habitat is affected by overshadowing for less than 4% of available annual daylight hours. This is considered to be a low degree of overshadowing and within the bounds of natural variability in sunshine hours due to variations in cloud cover. All potential habitat affected by overshadowing at the wind farm site is considered to be of low quality. Therefore, no significant impact on this species' basking behaviour is expected as a result of shadows from the proposed WTGs.

Woorndoo-Streatham Road

No wetlands or potentially wet areas that would provide suitable habitat for Corangamite Water Skinks were located along the road reserves. As a result, no significant impact on this species is expected from the works.

Transmission Line

The Corangamite Water Skink has been recorded historically in wetlands to the south of the windfarm site, which are surrounded by recent basalt flows and provide natural features including rocks and boulders along most of the edges of the wetlands offering fissures for protection and basking opportunities for the Corangamite Water Skink. The wetlands along the transmission line are very different to this habitat, with large areas consisting of wet depressions in paddocks without fringing native vegetation and rocks. The extent of suitable wetlands occurring along the transmission line is very limited and it is therefore considered unlikely that an important population of this species occurs along the transmission line. It is noteworthy that the spacing between power poles will permit any wetland shorelines to be avoided during construction altogether apart from a brief temporary disturbance when the transmission line is laid out prior to tensioning. For these reasons, impacts are not expected to lead to a significant effect on the species' population.

Targeted pre-construction surveys will be undertaken to confirm if any suitable Corangamite Water Skink habitat occurs along the transmission line, once the detailed design of the transmission line is determined. These surveys

will inform mitigation measures, such as avoiding these wetlands through micro-siting of power poles and access tracks where possible, to avoid or minimise the potential for impacts on this species.

24.5.8 Golden Sun Moth

Wind Farm and Main Access Track

The Golden Sun Moth (*Synemon plana*) is critically endangered under the EPBC Act, threatened under the Victorian FFG Act and critically endangered DEPI threatened species advisory list. Five records of Golden Sun Moth have been documented in four sites located approximately seven kilometres south-east of the wind farm site (refer to *Figure 12-11* in *Chapter 12* for locations). Further details are provided in *Section 10* of the *Flora and Fauna Assessment* contained in Volume 2

Detailed mapping was undertaken to define suitable habitat where the Golden Sun Moth is likely to occur. Habitat includes native grassland areas with high abundance of Wallaby Grass, as well as exotic pastures including Chilean Needlegrass. The majority of the wind farm site comprises improved pasture, including introduced grass species, but no Chilean Needlegrass. Photographs illustrating the contrast between suitable Golden Sun Moth habitat and grassland at the Dundonnell site are located at *Figures 12-13* and *12-14* contained in *Chapter 12*. Suitable habitat was only recognised in one discrete section of the wind farm site; a paddock west of Darlington-Nerrin Road in the eastern part of the wind farm site, refer to *Figure 12-12* in *Chapter 12.* Other areas supporting low coverage of wallaby grass were located in areas intermittently inundated by water and were considered unsuitable habitat. No road reserves suitable for Golden Sun Moth were identified within the wind farm site or along the major site access track.

Targeted surveys for Golden Sun Moth were not required at the wind farm site, as the only potential habitat identified at the site will be avoided. Therefore, no significant impacts are likely to occur for this species as a result of the wind farm site.

Woorndoo-Streatham Road

No native vegetation is proposed to be removed from the road reserves as part of the Woorndoo–Streatham Road works and therefore no significant impact to the Golden Sun Moth species is anticipated from the works.

Transmission Line

The Golden Sun Moth was identified as likely to occur in the 10km radius from the transmission line corridor due to the presence of suitable habitat (Plains Grassland).

If habitat removal is required for the power poles or access tracks, this species may be impacted. In a 'worst case' scenario, 2.38ha of the Plains Grassland mapped during the overview vegetation assessment as potential habitat for this species could be removed for the proposed access tracks and power poles. Thus, targeted pre-construction surveys will be undertaken during November to January to confirm the presence of the Golden Sun Moth and whether suitable habitat will be impacted, once the detailed design of the transmission line is known. These surveys will inform mitigation measures which will be implemented as appropriate, to minimise impacts to this species. The main means of avoiding impacts will be to locate poles in already disturbed locations and to minimise the construction footprint to much less than the conservative 100m^2 used in the 'worst case' analysis of impacts.

24.6 Impacts and Mitigation Measures

The impacts of the Project on MNES, and an initial impact rating are summarised in *Table 24-5.* In addition, mitigation measures and the residual impact rating after environmental mitigation measures have been applied are detailed in *Table 24-5.*

Table 24-5 Potential MNES Impacts, Mitigation Measures and Residual Impacts

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
24-01	Disturbance during the construction of the wind farm	Moderate	Project activities will be undertaken in accordance with an approved Environmental Management Plan, including a Construction Management Plan, which will include, but is not limited to, the following requirements. • All machinery will enter and exit works sites along defined routes, thereby avoiding impact on native vegetation, water-ways or cause soil disturbance and weed spread. • All machinery brought on site will be weed and pathogen free and will be checked regularly for mechanical leaks. • All machinery wash down, lay down and personnel rest areas will be defined (fenced) and located in disturbed areas. • Bunding and provision of sedimentation basins at the quarry sites. • Groundwater management and erosion protection at the quarry sites to minimise changes to the hydrology and ground water quality. Appropriate offsets will be implanted to ensure no net loss results to Victoria's biodiversity as a result of the removal of NTGVVP from the major access track.	Minor
24-02	Impact to birds (waterbirds and migratory, excluding Brolgas) in relation to the construction and operation of the wind farm	Low	Project activities will be undertaken in accordance with a Bat and Avifauna Management Plan. For migratory birds, as collision risk with turbines is considered low, only pre-construction and construction phase mitigation measures will be required. These measures include the avoidance of habitat in the siting and layout of the wind farm and the implementation of hygiene measures in relation to the Project as identified in *Impact 24-01* above.	Minor
24-03	Impact to bats in relation to the construction and operation of the wind farm	Moderate	Project activities will be undertaken in accordance with a Bat and Avifauna Management Plan. A buffer area of 120m will be implemented in relation to the rotor swept area of the WTGs and favoured habitats (forests, large hollow trees, isolated paddock trees and water bodies) to reduce flying bats interacting with operating WTGs.	Minor

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
24-04	Impacts to the Striped Legless Lizard in relation to the construction and operation of the wind farm	Moderate	Project activities will be undertaken in accordance with a Construction and Operational Environmental Management Plan and a Fauna Management Plan, which will include, but are not limited to, the following requirements: • Native vegetation removal will be avoided and minimised through micro-siting of WTGs and associated structures where possible. • Construction personnel will be trained in the identification of Striped Legless Lizard. • If species are found, works will stop within a 30m buffer area around the affected area and DEPI will be notified. • A salvage protocol will be implemented on-site including inspections of any excavations left open overnight and construction and operational personnel will be inducted. Protocol will be included as part of the CEMP and OEMP. • Translocation protocol will be developed for the Striped Legless Lizard and implemented if located.	Minor
24-05	Impacts to the Growling Grass Frog in relation to the construction and operation of the wind farm	Moderate	Project activities will be undertaken in accordance with a Construction and Operational Environmental Management Plan and a Fauna Management Plan, which will include, but are not limited to, the following requirements: • Hydrological, sedimentation and groundwater and erosion protection measures will be identified and implemented. • Sediment and contamination traps will be implemented to protect areas of habitat during construction. • Development will be sited (at a minimum) 30m away from all watercourses, wetlands and significant drainage lines. • Implementation of crossings where development intersects with Growling Grass Frog habitats. • No basalt rocks/boulders larger than 20cm in diameter are to be moved from waterway channel or banks. • Hygiene controls (vehicle and footwear) to avoid the introduction of Chytrid fungus on-site. • A minimum 55m buffer will be applied to all dams, waterways and minor tributaries to minimise impacts to habitat and on the species during the construction and operation of the wind farm. • Temporary drift fences beside roadways/ access tracks will be installed when in regular use for construction, to minimise the risk of injury to animals caused by traffic. • Any excavations left open overnight will be inspected regularly.	Minor

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
24-06	Impacts to the Corangamite Water Skink in relation to the construction and operation of the wind farm	Moderate	Project activities will be undertaken in accordance with a Construction and Operational Environmental Management Plan and a Fauna Management Plan. Mitigation measures will be consistent with those detailed for the Growling Grass Frog and will include: • Hydrological, sedimentation and groundwater and erosion protection measures. • Implementation of sediment and contamination traps. • Implementation of crossings where development intersects with suitable habitat. • No basalt rocks/boulders larger than 20cm in diameter are to be moved from waterway channel or banks. • Hygiene controls (vehicle and footwear) to avoid the introduction of Chytrid fungus on-site. • A minimum 55 metre buffer applied to all dams, waterways and minor tributaries to minimise impacts to habitat and on the species during the construction and operation of the wind farm. • Temporary drift fences beside roadways/ access tracks will be installed when in regular use for construction, to minimise the risk of injury to animals caused by traffic. • Regular inspection of excavations left open overnight. . Further, dry stone walls in close proximity to wetlands and drainage lines will be avoided. If dry stone walls are to be removed within 55m of a wetland a zoologist is to be present to salvage and relocate skinks (if present).	Minor
24-07	Impacts to the Golden Sun Moth in relation to the construction and operation of the wind farm	Minor/ Moderate	Project activities will be undertaken in accordance with a Fauna Management Plan. The area identified as potentially suitable habitat for the Golden Sun Moth will be retained where possible and excluded from access of both personnel and vehicles during construction and operation. WTGs and associated structures will be micro-sited to avoid GSM habitat if required.	Minor

Impact number	Impact	Impact rating	Mitigation measures	Residual impact rating
24-08	Impacts to Flora and Fauna, Ecological Communities and specifically the Spiny Rice-flower, Striped Legless Lizard, Corangamite Water Skink and Golden Sun Moth as a result of the construction and operation of the Transmission Line	Moderate/ Major	Project activities will be undertaken in accordance with a Construction and Operational Environmental Management Plan. With regards to vegetation, Project activities will be undertaken in accordance with a Vegetation Management Plan, which will include, but not limited to, the following requirements: • Removal of indigenous remnant patch vegetation will be avoided. • Removal of scattered trees will be avoided. • In areas where removal of indigenous vegetation cannot be avoided, the area to be removed will be minimised. • Where practicable, transmission line works will be sited at least 30m away from wetlands, lakes, creeks and significant drainage lines. Where this is not practicable and ephemeral wetlands may be unavoidably impacted, works will be undertaken when the wetlands are dry and the risk of altering the ground surface is lowest (i.e. when the ground is hard and dry). In relation to fauna, project activities will be undertaken in accordance with a Fauna Management Plan. Specific mitigation measures will be implemented as detailed in *Impacts 24-04, 24-05, 24-06* and *24-07* above. In relation to avifauna including migratory birds, markers will be utilised on the transmission line wire to increase visibility where required and practical. Once final transmission line pole sites are determined, targeted surveys will be undertaken to confirm the presence of habitat for threatened species and ecological communities within the transmission line. These surveys will inform mitigation measures to be implemented, such as the micro-siting of poles if required. The final details of the transmission line will take into account the results of these surveys in order to minimise impacts to threatened species and ecological communities.	Minor/ Moderate

24.7 Residual Impact Assessment Conclusions

In assessing the impacts of the Project in relation to MNES, potential impacts were assigned a risk rating of either: moderate to major, moderate, or minor to moderate. These risks are associated with the presence, or potential presence of EPBC Act listed species.

Potential impacts will be addressed through the implementation of mitigation measures as part of a robust construction and operational environmental management plan included within the overall Environmental Management Plan (EMP). The EMP will include specific flora and fauna plans, including a Vegetation Management Plan, Fauna Management Plan and Bat and Avifauna Management Plan. Further investigations however, are required to determine the impact of the transmission line on flora and fauna and to detail mitigation measures.

A precautionary approach has been taken to the assessment of MNES. Following is a summary of the potential impacts, including the potential 'worst case' scenario where relevant, and mitigation measures for each MNES.

No EPBC Act listed flora species will be impacted by the wind farm site infrastructure and Woorndoo-Streatham Road works. Thus, no further mitigation measures are required for these elements of the Project. Targeted surveys will be undertaken on the transmission line route once the detailed design is determined. These surveys will confirm mitigation measures to be implemented, such as the micro-siting of power poles and access tracks to avoid threatened species if identified. It is expected that the impact of the Project on EPBC Act listed flora species from the transmission line would be moderate and, likely minor with mitigation measures implemented.

In terms of EPBC listed ecological communities, a total of 1.023ha are proposed for removal from the wind farm site to accommodate the major access track. This impact would be significant, however will be appropriately offset to ensure no net loss results to MNES. All areas of potential occurrence of ecological listed communities within areas subject to potential Woorndoo-Streatham Road works would be avoided. With regards to the transmission line, dependant on avoidance measures taken, the 'worst case' would be the loss of 1.12ha of SHWTLP and 2.38ha of NTGVVP, which would be a significant impact, however this scenario is considered to be unlikely with the implementation of appropriate mitigation measures. Mitigation measures to minimise impact will include the use of existing roads and tracks for access where possible and the micro-siting of power poles and access tracks to avoid threatened communities. With mitigation measures including offsets and micro-siting, it is expected that the impact of the Project on EPBC Act listed communities from the wind farm site and transmission line would be minor to moderate.

Nine EPBC Act listed migratory bird species were identified within the Project area. The proposed wind farm area only contains poor quality wetland habitats of limited extent and comparatively low numbers of listed migratory species. Large, open saline wetlands several kilometres to the northeast of wind farm site were more suitable and supported the largest numbers of migratory species. The risk that migratory bird species will collide with WTGs is considered low given the geographical distribution of habitats away from the elevated country on which the wind farm is to be constructed and the usual behaviour of shorebirds when flying longer distances or migrating of rapidly climbing to flight heights higher than WTGs. WTGs have been sited away from suitable habitat at the wind farm site and specific mitigation measures are not considered necessary for the transmission line as impacts would be minimal due to the ephemeral nature and paucity of suitable habitat along the transmission line. Project activities will be undertaken in accordance with a Bat and Avifauna Management Plan and residual impacts are expected to be minor.

The Southern Bent-wing bat has been recorded within the wind farm site with potential to occur along Woorndoo-Streatham Road and the transmission line route. WTGs have been located over 120m from suitable habitat to avoid impacts. Project activities will be undertaken in accordance with a Bat and Avifauna Management Plan and residual impacts are expected to be minor.

The Striped Legless Lizard is unlikely to occur on the wind farm site, however has the potential to occur along Woorndoo-Streatham Road and the transmission line route. No habitat would be impacted along Woorndoo-Streatham Road. A salvage protocol will be developed and implemented should Striped Legless Lizard be detected during construction on the wind farm site.

The Growling Grass Frog is unlikely to occur on the wind farm site with potential to occur on the transmission line. A 55m protection buffer has been implemented between suitable habitat and wind farm infrastructure.

The Corangamite Water Skink has potential to occur on the wind farm site and the transmission line corridor. A 55m protection buffer has been implemented between suitable habitat and wind farm infrastructure.

The Golden Sun Moth has potential to occur on the wind farm site, along Woorndoo-Streatham Road and the transmission line corridor. All areas of suitable habitat will be avoided on the wind farm site and Woorndoo-Streatham Road.

Mitigation measures for the Striped Legless Lizard, Growling Grass Frog, Corangamite Water Skink and Golden Sun Moth to minimise impact along the transmission line route will include the use of existing roads and tracks for access where possible and the micro-siting of power poles and access tracks to avoid likely habitat if required. Project activities will be undertaken in accordance with Fauna Management Plan and residual impacts are expected to be minor for the wind farm site and minor-moderate depending on avoidance measures taken for the transmission line.

With the implementation of mitigation measures where required, the overall residual impact on MNES as a result of the Project would be minor, with the exception of the transmission line route which depending on the avoidance measures taken, will be moderate to minor.

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 25 – ENVIRONMENTAL MANAGEMENT FRAMEWORK

This page is intentionally blank

Contents

Figures

Tables

25 ENVIRONMENTAL MANAGEMENT FRAMEWORK

25.1 Introduction

This Chapter describes the Environmental Management Framework (EMF) that will be put in place for the design, construction and operational phases of the Project. The EMF provides a clear framework for managing the environmental effects associated with the construction and operation of the Project. This Framework will be elaborated in the Construction Environmental Management Plan (CEMP), Operational Environmental Management Plan (OEMP) and Decommissioning and Rehabilitation Environmental Management Plan (D&REMP). These three documents (collectively referred to as the EMPs) will be prepared following the approval and commissioning of the Project.

25.2 EES Objectives

The EES evaluation objective relevant to the EMF is:

To provide a transparent framework with clear accountabilities for managing environmental effects and hazards associated with construction, operation, decommissioning and rehabilitation phases of the project, in order to achieve acceptable environmental outcomes.

This Chapter describes the EMF for the Project and addresses the EES Scoping Requirements by identifying:

- the means by which a register of environmental risks associated with the Project will be developed and maintained during Project implementation;
- a proposed framework for managing the risks of adverse environmental effects, including:
  - the context of required approvals and consents, in particular requirements for related EMPs;
  - the environmental management system to be adopted, including organisational responsibilities and accountabilities; and
  - a summary of environmental management measures proposed in the EES to address specific issues, including commitments to mitigate adverse effects and enhance environmental outcomes;
- the proposed objectives, indicators and monitoring requirements for managing, including but not limited to:
  - community engagement;
  - effects on transport and local infrastructure;
  - biodiversity issues, including bird and bat mortality and any contingency or offsetting measures, if required;
  - noise and vibration;
  - blade glint and shadow flicker;
  - surface runoff and groundwater effects; and
  - cultural heritage;
- an outline of any relevant EMPs for construction, operational and decommissioning and rehabilitation phases; and
- procedures for:
  - evaluating the effectiveness of the proposed environmental management framework in controlling adverse effects;
  - verifying or monitoring environmental performance and compliance with requirements;
  - reviewing the effectiveness of the environmental management framework for continuous improvement; and
  - management of, and access to, baseline and monitoring data, to ensure the transparency and accountability of environmental management, as well as to contribute to the improvement of environmental knowledge.

25.3 Legislation and Policy

The relevant legislation and government policies relevant to environmental management are outlined in *Table 25-1*. The primary documentation relied upon for the overarching EMF and the preparation of EMPs for wind farms in Victoria are the Wind Energy Guidelines.

Table 25-1 Relevant Legislation and Policies

Legislation / Policy	Description
State	
Policy and planning guidelines for development of wind energy facilities in Victoria (DELWP, 2015)	The Wind Energy Guidelines are for responsible authorities, proponents and the community to provide guidance about wind farms and inform planning decisions about wind energy facility proposals. The Guidelines also set out information requirements for wind energy developments, including the preparation of EMPs.
Local	
Moyne Planning Scheme	The Moyne Planning Scheme is implemented via the P&E Act. Clause 13 relates to 'Environmental Risks' and states: *'Planning should adopt a best practice environmental management and risk management approach which aims to avoid or minimise environmental degradation and hazards. Planning should identify and manage the potential for the environment, and environmental changes, to impact upon the economic, environmental or social well-being of society.'* Clause 52.32 sets out the matters to be considered prior to the determination of an application for a wind energy facility, including the preparation of EMPs and includes consideration of the Wind Energy Guidelines. The EMPs will be developed with reference to the Dundonnell Wind Farm Planning Permit Applications and all associated documentation including the recommendations within specialist reports and the conditions of the Planning Permits.

25.4 Environmental Management Framework

25.4.1 Trustpower Environmental Policy

Trustpower is dedicated to maintaining a high standard of environmental care in conducting its activities and has a long standing Environmental Policy to guide how the company manages environmental issues across all activities.

The overarching goal of the Policy is to:

> *"Operate in a manner which minimises all potential adverse environmental effects and maximises where practical potential environmental benefits".*

In operating, maintaining and enhancing its generation assets, Trustpower will:

- *'avoid or minimise all adverse environmental effects which our operations may inadvertently cause;*
- *liaise and work with the community and potential stakeholders in the identification, mitigation and monitoring of any potential environmental benefits;*
- *use and operate the natural and physical resources under our control in an efficient and environmentally appropriate manner;*
    - *recycle and reuse plant, machinery and materials where-ever practical and economically feasible; and*
    - *ensure that all generation staff and contractors are aware of:*
- *the surrounding environment and potential environmental effects which our operations could induce; and*
- *the contingencies and procedures to be followed in the event of an adverse environmental effect being induced'.*

By adopting and requiring adherence to the above goal and its associated policies Trustpower seeks to promote both continuing environmental awareness and enhanced environmental performance.

The Project is a significant undertaking. To give effect to the above Environmental Policy and to ensure that the Project accords with regulatory requirements, the following key commitments have been established:

- to contribute to Federal and State government policy objectives to maintain a secure, efficient and affordable supply of energy in Victoria while reducing the intensity of greenhouse gas emissions from the energy sector;
- to ensure that the construction and operation of the Project does not unduly affect the amenity of nearby dwellings, or existing land uses, on and around the wind farm site or transmission line corridor;
- to avoid or minimise impacts on species and communities listed under the EPBC Act and FFG Act, to avoid or minimise impacts on other indigenous species and communities,
- to avoid or minimise impacts on places with Aboriginal and historic cultural heritage values; and
- to minimise any physical impacts from the construction and operation of the Project such as erosion, sedimentation, road damage and traffic hazards.

25.4.2 Trustpower Environmental Management System

Trustpower operates an Environment Management System that has been developed in accordance with the requirements of AS/NZ ISO 14001.

Amongst other matters, the Trustpower Environmental Management System:

- includes a publicly available Environmental Policy;
- commits to prevention of pollution and compliance with environmental regulations;
- sets out a structure and responsibilities to achieve sound environmental management;
- stipulates both internal and external reporting requirements, including incident and non-compliance processes;
- outlines how the company manages operations in compliance with applicable laws, legislation, regulations, standards and codes of practice;
- commits to continuous improvement of processes to protect the environment, the conservation of resources and minimisation of waste; and
- includes appropriate training for awareness and education of personnel on environmental issues.

Trustpower has effective and efficient practices in place to ensure ongoing compliance with legislation, rules and codes within the jurisdictions in which it operates. These practices are regularly reviewed to meet Trustpower's changing requirements. Reporting on regulatory matters and compliance, including breaches and assurance outcomes, are part of regular reporting to the Trustpower board.

Trustpower has developed processes to track its obligations. To support compliance management, Trustpower has built and, continues to develop, a register of regulations under which it operates. It uses this tool to share understanding and allocate responsibilities for compliance activity. Trustpower also operates an electronic compliance management system.

Trustpower has recently acquired additional power generation assets in New South Wales and as a consequence is undertaking a review to ensure alignment between the different environmental management frameworks that are in place for its assets across New Zealand and Australia. The review will address the possible need for changes to Trustpower's Environmental Policy, objectives and other elements of the Environmental Management System in the light of operating in new regulatory jurisdictions, changing company strategy, and its commitment to continual environmental improvement.

The process for implementation of Trustpower's Environmental Management System is shown in *Figure 25-1*.

Figure 25-1 Implementation of Trustpower's Environmental Management System

25.5 Environmental Management Plan

25.5.1 Overview

Project specific EMPs will be developed in accordance with Trustpower's Environmental Management System. The EMPs will guide proposed activities associated with the construction, operation and decommissioning and rehabilitation of the Project to ensure that appropriate measures and processes are in place to manage identified environmental risks and provide for ongoing continual improvement.

The EMPs will be procedural documents which outline the environmental goals of the Project, the safeguard measures to be implemented, the timing of the implementation in relation to the progress of the Project, responsibilities for implementation and management, and a review process.

The EMPs will include:

- an overview of activities applicable to the design, construction, operational and decommissioning and rehabilitation phases of the Project;
- measures to ensure that works are undertaken in accordance with planning permit conditions and environmental statutory requirements:

- in a manner so as to minimise the occurrence of environmental impact;
- in a manner so as to minimise the impacts generated from the construction and operation of the Project (e.g. noise, traffic) on nearby residential properties;

- clear procedures for the management of identified environmental and social impacts;
- an outline of any monitoring programs that may be required;
- management responsibilities and reporting requirements to demonstrate compliance with the EMPs; and
- measures to ensure that employees engaged in the works comply with the requirements of the EMPs and are provided with appropriate training.

The EMPs will be prepared following assessment of the EES and planning permit applications, and approval of the Project by the responsible authority.

25.5.2 EMPs Content and Structure

The EMPs will address the following stages of the Project:

1. Construction
2. Operation; and
3. Decommissioning and Rehabilitation

Each of the EMPs will be developed as standalone documents for their separate phases. In relation to the CEMP, the preparation will be a condition of a contractual agreement between Trustpower and the Principal Construction Contractor and will be prepared to the satisfaction of the relevant authorities, as required by any planning permits issued for the Project.

The EMPs will serve as working documents to be regularly reviewed and amended as the Project progresses. The OEMP will be prepared at the appropriate time prior to the completion of the commissioning of the WTGs.

The D&REMP will also be prepared as per the requirements outlined within the Wind Energy Guidelines, and will provide for the rehabilitation of components of the Project.

The EMPs basic structure is outlined in *Table 25-2*. Further details regarding EMPs reporting, monitoring and review are provided later in this Chapter.

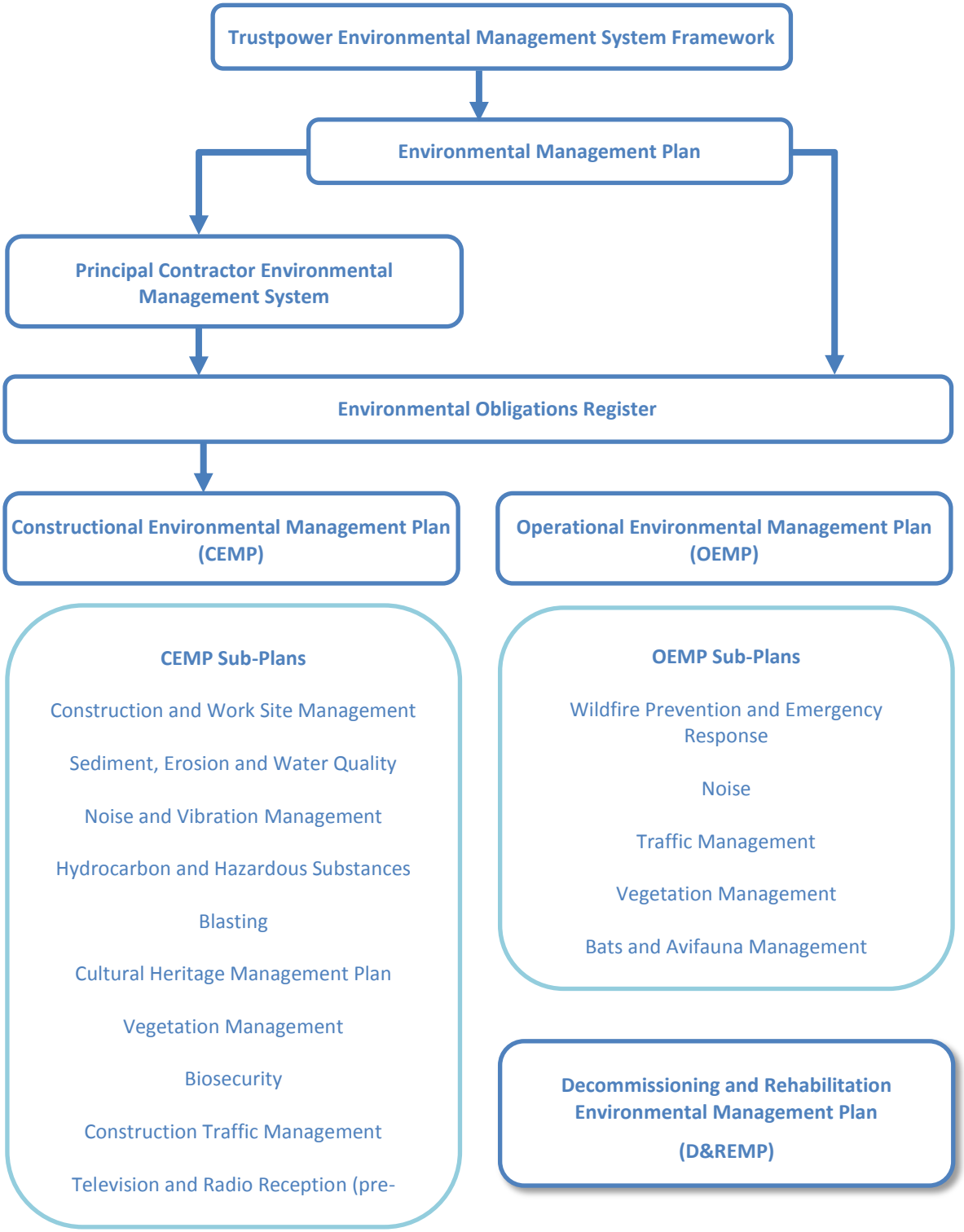
Table 25-2 Anticipated Structure of the EMPs

EMP Component	Description
Chapter 1 - Introduction	Details the objectives, scope and purpose of the individual EMP.
Chapter 2 – Project Description	Provides a brief description of the Project including relevant activities covered by the EMP.
Chapter 3 – Legislation and Statutory Requirements	Outlines the relevant legislation and statutory requirements as well as obligations to be met under the planning permit conditions.
Chapter 4 – Environmental Impact Assessment	Provides an overview of the existing conditions and a summary of the key findings of the EES.
Chapter 5 - Environmental Management and Mitigation	Defines environmental objectives for the Project as well as the measures for the management of environmental impacts.
Chapter 6 - Reporting	Outlines the reporting requirements associated with the EMPs.
Chapter 7 - Monitoring and Review Requirements	Outlines the processes of monitoring and performance management associated with the EMPs, including inspections, audits and ongoing review of the EMPs.

EMP Component	Description
Chapter 8 – Roles and Responsibilities	Outlines the roles and responsibilities associated with the EMPs.
Chapter 9–Training and Continuous Improvement	Outlines the training requirements associated with the EMPs.
Chapter 10 - Emergency Response Procedures	Contains emergency response plans and procedures.
Chapter 11 - Consultation	Outlines the consultation requirements associated with the EMPs.

How the Project EMPs sits within Trustpower's overarching EMF is illustrated in *Figure 25-2*. This EMF has been developed in accordance with applicable legislative requirements and assumes approvals are ultimately issued pursuant to the P&E Act, *Aboriginal Heritage Act 2006* and the *Mineral Resources* (Sustainable Development) *Act 1990*, as appropriate.

Figure 25-2 Trustpower Environmental Management Framework



25.5.3 EMPs Reporting and Review

Environmental performance reporting is an integral part of ISO 14001 and seeks to ensure that relevant authorities are appropriately informed of how the proponent is managing its environmental performance. The EMPs will outline all environmental reporting requirements for the Project and Trustpower will maintain an appropriate and auditable record system. The environmental reporting and review requirements broadly include the reporting of:

- Compliance Reporting – regular reporting detailing the results of the monitoring programs under approved management plans, a comparison of actual performance against goals and objectives, and the identification of corrective actions;
- Incident Reporting – consistent with Trustpower's current incident reporting system. The incident reporting and investigation process will be a valuable method of addressing shortcomings in procedures, training or equipment, and forms part of the opportunity for improvement. Where lessons are learnt from the investigation or current procedures are identified as being ineffective, the EMPs will be revised to include the improved procedures or requirements. In accordance with incident management procedure, Moyne Shire Council and the EPA will be advised if a notifiable environmental incident occurs; and
- Statutory Notification – required where there has been a non-compliance with legislation or approval conditions; or actual or potential harm to the health or safety of human beings or the environment is considered significant.

25.5.4 Roles and Responsibilities

Trustpower is responsible for the overall delivery of the Project and will appoint a Principal Construction Contractor responsible for construction works on the Project.

The EMPs will be developed by Trustpower, or by a nominated and suitably qualified expert. For example, the Principal Construction Contractor will have the ultimate responsibility for the implementation of the CEMP.

Environmental consultants may be commissioned by Trustpower and/or the Principal Construction Contractor as required to provide specialist input and advice on environmental matters, undertake surveys, inspections and monitoring. In the preparation of the CEMP, for example, environmental consultants may also be required to prepare environmental reports in consultation with the Principal Construction Contractor.

All contractors, sub-contractors and personnel involved in the construction, operation and decommissioning of the Project will be accountable through conditions of employment or contractual arrangements for ensuring that their work complies with the stated EMPs framework and procedures.

As an example, the key roles and responsibilities for environmental management during the construction phase of the Project are shown in *Table 25-3.*

Table 25-3 Roles and Responsibilities for Environmental Management during the Construction phase

Role	Responsibility
Trustpower Project Director	• Prepare documentation for statutory approvals compliance and planning permit amendments, obtain approvals; • Undertake liaison with responsible authorities in relation to any planning permit amendments; • Undertake liaison and negotiation with affected landowners in relation to micro-siting and planning permit amendments; and • Appoint Principal Construction Contractor.
Principal Construction Contractor	• Comply with all conditions of approvals of the planning permits; • Develop the EMPs to the satisfaction of the Trustpower Project Director; • Implement the EMPs to the satisfaction of the Trustpower Project Director; • Monitor, audit and conduct surveillance of the implementation and effectiveness of the EMPs to the satisfaction of the Trustpower Project Director; • Engage an independent, suitably qualified and experienced auditor, if required, to conduct audits of the implementation of the contract specification; • Engage specialist environmental advice when required; • Check that all contractual commitments including requirements as described in the contract specification are honoured; • Report environmental incidents to Trustpower Project Director; • Report notifiable incidents to relevant statutory authorities and to ensure corrective actions are implemented. Document actions taken to rectify incidences; • Respond to community complaints and ensure responses to issues raised are closed out; and • Ensure all contractor staff and subcontractors have been appropriately trained in environmental awareness.
Contractor Construction Site Supervisor	The Contractor Construction Site Supervisor is responsible for ensuring the implementation of relevant EMPs and associated environmental controls.
Contractor Site Safety & Environmental Officer	The Contractor Site Safety and Environment Officer is responsible for ensuring the Project proceeds without health, safety and environment risk to the persons, environment and property involved in the completion of the works. Authority to 'stop work' if unacceptable impact is likely, or has occurred.
All Personnel	All employees are equally responsible for safety and environment management at the Project sites. Specifically, they will support the hazard identification and risk management process by: • identifying the hazards; • evaluating the risks; • implementing the control measures; and • evaluating and monitoring the controls.

25.5.5 Training

Trustpower will ensure that all personnel responsible for the implementation of the EMPs are competent on the basis of education, training and experience. All personnel will be provided with environmental and social training appropriate to their scope of activity, level of responsibility and competency.

Environmental and social training activity will be detailed in the EMPs, including:

- definitions of role specific training requirements;
- a training needs assessment; and
- a process for documenting records of training undertaken including detailing the attendees, content, trainer and dates of the induction/training.

25.5.6 Environmental Obligations Register

Trustpower and the Principal Construction Contractor will develop an Environmental Obligations Register. This will be an electronic database of environmental requirements, safeguards, project commitments and monitoring requirements.

The Environmental Obligations Register will be structured to enable evidence of compliance to be linked to each project commitment for ease of reporting, tracking compliance, and demonstrating to Moyne Shire Council and relevant Government agencies that project commitments and planning permit conditions are being progressively satisfied.

The Environmental Obligations Register will include as a minimum the following items:

- relevant legislation;
- State, regional and local policies;
- industry standards and guidelines;
- EES commitments;
- planning and environmental (permits, licences) and conditions of approval; and
- clear roles and responsibilities against each action and task.

The Environmental Obligations Register will be regularly reviewed (at a minimum on a quarterly basis) and amended as additional approvals/licences/permits are received. The Principal Construction Contractor will also have a process in place to ensure changing legislative requirements are monitored, identified and incorporated into the Register.

25.5.7 Environmental Monitoring and Audit

The EMPs will outline the processes of monitoring and performance management associated with the relevant phases (for example construction or operation) of the Project. These processes are required to:

- evaluate the effectiveness of the environmental management framework in controlling adverse effects and where necessary;
    - verify and document that management and mitigation measures identified in the EMPs have been implemented;
    - validate predictions made in the EES and assess the actual impacts of the Project on the environment;
    - document and evaluate the effectiveness of management and mitigation measures and identify any necessary corrective actions;
    - demonstrate compliance with applicable legislation and other statutory requirements; and
    - achieve transparency and accountability of environmental management and reporting.

Discipline specific monitoring programs will be developed in the EMPs and associated management sub-plans and as a minimum, will include the following:

- timing, frequency and duration of monitoring for the proposed monitoring program;
- sampling strategies and protocols undertaken for each monitoring program including locations, responsibilities and quality assurance;
- the applicable standards, environmental objectives and performance goals; and
- reporting of results for the monitoring programs.

During the construction, operation and decommissioning and rehabilitation phases, personnel will conduct regular visual inspections of the wind farm in accordance with the EMPs. Where potential breaches are identified during routine monitoring, they will be addressed in accordance with the EMPs reporting and review requirements outlined above. This will likely involve amendments to the EMPs with the introduction of new/ revised management measures in relation to the environmental aspect in question, to ensure the non-compliance is addressed and there is continual improvement.

Environmental audits of the Project (both internal and external) will be undertaken if required, with the objective of determining the appropriateness of the EMPs in achieving environmental objectives and performance goals throughout the Project development. If required, audits will be undertaken in accordance with predetermined protocols. Internal audits may be undertaken by independent persons.

25.5.8 Environmental Impact Identification and Management Measures

As described in *Chapter 6*, the screening and scoping stages of the environmental assessment identify the significant environmental and social impacts associated with the Project. Environmental sensitivities and potential impacts have been identified and assessed through the specialist assessments undertaken for the EES.

Environmental objectives and indicators to guide the environmental performance of the Project were also developed. The objectives were identified having consideration for the EES Scoping Requirements, relevant environmental legislation and the potential environmental impacts identified for the Project. The indicators were developed to measure the effectiveness of proposed environmental management and mitigation measures.

Environmental management and mitigation measures, including requirements to prepare issue specific management sub-plans, have been identified to reduce and manage potential impacts to the environment arising from the Project. These measures have been informed by the recommendations provided by the specialist technical reports contained in Volume 2 and summarised in the preceding chapters of this EES.

The environmental objectives and indicators developed for the Project and management and mitigation measures are detailed in *Tables 25-4* to *25-19*. Specifically, these tables outline environmental management measures for the following environmental aspects:

- Geomorphology, Geology and Soils;
- Hydrogeology;
- Surface Water;
- Cultural Heritage;
- Flora and Fauna;
- Brolga;
- Noise and Vibration;
- Shadow Flicker and Blade Glint;
- Landscape and Visual Impact;
- Planning and land use;
- Traffic and transport;
- Socio-economic impacts;
- Aviation;
- Fire Management; and
- Matters of National Environmental Significance.

Together these tables form a consolidated register of environmental impacts and mitigation measures associated with the implementation of the Project. These objectives and indicators will be incorporated into the EMPs to satisfy the management protocols for these environmental aspects.

Table 25-4 Environmental Management Measures – Geomorphology, Geology and Soils

Geomorphology, Geology and Soils	
Objectives	**Indicators**
Project to minimise impacts on identified geoscience values. Project to minimise impacts on soil stability, erosion and exposure and disposal of waste or hazardous soils.	No impacts to identified sites of geoscience significance. Project activities undertaken in accordance with a Sediment, Erosion and Water Quality Management Plan. Project activities undertaken in accordance with a Hydrocarbon and Hazardous Substance Plan.

Impact number	Impact	Mitigation measures
8-01	Excavation for Project infrastructure has the potential to impact on geomorphological values through the levelling of surfaces and removal of regolith and rock.	• The Project layout will avoid impacts to geoscience features detailed in *Chapter 8* with WTGs and other project infrastructure microsited, if required, to avoid and minimise local direct impacts on geoscience features. • The reshaping and fill of surfaces will be minimised and access tracks will be constructed to avoid crossing ridge crests where possible.
8-02	Excavation for Project infrastructure has the potential to impact on geomorphological values through the creation of spoil.	• Excess excavated rock and imported construction materials will be removed from the site on completion of construction. • If excess spoil is to be deposited on-site, it will be located to avoid identified geoscience features detailed in *Chapter 8*.
8-03	Excavation for Project infrastructure has the potential to damage previously unknown lava caves.	• Detailed geotechnical investigation will be undertaken at the location of each WTG to determine if there are indications of potential cavities (caves) in the lava. If necessary, subsurface testing will be undertaken at WTG sites identified at risk of cavities. • Should unknown caves or other significant features, such as unusual minerals be encountered during the investigation, construction and operation of the Project, protocols developed by the Geological Society of Australia (GSA) will be implemented, including principles regarding geological and geomorphological sites.
8-04	Erection of WTGs and other Project infrastructure has the potential to impact on geomorphological and landscape values if construction occurs on steep slopes, ridges and plateau edges and on the margins of enclosed depressions within the wind farm site.	• WTGs and other project infrastructure will be located on subdued terrain rather than ridged, higher stony rise surfaces, where feasible. • WTGs and hardstands will be located 50m from the edges of escarpments, where possible. • WTGs, underground cabling and roadways will be micro-sited to avoid enclosed depressions on the lava flow surfaces.
8-05	Installation of culverts and drains around WTGs and regrading of slopes has the potential to impact on spring discharge sites, associated drainage lines and internal lakes and swamps.	• The regrading of slopes will be avoided and minimised where possible. • Underground cabling and roadways across spring outflow sites will be avoided and minimised where possible.

Impact number	Impact	Mitigation measures
8-06	Construction of Project infrastructure will expose soils with the potential to create increased sedimentation and erosion processes.	• Project activities will be undertaken in accordance with a Sediment, Erosion and Water Quality Management Plan, which will include, but not be limited to, the following requirements: ○ installation of drainage, erosion and sedimentation controls; ○ minimise the amount of exposed erodible surfaces; ○ prompt covering of exposed surfaces; ○ progressive revegetation of the site; ○ management of stockpiles; and ○ avoidance of works near watercourses, where possible.
8-07	Construction of Project infrastructure has the potential to expose hazardous materials relating to past agricultural use and storage e.g. fuels, chemical fertilisers and herbicides/pesticides, machinery and building ruins or construction residue.	• Project activities will be undertaken in accordance with a Hydrocarbon and Hazardous Substance Plan. • Landholders will be consulted to determine the location of former storage or waste disposal areas that may not be readily visible. • If hazardous materials or wastes are encountered during construction, appropriate measures for the removal, transport and disposal of any such material will be followed.

Table 25-5 Environmental Management Measures – Hydrogeology

Hydrogeology	
Objective	**Indicators**
Maintain the environmental values and beneficial uses of groundwater within and surrounding the Project.	Minimal changes to groundwater regime, quality or availability. Project activities undertaken in accordance with a Sediment, Erosion and Water Quality Management Plan. Project activities undertaken in accordance with a Hydrocarbon and Hazardous Substance Plan.

Impact number	Impact	Mitigation measures
9-01	Concrete batching plant may cause contaminated surface water runoff and infiltration into groundwater. Localised diversion of drainage patterns disrupting the natural recharge regime.	• The concrete batching plant will be developed and managed in accordance with a Sediment, Erosion and Water Quality Management Plan that will be incorporated within an EMP. This Plan will include measures to mitigate impacts from water runoff and sedimentation. The location of the concrete batching plant relative to key stony rise areas, springs and wetlands on-site will also be assessed.
9-02	Earthworks and WTG foundation design may impact physical interception of groundwater flow paths, loss of cement grout to aquifer, altered recharge and infiltration trends. Chemical alterations to groundwater quality.	• WTG foundations will be located to avoid identified spring discharges or wetlands. • Project activities will be undertaken in accordance with Sediment, Erosion and Water Quality Management Plan will include measures to mitigate potential runoff and chemical alterations to groundwater quality.
9-03	Groundwater pumping for on-site water supply for concrete batching plant, earthworks and WTG foundations may result in water table decline affecting off-site groundwater users or reducing discharge to springs.	• Abstraction wells will be located away from springs and site boundaries, where possible. • If required, a pumping regime that manages pumping cycles and/or pumping rates will be implemented to ensure any impacts are minimised.
9-04	Groundwater pumping for on-site water supply for concrete batching plant, earthworks and WTG foundations may result in water table decline affecting on-site groundwater uses.	• Abstraction wells will be located away from other on-site pumping wells where possible. • If required, a pumping regime that manages pumping cycles and/or pumping rates will be implemented to ensure any impacts are minimised. • Should water levels in pumping bores located nearest to the proposed abstraction bores decline during groundwater abstraction to the extent that those bores cannot be pumped, a temporary supply of water will be arranged to the affected user, if required.

Impact number	Impact	Mitigation measures
9-05	Access tracks, surface water drainage may cause physical interception of infiltration, redistribution of recharge through stony rises.	• Access tracks will be constructed using permeable surfaces and their locations relative to key stony rise areas, springs and wetlands will be assessed.
9-06	Leaks, spillages and losses of construction fluids, chemicals and/or fuels may introduce contaminants to groundwater through accidental leakage or direct or indirect discharge.	• Project activities will be undertaken in accordance with a Hydrocarbon and Hazardous Substance Plan. • Project activities will be undertaken in accordance with a Sediment, Erosion and Water Quality Management Plan which will incorporate appropriate pollution control measures outlined in EPA Publication 480 Environmental Guidelines for Major Construction Site. • General best practice for storage and use of chemicals and fuels on-site will be adopted; including the implementation of an approved clean-up plan should a spill occur.
9-07	Quarrying and management of potential groundwater inflow to the quarry may cause alteration of recharge to groundwater (rate, location) and/or impact on groundwater flow directions and, potentially, groundwater discharge (e.g. springs). May require groundwater control of localised water table to enable dry working.	• In the unlikely event that groundwater should be intersected, permission for groundwater extraction will be sought from Southern Rural Water.
9-08	Ongoing surface water management, runoff control may cause physical interception of infiltration, redistribution of recharge through stony rises.	• Project activities will be undertaken in accordance with a Sediment, Erosion and Water Quality Management Plan which will include measures to mitigate impacts of controlling runoff and interception of water which may redistribute recharge.
9-09	Potential for groundwater to flow into the quarry resulting in wetted quarry base during operation.	• Given the depth of the groundwater table, the potential for this to occur is unlikely and if the quarry base did wet, it is likely to be only temporarily and therefore, does not requiring on-going mitigation measures.

Table 25-6 Environmental Management Measures – Surface Water

Surface Water	
Objective	**Indicators**
Maintain the environmental values and beneficial uses of surface water bodies within and surrounding the Project.	Minimal change to stormwater runoff. No deterioration in quality (sediment and/or contaminant loading) of surface water bodies. Project activities undertaken in accordance with Sediment, Erosion and Water Quality Management Plan. Project activities undertaken in accordance with a Hydrocarbon and Hazardous Substance Plan.

Impact number	**Impact**	**Mitigation measures**
10-01	Construction of Project infrastructure results in increased sediment loadings to receiving waterways and wetlands, and degradation of water quality.	• Construction will occur in accordance with a Sediment, Erosion and Water Quality Management Plan and a Hydrocarbon and Hazardous Substance Plan which will be implemented as part of an EMP. These plans will include, but not be limited to, the following requirements: ○ avoidance of works near watercourses where possible; ○ installation of drainage, erosion and sedimentation control measures; ○ completing excavation of open drainage lines, levees and sediment/water storage dam prior to commencement of extraction and processing operations; ○ appropriately bunded fuel storage facilities; ○ minimising the amount of exposed erodible surfaces; ○ prompt covering of exposed surfaces; ○ progressive revegetation of the site; and ○ management of stockpiles.
10-02	Construction within transmission line corridor intersects with designated waterways.	• Works within 20m of a designated waterway will be avoided where possible. • Should works within 20m be required, additional investigation will be undertaken to ensure impacts to waterways are minimised. Any works will be undertaken in accordance with a Works on Waterways License obtained from Glenelg Hopkins Catchment Management Authority.
10-03	Quarrying of materials during construction results in increased sediment loadings to receiving waterways and wetlands and degradation of water quality.	• Once final details of the quarry are determined, a further detailed drainage investigation will be undertaken to confirm the need/size of sediment basins and bunding to control the release of runoff. • Drains and sediment ponds will be sized and designed to meet the required grade, volume and water quality targets.
10-04	Flood events within transmission line corridor damage infrastructure during operation.	• The type and location of transmission line infrastructure will be designed and infrastructure located to mitigate flood risk.
10-05	Flood events within transmission line corridor prevent access/ egress to infrastructure during operation.	• Alternative access/egress points along the transmission line corridor will be identified and used in the event of a flood.

Impact number	Impact	Mitigation measures
10-06	Operation of Project results in increased stormwater, sediment and contaminant run off to receiving waterways and wetlands and degradation of water quality.	• Drainage works will be designed and sited to control any runoff generated during the operation of the Project, e.g. drains and/or swales to direct runoff around the WTGs, where required.

Table 25-7 Environmental Management Measures – Cultural Heritage

Cultural Heritage	
Objective	**Indicators**
Minimise impacts on Aboriginal and historic cultural heritage places and values.	Project activities conducted in accordance with approved Cultural Heritage Management Plans (CHMPs) and Historic Heritage Assessments (HHAs). Project activities conducted in accordance with contingency measures outlined in the Historic Heritage Assessments.

Impact number	**Impact**	**Mitigation measures**
11-01	Construction encounters previously identified Aboriginal heritage place, VAHR 7422-0566.	In order to avoid inadvertent harm to the place, the following management measures will be implemented: • Prior to the conduct of the activity, secure protective fencing will be erected with a 10m radius around the recorded place location as shown on Map 21 of the *Dundonnell Wind Farm CHMP*. • During the conduct of the activity, Heritage 'no go' Zone signs will be attached to the protective fence. • The fenced Heritage 'no go' zone location will be shown on all relevant work plans. • The secure protective fencing and Heritage 'no go' zone signs will be maintained during the activity. • Fence and signs will be removed only once the activity has finished. • Information in relation to the above management measures will be provided to all relevant contractors before working in the study area.
11-02	Construction encounters the following previously identified Aboriginal cultural heritage places: • VAHR 7422-0154; • VAHR 7422-0156; • VAHR 7422-0314.	In order to avoid inadvertent harm to the places, the following management measures will be implemented: • The place locations will be shown on all relevant work plans. • Work plans will clearly state that the place locations must not be impacted by the activity. • Information in relation to the places will be provided to all relevant contractors before working in the study area.
11-03	Construction encounters newly identified Aboriginal heritage places: • VAHR 7422-0567; • VAHR 7422-0568.	These places will be impacted as an access track and WTGs are proposed at these place locations. • With regards to VAHR 7422-0567, the artefact values have been documented and the stone artefacts collected will be managed in accordance with the requirements of *Section 10.8* of the *Dundonnell Wind Farm Draft CHMP*. • With regards to VAHR 7422-0567, salvage of the place will be undertaken. This will occur prior to the commencement of works within the place in accordance with *Section 10.2* of the *Dundonnell Wind Farm Draft CHMP*.

Impact number	Impact	Mitigation measures
11-04	Wind farm design may result in ground disturbance of areas likely to contain Aboriginal cultural heritage.	• Areas of sensitivity shown in *Chapter 11* will not be subject to ground disturbance by any proposed wind farm infrastructure. These areas will be included in 'no go' zones. A consolidated map of the 'no go' zones will be prepared as part of the EMP and work plans for the Project and will be displayed in work sheds on-site. • Further ground surveys will be undertaken of the access tracks during construction, with a minimum of 5% of new tracks surveyed. If cultural heritage is found, management measures will be implemented in accordance with *Section 10.6* of the *Dundonnell Wind Farm Draft CHMP*. • All contractors will be provided with a booklet/pamphlet that provides information on the identification of Aboriginal cultural heritage and details the requirements of the CHMP. Contractors or employees involved in ground disturbing work will be provided with cultural heritage awareness and inductions, including: ○ information in relation to the requirements of the approved CHMP, ○ requirements of the relevant Contingency Plan; and ○ management and reporting requirements for any Aboriginal cultural heritage, if discovered. • If any Aboriginal cultural heritage is found during construction, management measures detailed in the CHMP and specifically, the Contingency Plan, as detailed in *Impact 11-06* below, will be implemented.
11-05	Transmission line design may result in ground disturbance of land sensitive for Aboriginal cultural heritage.	• No ground disturbance is proposed on land within 50m of former freshwater meadows and marshes. These areas will be included in 'no go' zones. A consolidated map of the 'no go' zones will be prepared as part of the EMP and work plans for the Project and will be displayed in work sheds on-site. • Further ground surveys will be undertaken of the access tracks during construction, with a minimum of 10% of new access tracks surveyed. If cultural heritage is found, management measures will be implemented in accordance with *Section 8.2* of the CHMP. • In the Martang Pty Ltd RAP area, the following will be undertaken: ○ Inductions for construction personnel in regards to Aboriginal cultural heritage within the transmission line corridor. These inductions will be carried out by Martang Pty Ltd before the commencement of any works and will include information relating to the identification of stone artefacts and deposits in which they may occur. Personnel who will be working permanently within the transmission line corridor will attend this induction. ○ An on-site tool box meeting regarding Aboriginal cultural heritage will be required for contractors who are not permanent. Contractors will be provided with a booklet/pamphlet on the identification of artefacts prior to commencement of ground work. • In the remainder of the transmission line corridor where there is no RAP, all contractors will be provided with a booklet/pamphlet that provides information on the identification of Aboriginal cultural heritage and details the requirements of the CHMP. • If any Aboriginal cultural heritage is found during construction, management measures detailed in the CHMP and specifically, the Contingency Plan, as detailed in *Impact 11-06* below, will be implemented.

Impact number	Impact	Mitigation measures
11-06	Construction works encounter a previously unregistered Aboriginal cultural heritage places.	• Areas considered more likely to contain Aboriginal cultural heritage have been identified within the wind farm site and transmission line corridor. Access tracks within these areas will be subject to further testing. On the wind farm site, a ground survey of at least 5% of the access tracks will be conducted during construction in accordance with *Section 10.6* of the *Dundonnell Wind Farm Draft CHMP*. Within the transmission line corridor, at least 10% of any new access track in areas of low archaeological potential will be surveyed in accordance with *Section 8.2* of the *Transmission Line Draft CHMP*. Management measures will be implemented in accordance with the CHMPs if any Aboriginal cultural heritage is discovered. • Any Aboriginal cultural heritage found during the conduct of the activity must be dealt with according to the Contingency Plan detailed in *Section 11* of the *Dundonnell Wind Farm Draft CHMP* and Section *9* of the *Transmission Line Draft CHMP*. • The Plan includes: ○ specific measures in the event that any Aboriginal cultural heritage beyond known places (comprising human remains, stone artefact scatters and all other place-types) is unexpectedly discovered during the activity; ○ the notification of the discovery of Aboriginal cultural heritage during the carrying out of the activity; ○ contingency plans required in relation to disputes, delays and other obstacles that may affect the conduct of the activity; ○ compliance with the cultural heritage management plan and mechanisms for remedying non-compliance; and ○ requirements relating to the custody and management of any Aboriginal cultural heritage found during the course of the activity.
11-07	Alteration to design could cause damage to, or completely destroy, previously unregistered historical cultural heritage places/sites.	• Additional fieldwork will be undertaken if required to fully document all historic heritage to a level which satisfies Heritage Victoria Inventory recording requirements. • Additional historic research on soldier settlement blocks and examination of high definition aerial photography will be undertaken if required to identify remaining historic heritage in the study area. Soldier Settlement blocks outside the areas surveyed during the historic assessment will be identified so they can be avoided if there are any changes to the design of the wind farm. • An EMP for the Project will include contingency measures to manage the unexpected discovery of historic cultural heritage sites and features, in accordance with the Heritage Act. • If places listed on the Heritage Inventory will be impacted by the development, further archaeological investigation will be undertaken. This will be a two stage process, and will require a *Consent to Excavate* followed by a *Consent to Destroy* from Heritage Victoria prior to any impact to Heritage Inventory places by the proposed Project.
11-08	Damage to Fasham House Complex (H7422-0006).	• Wind farm infrastructure will be located away from known historical places such as Fasham House Complex, where possible. • If places listed on the Heritage Inventory will be impacted by the development, further archaeological investigation will be undertaken. This will be a two stage process, and will require a *Consent to Excavate* followed by a *Consent to Destroy* from Heritage Victoria prior to any impact to Heritage Inventory places by the proposed Project.

Impact number	Impact	Mitigation measures
11-09	Damage to or destruction of the dry stone walls during construction.	• Impacts to dry stone walls will be avoided by using existing tracks and gates where possible. • If any impacts are proposed to dry stone walls, consideration will be given to the following: ○ Sections in poorest condition, as determined by an historic archaeologist, must be considered in the first instance for gates and access track locations. These comprise sections where only the basal course or only loose stone remains. ○ Damage to the original dry stone fabric must be mitigated by the reconstruction of walls and wall terminals to the same specification and traditional style as the existing walls and by using the same materials. ○ Any dry stone wall work must be conducted by a suitably qualified dry stone wallers. ○ In order to avoid any inadvertent harm to the dry stone walls, a buffer of 5m during construction must be applied by the contractor as a 'no go' zone. ○ The location of dry stone walls will be shown on all relevant work plans.
11-10	Alteration to design could cause damage to, or completely destroy, previously registered historical cultural heritage places/sites.	• If the wind farm design were to be significantly altered, consideration and assessment will be made of potential impacts on the following places listed on the Victorian Heritage Inventory: ○ Fasham House Complex (H7422-0006) ○ Mount Violet Homestead Complex – Bluestone Cottages (H7422-0005) ○ Shepherds / Boundary Rider Hut & Stockyards (H7422-0007) ○ McColl House Complex (H7422-0008) ○ O'Donnell House Complex (H7422-0009). • Additionally, consultation with Moyne Shire Council will be undertaken where appropriate to determine whether any of the historic places should be included in the Heritage Overlay under the Moyne Planning Scheme.

Table 25-8 Environmental Management Measures – Flora and Fauna

Flora and Fauna	
Objective	**Indicators**
Project to minimise clearing of native vegetation and avoid and minimise impacts on significant flora, fauna and ecological communities. Project to prevent introduction and spread of pest plants, weeds and disease.	No impact to native vegetation that is identified to be retained. • Project activities conducted in accordance with specific measures and species management plans for EPBC and FFG listed threatened species and communities. • Project activities conducted in accordance with a Biosecurity Management Plan incorporating hygiene practices to alleviate pathogen/disease risk. • Native vegetation offsets implemented in accordance with the Biodiversity Assessment Guidelines. • Project activities undertaken in accordance with a Vegetation Management Plan. • Operational activities undertaken in accordance with a Bat and Avifauna Management Plan. • Operational activities undertaken in accordance with a Fauna Management Plan.

Impact number	Impact	Mitigation measures
12-01	Removal of native vegetation - wind farm.	• Offsets will be implemented in accordance with the Biodiversity Assessment Guidelines.
12-02	Removal of native vegetation - transmission line.	• Offsets will be implemented in accordance with the Biodiversity Assessment Guidelines.
12-03	Disturbance during the construction of the wind farm.	• Works will be undertaken in accordance with a Construction Environment Management Plan and Biosecurity Management Plan. This will include, but is not limited to, the following requirements. ○ All machinery will enter and exit works sites along defined routes, thereby avoiding impact on native vegetation, water-ways or cause soil disturbance and weed spread. ○ All machinery brought on site will be weed and pathogen free and will be checked regularly for mechanical leaks. ○ All machinery wash down, lay down and personnel rest areas will be defined (fenced) and located in disturbed areas. ○ Bunding and provision of sedimentation basins at the quarry sites. ○ Groundwater management and erosion protection at the quarry sites to minimise changes to the hydrology and ground water quality.
12-04	Impact to birds (waterbirds and migratory, excluding Brolga) in relation to the construction and operation of the wind farm.	• Project activities will be undertaken in accordance with a Bat and Avifauna Management Plan and a Construction Environmental Management Plan. • Pre-construction and construction phase mitigation measures will be included in the Environmental Management Plan, as detailed in impact 12-03. • For migratory birds, only pre-construction and construction phase mitigation measures will be required. These measures include the avoidance of habitat in the siting and layout of the wind farm and the implementation of hygiene measures in relation to the Project as identified in Impact 12-03 above. • Monitoring and reporting of casualties as part of a salvage protocol will be undertaken in accordance with an endorsed Bat and Avifauna Management Plan.
12-05	Impact to bats in relation to the construction and operation of the wind farm.	• Project activities will be undertaken in accordance with a Bat and Avifauna Management Plan and a Construction Environmental Management Plan. • A buffer area of 120m will be established in relation to the rotor swept area of the WTGs and favoured habitats (woodlands, large hollow trees, isolated paddock trees and water bodies) to reduce flying bats interacting with operating WTGs. • Work will avoid scattered trees. • Monitoring and reporting of casualties, as part of a salvage protocol, will be undertaken in accordance with the Bat and Avifauna Management Plan.

Impact number	Impact	Mitigation measures
12-06	Impacts to the Striped Legless Lizard and the Fat-tailed Dunnart in relation to the construction and operation of the wind farm.	• Project activities will be undertaken in accordance with a Construction and Operational Environmental Management Plan and a Fauna Management Plan, which will include, but are not limited to, the following requirements. ○ Native vegetation removal will be avoided and minimised through micro-siting of WTGs and associated structures where possible. ○ Construction personnel will be trained in the identification of Striped Legless Lizard and Fat-tailed Dunnart. ○ If species are found, works will stop within a 30m buffer area around the affected area and DELWP will be notified. ○ A salvage protocol will be implemented on-site and construction and operational personnel will be inducted. Protocol will be included as part of the CEMP and OEMP. ○ Translocation protocol will be developed for the Striped Legless Lizard and implemented if located.
12-07	Impacts to the Growling Grass Frog in relation to the construction and operation of the wind farm.	• Project activities will be undertaken in accordance with a Construction and Operational Environmental Management Plan and a Fauna Management Plan, which will include, but are not limited to, the following requirements. ○ Hydrological, sedimentation and groundwater and erosion protection measures will be identified and implemented. ○ Sediment and contamination traps will be implemented to protect areas of habitat during construction. ○ Implementation of crossings where development intersects with Growling Grass Frog habitats. ○ No basalt rocks/boulders larger than 20cm in diameter are to be moved from waterway channel or banks. ○ Hygiene controls (vehicle and footwear) to avoid the introduction of Chytrid fungus on-site. ○ A minimum 55 metre buffer will be applied to all dams, waterways and minor tributaries to minimise impacts to habitat and on the species during the construction and operation of the wind farm. ○ Temporary drift fences beside roadways/ access tracks will be installed when in regular use for construction, to minimise the risk of injury to animals caused by traffic. ○ Any excavations left open overnight will be inspected regularly.
12-08	Impacts to the Corangamite Water Skink in relation to the construction and operation of the wind farm.	• Project activities will be undertaken in accordance with a Construction and Operational Environmental Management Plan and a Fauna Management Plan. • Mitigation measures will be implemented as above in *Impact 12-07* for the Growling Grass Frog. • Dry stone walls in close proximity to wetlands and drainage lines will be avoided. If dry stone walls are to be removed within 55m of a wetland a zoologist is to be present to salvage and relocate lizards (if present).
12-09	Impacts to the Golden Sun Moth in relation to the construction and operation of the wind farm.	• Project activities will be undertaken in accordance with a Construction and Operational Environmental Management Plan and a Fauna Management Plan. • The area identified as potentially suitable habitat for the Golden Sun Moth, (refer to *Chapter 12*) will be excluded with fencing for access by personnel and vehicles in accordance with specific exclusion measures to be detailed in the EMPs. • WTGs and associated infrastructure will be micro-sited, if required, to avoid GSM habitat.

Impact number	Impact	Mitigation measures

12-10	Impacts to Flora and Fauna (specifically the Spiny Rice-flower, Striped Legless Lizard, Corangamite Water Skink and Golden Sun Moth) in relation to the Transmission Line.	• Project activities will be undertaken in accordance with a Construction and Operational Environmental Management Plan.
		• With regards to vegetation, Project activities will be undertaken in accordance with a Vegetation Management Plan, which will include, but not limited to, the following requirements.
		  ○ Removal of indigenous remnant patch vegetation will be avoided.
		  ○ Removal of scattered trees will be avoided.
		  ○ In areas where removal of indigenous vegetation cannot be avoided, the area to be removed will be minimised.
		  ○ Where practicable, transmission line works will be sited at least 30m away from wetlands, lakes, creeks and significant drainage lines. Where this is not practicable and ephemeral wetlands may be unavoidably impacted, works will be undertaken when the wetlands are dry and the risk of altering the ground surface is lowest (i.e. when the ground is hard and dry).
		• In relation to fauna, project activities will be undertaken in accordance with a Fauna Management Plan and a Bat and Avifauna Management Plan. Specific mitigation measures will be implemented as detailed in *Impacts 12-06, 12-07, 12-08* and *12-09* above.
		• Once final transmission line pole sites are determined, targeted surveys will be undertaken to confirm whether these species are present within the transmission line. Micro-siting of poles and access tracks will be utilised to avoid and minimise impacts where possible.
		• In relation to impacts to avifauna, markers will be utilised on the wire to increase visibility if required, and where necessary (i.e. if collision 'hot-spots' are identified).

Table 25-9 Environmental Management Measures – Brolga

Brolga	
Objective	**Indicators**
Project to ensure no net loss of the size of Victorian Brolga population.	Compensation measures established and implemented to improve and manage Brolga breeding sites. Operational activities undertaken in accordance with the Bat and Avifauna Management Plan. Operational activities undertaken in accordance with Brolga Compensation Plan.

Impact Number	**Impact**	**Mitigation Measures**
13-01	Disturbance to breeding and flocking birds from construction and operation of the proposed wind farm.	• The wind farm layout has been adjusted based on the identification of turbine-free buffers that incorporate historical breeding and flocking records and estimate areas of activity around breeding and flocking sites, together with a 300m disturbance buffer. The location of the turbine-free buffers within the wind farm site is shown in *Chapter 13*. This measure will avoid any potential for significant impacts from disturbance on nearby breeding and flocking Brolgas. • Project activities will be undertaken in accordance with a Bat and Avifauna Management Plan. • The following measures to protect or improve breeding sites as compensation for residual Brolgas impacts will be implemented: ○ restoration of the natural flooding regime of wetlands by closing drains; ○ increasing inundation frequency of breeding wetlands through artificial flooding; ○ creating new potential breeding habitat by damming or modifying existing wetlands or dams, including blocking previously installed drains; ○ management of wetland vegetation condition through controlled grazing (or stock removal) to improve suitability as a breeding site; ○ addition of nesting material to potential breeding wetlands to facilitate nest building; and ○ fox control at key breeding habitats. • These measures will be detailed in a compensation plan for zero net impact to be implemented over the 25 year duration of the Project, which will outline the following: ○ the locations of historical Brolga breeding wetlands that will be enhanced; ○ evidence of landholder agreements to participate in the breeding site enhancement project for its duration; ○ methods of enhancement appropriate to each site such as restoration of the natural flooding regime and controlled grazing or stock removal; ○ where appropriate, a program of appropriate fox baiting leading up to each breeding season in areas subject to the plan; and ○ five-yearly performance targets for each site and the program as a whole, consistent with the outcomes of the PVA and the zero net impact objective (to be amended every five years depending on outcomes); monitoring and reporting requirements, including reporting on whether the number of sites being managed and the way management is proceeding are to meet the 25-year zero net impact objective.

Impact Number	Impact	Mitigation Measures
13-02	Collision by breeding and flocking birds with WTGs and transmission lines, leading to a significant reduction in breeding success and/or the survivorship of Brolgas while using the flocking site.	• The wind farm layout has been adjusted based on the identification of turbine-free buffers that incorporate historical breeding and flocking records and estimate areas of activity around breeding and flocking sites, together with a 300m disturbance buffer. The location of the turbine-free buffers within the wind farm site is shown in *Chapter 13*. This measure will avoid any potential for significant impacts from WTG collision involving birds from nearby breeding and flocking sites. • Markers will be utilised if, and where necessary, on the transmission line to increase visibility of the line.

Table 25-10 Environmental Management Measures – Noise and Vibration

Noise and Vibration	
Objective	**Indicators**
Project to protect local noise amenity during construction and operation. Project to comply with relevant noise criteria including NZS 6808:2010.	Noise monitoring results are compliant with the adopted assessment criteria. Project activities undertaken in accordance with a Noise and Vibration Management Plan. Quarrying activities undertaken in accordance with a Blasting Management Plan. Community complaints (regarding noise and vibration) addressed in accordance with formal complaints recording and management process. Operation of the Project controlled and managed by an Operational Noise Management Plan.

Impact number	Impact	Impact assessment outcome*
14-01	Noise levels generated during construction activities, including traffic, exceed noise criteria at the sensitive receptor locations.	• Construction will be undertaken in accordance with a Construction Noise Management Plan that will address potential noise impacts associated with the proposed construction activities at the nearest receptors. • The Plan will include the following measures: ○ Performance Requirements (developed in accordance with the Construction and Demolition Site Noise of EPA Publication 1254 Noise Control Guidelines); ○ Noise Compliance Assessment; ○ Noise Complaints Evaluation; and ○ Noise Complaint Response Plan.
14-02	Vibration generated during construction activities.	• Construction will be undertaken in accordance with a Construction Noise Management Plan which will address potential vibration impacts associated with the proposed construction activities at the nearest receptors. • The Plan will include the following measures: ○ Performance Requirements; ○ Noise Compliance Assessment; ○ Noise Complaints Evaluation; and ○ Noise Complaint Response Plan. • Residents will be notified of times when access road construction will occur in close proximity to their property.

Impact number	Impact	Impact assessment outcome*
14-03	Noise and vibration associated with on-site quarry operations.	• Quarrying activities will be undertaken in accordance with a Blasting Management Plan, if required. • Quarry operations will be restricted to the daytime period (Monday to Friday 0700-1800hrs and Saturday 0700-1300hrs). If any changes are proposed in future, a detailed noise assessment will be undertaken and operations will accord with evening time noise limitations.
14-04	WTG operational noise.	• The operation of the Project will be controlled and monitored by an Operational Noise Management Plan, which will detail specific measures to ensure compliance with the relevant noise criteria to the satisfaction of the responsible authority. • The following measures will be undertaken: ○ When the final WTG model is selected, the sound power levels of the WTG will be compared to the modelled results to assess whether there is a potentially greater noise impact. If compliance with NZS 6808:2010 is not achieved initially, a Noise Reduction Management Strategy will be developed (see below) and the Project will be revised to ensure compliance NZS 6808:2010. ○ A tonal audibility test report will be provided for the final WTG model prior to commencing any site works. ○ The procurement contract for the supply of WTGs to the site will typically include specifications concerning the allowable sound power levels from the WTG, and the permissible characteristics of the WTG (including special audible characteristics). In the event that WTG sound power or tonality levels are found to exceed the contracted values, the supplier will be required to implement measures to reduce the noise to the contracted value. This can include measures to rectify manufacturing defects, make appropriate modifications, or implementation of appropriate control settings. ○ A Noise Reduction Management Strategy will be developed (if required), which outlines control measures to achieve noise reductions for predetermined wind speed ranges and directions.
14-05	Operation of the on-site and/or off-site substation.	• The operation of the Project will be controlled and monitored by an Operational Noise Management Plan, which will outline measures to ensure compliance with the relevant noise criteria to the satisfaction of the responsible authority.
*The noise and vibration impact assessment is based on compliance or non-compliance, therefore this section is described in terms of 'impact assessment outcome' rather than 'mitigation measures' like other environmental areas.		

Table 25-11 Environmental Management Measures – Shadow Flicker and Blade Glint

Shadow Flicker and Blade Glint	
Objective	**Indicators**
Minimise amenity impacts caused by shadow flicker and blade glint of the Project. Project to comply with the criteria established in the Draft National Guidelines.	Shadow flicker results are compliant with the adopted assessment criteria. Community complaints (regarding shadow flicker and blade glint) consistently addressed in accordance with formal complaints recording and management process.

Impact number	**Impact**	**Impact Assessment Outcome***
15-01	WTGs result in shadow flicker hours to nearby dwellings in excess of the recommended annual limit.	• Screening structures will be utilised and/or planting will be undertaken of trees to block shadows cast by the WTGs where required. • The use of WTG control strategies will be implemented if required, which shut down WTGs when shadow flicker is likely to occur.
15-02	WTGs result in blade glint to nearby dwellings.	• The proposed blades will be finished with a non-reflective finish to reduce or negate any potential effects.
*It is noted that shadow flicker and blade glint impact assessment is based on compliance or non-compliance, therefore this section is described in terms of 'impact assessment outcome' rather than 'mitigation measures' like other environmental areas.		

Table 25-12 Environmental Management Measures – Electromagnetic Interference

Electromagnetic Interference	
Objective	**Indicators**
The Project is to avoid impacts on radio communications services during operation of the wind farm.	Project operation undertaken in accordance with a Television and Radio Reception Management Plan. Community complaints (electromagnetic interference) consistently addressed in accordance with formal complaints recording and management process.

Impact number	**Impact**	**Mitigation measures**
16-01	Potential for the Project to affect the performance of the following radio communications services through the introduction of EMI: • Fixed point-to-point links; • Point-to-multipoint links;	• Whilst no adverse impacts are anticipated to the performance of these radio communication services, and therefore no mitigation measures are considered necessary, on-going consultation will be undertaken with service operators.

Impact number	Impact	Mitigation measures
	• Emergency services; • Aviation radar; • Meteorological radar; • Trig stations; • CB Radio; and • Satellite television and internet.	
16-02	Potential for the Project to affect the performance of television and radio broadcasting through the introduction of EMI.	• Project activities will be undertaken in accordance with a Television and Radio Reception Management Plan. • The Plan will include the following requirements: ○ A pre-construction survey to determine television and radio reception strength in the area within 5km of the wind farm site and in which dwellings are located, to the satisfaction of the responsible authority. ○ The pre-construction survey will include testing at selected locations to enable the average television and radio reception strength in the area within 5 km of the wind farm site to be determined. The specific locations of testing will be determined by an independent television and radio monitoring specialist, to the satisfaction of the responsible authority. ○ If, following commencement of the operation of the Project, a complaint is received regarding the Project having an adverse effect on television or radio reception at any dwelling within 5km of the wind farm site, which existed prior to construction, a post-construction survey will be carried out at the dwelling. ○ If the post-construction survey establishes any increase in interference to reception as a result of the Project, the operator of the wind farm will undertake measures to mitigate the interference and return the affected reception to pre-construction quality to the satisfaction of the responsible authority. ○ If required, the following mitigation measures can be implemented (in approximate order of increasing cost): 1. Realigning the householder's TV antenna more directly towards their existing transmitter; 2. Tuning the householder's antenna into alternative sources of the same or suitable signal; 3. The installation of more directional and/or higher gain antenna at the affected house; 4. Relocating the antenna to a less affected position; 5. The installation of cable/satellite television at the affected house; and 6. The Installation of a television relay station. ○ In the event that DTV reception cannot be improved, satellite television represents an alternative mitigation measure. ○ Interference to radio broadcasting will be mitigated through the installation of a high quality antenna and/or amplifier if required.
16-03	Potential for the Project to affect the performance of mobile phones and wireless internet through the introduction of EMI.	• No specific mitigation measures are required as simple procedures are available to mitigate interference, such as moving a short distance to a new or higher location until the signal improves, or using an external antenna to improve the signal.

Table 25-13 Environmental Management Measures – Landscape and Visual

Landscape and Visual	
Objective	**Indicators**
Minimise the visual impacts of the Project.	Landscape mitigation measures offered to affected residential properties. Implementation of landscape works where required.

Impact number	**Impact**	**Mitigation measures**
17-01	Visual Impact upon townships and public reserves.	• The siting of the wind farm and WTGs has been undertaken to minimise landscape and visual impacts. No further management or mitigation measures are necessary.
17-02	Visual impact upon highways.	• The siting of the wind farm and WTGs has been undertaken to minimise landscape and visual impacts. No further management or mitigation measures are necessary.
17-03	Visual impact upon major roads.	• The siting of the wind farm and WTGs has been undertaken to minimise landscape and visual impacts. No further management or mitigation measures are necessary.
17-04	Visual impact upon local roads.	• The siting of the wind farm and WTGs has been undertaken to minimise landscape and visual impacts. No further management or mitigation measures are necessary.
17-05	Potential visual impact to residential properties within 4km of a WTG.	• The siting of the wind farm and WTGs has been undertaken to minimise landscape and visual impacts. • The following mitigation measures will be undertaken for any potentially affected residential properties: ○ landscape mitigation measures will be offered to residential properties within 4km of the nearest WTG. Any such offer will remain in place for a period of one year after completion of construction, to allow people time to either adjust or to decide that landscape filtering or screening is warranted; ○ site visit will be undertaken to affected residences and a landscape concept will be created. Species selection will be determined in consultation with landholders using advice from the local Landcare group; ○ consultation and agreement upon landscape mitigation measures will be undertaken between landholder and Trustpower; and ○ implementation of agreed landscape concept will be carried out by the landholder and reimbursed by Trustpower. This approach will avoid the introduction of weeds to the landholder's property.
17-06	Cumulative visual impacts as a result of simultaneous views.	• The siting of the wind farm and WTGs has been undertaken to minimise landscape and visual impacts. No further management or mitigation measures are necessary.
17-07	Cumulative visual impacts as a result of sequential views.	• The siting of the wind farm and WTGs has been undertaken to minimise landscape and visual impacts. No further management or mitigation measures are necessary.

Table 25-14 Environmental Management Measures – Planning and Land Use

Planning and Land Use	
Objective	**Indicators**
Minimise disruption and other effects to existing and potential future land uses, including agricultural activities, housing and public infrastructure. Minimise residual effects on land use post-construction of the Project.	Agricultural land uses continue to operate for the site and surrounds. Community has been consulted prior to, during and following construction.

Impact Number	**Impact**	**Mitigation Measures**
18-01	Potential for inconsistency with planning policies and provisions, including the Moyne Planning Scheme.	• The Project will be undertaken in accordance with planning permit conditions which will ensure compliance with the objectives of relevant policies and provisions of the Planning Scheme.
18-02	Potential impact of the Project on existing and potential future land uses, including agricultural uses, housing and public infrastructure.	• An Environmental Management Plan will be developed and implemented, providing detailed management procedures and controls including dust, sediment, erosion, water run-off, weed management, noise and traffic. • The site will be rehabilitated following construction, including potential opportunities to establish surface vegetation on hardstand areas and certain access tracks with pasture species to allow agricultural grazing. • The wind farm will be decommissioned in accordance with legal agreements with participating landholders, including removal of infrastructure and revegetation of hardstand areas and access tracks (not required by the landholder) with pasture species to allow agricultural grazing. • Construction activities will be limited to specific construction impact zones and access tracks as agreed with participating landholders. • Management and operating procedures will be developed in consultation with participating landholders to ensure existing agricultural activities can be continued around the majority of the site. • Ongoing discussions with participating landholders and surrounding neighbours will be undertaken to provide information to assist with the location of future dwellings, as requested.

Table 25-15 Environmental Management Measures – Traffic and Transport

Traffic and Transport	
Objective	**Indicators**
The Project is to minimise inconvenience to existing road users and any damage to public roads.	Project activities undertaken in accordance with a Traffic Management Plan (TMP). Reinstatement of roads to at least pre-construction conditions.

Impact Number	Impact	Mitigation Measures
19-01	All construction related traffic impacts.	• Project activities will be undertaken in accordance with a Traffic Management Plan (TMP), including a Construction Traffic Management Plan (CTMP). This Plan will be prepared prior to the commencement of works and will include a further review of expected traffic volumes during construction, outline measures to minimise impacts to existing road users during works and will identify maintenance and rectification works during/post construction. • In general, the Traffic Management Plan will include (but is not limited to) the following. ○ confirmation of expected traffic volumes generated by the wind farm for all work stages; ○ identification/qualification of all heavy vehicle and OD vehicle haulage routes for all work stages, including for the MOPS substation construction work stage; ○ a mechanism to review identified haulage route road conditions prior to the commencement of works; ○ mechanisms/agreements to maintain haulage route roads and road infrastructure during construction works and to reinstate roads to at least pre-construction conditions; ○ qualification of any requirement for specific work stage construction traffic management plans; and ○ qualification and identification of relevant mechanisms for OD vehicle permits and traffic management requirements. • Specific items that will be addressed within the Plan with regards to VicRoads include: ○ confirmation of arterial road OD routes to be used and expected associated traffic volumes (as AADT); ○ confirmation of arterial heavy vehicle haulage routes to be used and expected associated traffic volumes (as AADT); ○ the preparation of a functional plan of works required at the Mortlake-Ararat Road/Woorndoo-Dundonnell Road and Woorndoo-Streatham Road/Woorndoo-Dundonnell Road intersection (in conjunction with Moyne Shire) to accommodate OD vehicles including: ▪ the extent of prospective widening/improvement works required to facilitate OD vehicle movements (and any resultant works); and ▪ improvements/changes to signage and line marking at and on approach to the intersection required for the safe operation of this intersection for non-wind farm vehicle traffic. ○ the preparation of a functional stage Road Safety Audit (RSA) of the Mortlake-Ararat Road/Woorndoo-Dundonnell Road and Woorndoo-Streatham Road/Woorndoo-Dundonnell Road intersection works;

Impact Number	Impact	Mitigation Measures
		○ the preparation of Construction Traffic Management Plan (CTMP) for the Mortlake-Ararat Road between Woorndoo and the Ararat-Mortlake Road/Woorndoo-Dundonnell Road intersection (to be coordinated with any adjacent local road CTMP's prepared for Moyne Shire); ○ the preparation of a CTMP post implementation RSA, with particular consideration of the Mortlake-Ararat Road Salt Creek Bridge approach sightlines; ○ a detailed structural analysis of the Mortlake-Ararat Road Salt Creek Bridge; and ○ the preparation of a developer funded road maintenance levy or agreed alternative in accordance with the draft VicRoads Guidelines and Framework for Assessing Wind Farm Energy Project guidelines. • Specific items that will be addressed within the Traffic Management Plan with regards to Moyne Shire Council roads include: ○ functional plans of the identified potential road widening works on Woorndoo-Streatham Road and Woorndoo-Dundonnell Road required for OD vehicles; ○ confirmation of expected traffic volumes to be generated on Woorndoo-Streatham Road and Woorndoo-Dundonnell Road for each identified works stage and further assessment of potential road up-grade works required to cater for this traffic, including: ▪ additional road widening works beyond that already identified of OD vehicles ▪ upgrade of road pavements to support expected traffic volumes; and ▪ any required culvert/drainage upgrade/mitigation works. • The preparation of Construction Traffic Management Plans (CTMP) for each work identified stage for Woorndoo-Dundonnell Road between Ararat-Mortlake Road and Woorndoo-Streatham Road, Woorndoo-Streatham Road from Woorndoo-Dundonnell Road to the site access, and for any other identified sites where construction activity may impact on the local road network (to be coordinated with any adjacent local road CTMP's prepared for VicRoads). • The CTMP will include, but not be limited to the following: ○ any signage/line marking requirements; ○ expected haulage hours, including identification of non-activity periods during school bus times; ○ a 6 month review non-activity haulage periods associated with school bus times in consultation with Moyne Shire Council (to be undertaken prior to the commencement of semester 1 and semester 3); ○ an on-site contact responsible for the implementation and maintenance of the CTMP; ○ the preparation of a CTMP post implementation RSA for each work stage CTMP; and ○ the preparation of a workable road maintenance agreement between Moyne Shire and Trustpower for the relevant sections of Woorndoo-Dundonnell Road and Woorndoo-Streatham Road (and other Council roads identified as additional haulage roads) that: ▪ establishes existing road conditions prior to the commencement of works on-site; ▪ establishes a regular inspection and reporting schedule of haulage route road conditions; ▪ nominates an appropriate on-site contact for the reporting of road maintenance issues identified outside of regular

Impact Number	Impact	Mitigation Measures
		inspections; ▪ establishes timeframes and procedures for rectification of identified issues; and ▪ identifies the standard and extent of post construction rectification works of roads (to existing conditions or an agreed alternative).
19-02	Construction vehicles damage existing culverts along the access route.	• A structural review will be undertaken of existing culverts on local access routes prior to the commencement of construction to confirm their suitability for OD vehicle loads. • A photographic survey will be undertaken of the condition of all culverts prior to construction to document their pre-development condition. • Culverts will be improved and replaced as necessary to withstand OD vehicle traffic. • The condition of all culverts will be reviewed post construction, and undertake works to reinstate culverts to pre-development conditions.
19-03	OD vehicles impact on overhanging branches along access route.	• Overhanging branches will be restrained or pruned to ensure that adequate overhead clearance is provided for OD vehicles.
19-04	Construction vehicles interact with school bus routes.	• A period of inactivity will be negotiated for construction vehicles during the time of school bus services and details of this arrangement will be confirmed in the CTMP prepared for the Project.

Table 25-16 Environmental Management Measures – Socio-Economic

Socio Economic	
Objective	**Indicators**
The Project is to maximise potential socio-economic benefits, including in relation to affected residents and minimise potential adverse social and economic effects.	Community has been consulted prior to, during and following construction. A process is established for receiving and responding to community complaints on environmental amenity and social interaction.

Impact number	**Impact**	**Mitigation measures**
20-01	Significant contributions to the State, regional and local economy.	• Given this is a positive impact, no mitigation measures are required.
20-02	Potential impact of the Project on existing land uses and public infrastructure.	• Project activities will be undertaken in accordance with an Environmental Management Plan which will include specific procedures and measures relating to, but not limited to; noise, dust and traffic. • Local roads will be upgraded for construction and delivery vehicles prior to the development of the Project as identified in *Chapter 19*. • Evidence will be made available to demonstrate that the Project is meeting approval requirements and additional commitments such as the TMP. • During the decommissioning of the wind farm, the land will be returned to its original state to ensure it is capable of supporting future agricultural activity where possible.
20-03	Increased direct and indirect employment opportunities at the State, regional and local level during the construction and operational phases.	• Opportunities will be investigated to cooperate with other wind farms in the region to support the development of an industry cluster for wind farm sustainable long term workforce. • Work will be undertaken closely with existing local communities and local employment agencies to maximise local job opportunities.
20-04	Increased size of the construction workforce offers incentives to local residents to remain in the local area and support local membership to volunteer groups.	• Given this is a positive socio-economic impact, no mitigation measures are required.

Impact number	Impact	Mitigation measures
20-05	Demand for services/positions within existing local businesses creates short term job opportunities and provision of a broader knowledge base and range of experiences.	• Work will be undertaken closely with existing local industries to maximise local business opportunities. • Ongoing communication will be undertaken with the emergency service sector to ensure road layout meets their needs and maximises the benefits for improved road infrastructure access for emergency services. • Volunteer membership opportunities will be actively promoted with all staff to support growth in local membership. • Evidence will be provided to demonstrate that the project is meeting approval requirements such as approvals relating to the establishment of a dedicated on-site quarry.
20-06	Increased revenue for participating landholders of the Project and ongoing opportunities to contribute to community benefit programs.	• Given this is a positive socio-economic impact, no mitigation measures are required.
20-07	Potential impacts on the certainty and peace of mind of members of the community.	• Regular reviews will be undertaken and the Stakeholder Engagement Strategy will be updated when required including methodology and platform. • A complaints register and management process will be implemented. • Evidence will be made available if required to demonstrate that the Project is meeting approval requirements and additional commitments. • Ongoing community consultations and communication will be undertaken such as monthly newsletters or on-going hotline number. • All necessary licenses and approvals will be obtained, including (but not limited to) the on-site quarry and extraction of groundwater.

Table 25-17 Environmental Management Measures – Aviation

Aviation	
Objective	**Indicators**
Ensure that the Project does not prejudice aircraft safety.	Location of WTGs and wind monitoring masts provided to CASA, Department of Defence, Air services Australia, the Aerial Agricultural Association of Australia and any organisation responsible for providing air ambulance services.

Impact Number	**Impact**	**Mitigation measures**
21-01	Alteration to aircraft operating heights within the vicinity of the wind farm site.	• The location of the WTGs and wind monitoring masts will be provided to local and regional aircraft operators prior to, during and, following construction. To avoid the wind farm, aircraft will have to fly at a higher altitude or divert around it.
21-02	Wind farm prevents fixed wing agricultural operations within the wind farm site, and impacts the viability of conducting such operations on adjacent properties.	• Details of the wind farm (WTG locations and location of wind monitoring masts) will be communicated to local and regional aircraft operators prior to, during and following construction of the Project so that they can plan their operations accordingly. • The use of helicopters will enable aerial application operations to be conducted in closer proximity to obstacles than would be possible with fixed wing aircraft due to their greater manoeuvrability.
21-03	Wind farm restricts aerial firefighting operations within the wind farm site and in the vicinity of the Project	• The location of WTGs and wind monitoring masts will be provided to emergency services operating in the vicinity of the Project. • Although aerial fire-fighting activities may be restricted, valid ground-based access will be provided to and near the properties within the wind farm site.
21-04	Potential aircraft collision with WTG resulting in harm to people and damage to property.	• The location of the WTGs and wind monitoring masts will be made available to local and regional aircraft operators prior to, during and following construction so that they can plan their operations accordingly.
21-05	Potential aircraft collision with wind monitoring tower resulting in harm to people and damage to property.	• The location of the WTGs and wind monitoring masts will be made available to local and regional aircraft operators prior to, during and following construction so that they can plan their operations accordingly. Consideration will be given to marking the wind monitoring towers with bands of contrasting colour according to the requirements set out in *MOS 139 Section 8.10 - Obstacle Markings*.
21-06	Aircraft colliding with terrain as a result of harsh manoeuvring to avoid colliding with a WTG, resulting in harm to people and damage to property.	• The location of the WTGS and wind monitoring masts will be made available to local and regional aircraft operators prior to, during and following construction so that they can plan their operations accordingly.
21-07	Installation and operation of obstacle lighting on WTGs diminishes neighbours' visual amenity.	• As a result of the aeronautical assessment, obstacle lighting is not considered to be required. If obstacle lighting is ultimately installed it would be microsited to minimise visual impact.

Table 25-18 Environmental Management Measures – Fire Management

Fire Management	
Objective	**Indicators**
The Project is to manage wildfire and emergency events to prevent injury, damage to property and assets and protect the environment.	Project activities are undertaken in accordance with CFA Emergency Management Guidelines for Wind Energy Facilities. Operational activities undertaken in accordance with a Wildfire Prevention and Emergency Response Plan (WPER)

Impact number	**Impact**	**Mitigation measures**
22-01	Increased risk of bushfire during construction of the wind farm.	• Project activities will be undertaken in accordance with a Wildfire Prevention and Emergency Response Plan (WPER) prepared in consultation with the CFA, DELWP and the proponents of surrounding wind farm projects. ○ The WPER will outline bushfire prevention measures and management procedures to be applied during construction, including: ○ a requirement to supply appropriate fire-fighting equipment on-site during construction; ○ hot work procedures and response protocols; ○ maintenance of fuel reduced zones around construction activities that may result in ignition of a fire .i.e. welding; ○ procedures to manage any flammable materials that will be brought on-site; ○ requirement to use only diesel operated vehicles within the wind farm site during high fire risk season; ○ all site vehicles during the construction phase will use the site access roads to minimise the likelihood of igniting dry grass; and ○ Notification to the Barwon branch of the CFA when high fire risk construction work is being carried out.
22-02	Operation of the wind farm increases risk of bushfire ignition or spread.	• Project activities will be undertaken in accordance with a WPER, which will include the following measures to prevent fire during operation: ○ WTGs will be fitted with a monitoring system which will enable remote slowing or shut down in the event that a threshold temperature is reached or an electrical fault is discovered; ○ lightning conductors will be installed in WTGs; ○ criteria for the provision of static water supply tanks solely for fire-fighting purposes, including minimum capacities, appropriate connections and signage; ○ procedures for vegetation management, ignition source control; ○ a requirement that, within three months after the commencement of the operation of the wind energy facility, the operator of the wind energy facility facilitates a familiarisation visit to the site and explanation of emergency services procedures for: ▪ the CFA (including headquarters level, the CFA Regional Office and local volunteer brigade); ▪ subsequent familiarisation sessions for new personnel of the CFA; and ▪ if requested, training of personnel of the CFA, in relation to suppression of wind energy facility fires;

Impact number	Impact	Mitigation measures
22-03	Bushfire damages wind farm infrastructure.	• Internal access tracks will be maintained and available for access by the local CFA. A map showing the location of the access tracks is to be provided to the CFA within three months after the commencement of the operation of the wind energy facility and appropriate signage will be installed at the main access to the wind farm site with details of the access tracks.
22-04	Aerial-fighting capabilities are constrained within the wind farm site and in the vicinity of the wind farm.	• Upon construction, co-ordinates and heights of all WTGs will be provided to the CFA. • WTGs will be fitted with a monitoring system which will enable remote de-rating or shut down in the event that a threshold temperature is reached. • Internal access tracks will be maintained and available for access by the local CFA.

Table 25-19 Environmental Management Measures – Matters of National Environmental Significance

Matters of National Environmental Significance	
Objective	**Indicators**
Minimise impacts on flora, fauna and ecological communities which are of National Environmental Significance.	Project activities conducted in accordance with specific measures and species management plans for EPBC and FFG listed threatened species and communities. Project activities undertaken in accordance with a Vegetation Management Plan, Bat and Avifauna Management Plan and Fauna Management Plan. Project activities undertaken in accordance with a Biosecurity Management Plan incorporating hygiene practices to alleviate pathogen/disease risk.

Impact number	**Impact**	**Mitigation measures**
24-01	Disturbance during the construction of the wind farm.	• Project activities will be undertaken in accordance with an approved Environmental Management Plan, including a Construction Management Plan Biosecurity Management Plan, which will include, but is not limited to, the following requirements. ○ All machinery will enter and exit works sites along defined routes, thereby avoiding impact on native vegetation, water-ways or cause soil disturbance and weed spread. ○ All machinery brought on site will be weed and pathogen free and will be checked regularly for mechanical leaks. ○ All machinery wash down, lay down and personnel rest areas will be defined (fenced) and located in disturbed areas. ○ Bunding and provision of sedimentation basins at the quarry sites. ○ Groundwater management and erosion protection at the quarry sites to minimise changes to the hydrology and ground water quality. ○ Appropriate offsets will be implemented to ensure no net loss results to Victoria's biodiversity as a result of the removal of NTGVVP from the major access track.
24-02	Impact to birds (waterbirds and migratory, excludes Brolgas) in relation to the construction and operation of the wind farm.	• Project activities will be undertaken in accordance with a Bat and Avifauna Management Plan. • No important wetlands are within the wind farm site and therefore little impact is anticipated in relation to waterbirds. • For migratory birds, as collision risk is considered low, only pre-construction and construction phase mitigation measures will be required. These measures include the avoidance of habitat in the siting and layout of the wind farm and the implementation of hygiene measures in relation to the Project as identified in Impact 24-01 above.
24-03	Impact to bats in relation to the construction and operation of the wind farm.	• Project activities will be undertaken in accordance with a Bat and Avifauna Management Plan. • A buffer area of 120m will be implemented in relation to the rotor swept area of the WTGs and favoured habitats (forests, large hollow trees, isolated paddock trees and water bodies) to reduce flying bats interacting with operating WTGs.

Impact number	Impact	Mitigation measures
24-04	Impacts to the Striped Legless Lizard in relation to the construction and operation of the wind farm.	• Project activities will be undertaken in accordance with a Construction and Operational Environmental Management Plan and a Fauna Management Plan, which will include, but are not limited to, the following requirements. ○ Native vegetation removal will be avoided and minimised through micro-siting of WTGs and associated structures where possible. ○ Construction personnel will be trained in the identification of Striped Legless Lizard. ○ If species are found, works will stop within a 30m buffer area around the affected area and DELWP will be notified. ○ A salvage protocol will be implemented on-site including inspections of any excavations left open overnight and construction and operational personnel will be inducted. Protocol will be included as part of the CEMP and OEMP. ○ Translocation protocol will be developed for the Striped Legless Lizard and implemented if located.
24-05	Impacts to the Growling Grass Frog in relation to the construction and operation of the wind farm.	Project activities will be undertaken in accordance with a Construction and Operational Environmental Management Plan and a Fauna Management Plan, which will include, but not be limited to, the following requirements: • Hydrological, sedimentation and groundwater and erosion protection measures will be identified and implemented. • Sediment and contamination traps will be implemented to protect areas of habitat during construction. • Development will be sited (at a minimum) 30m away from all watercourses, wetlands and significant drainage lines. • Implementation of crossings where development intersects with Growling Grass Frog habitats. • No basalt rocks/boulders larger than 20cm in diameter are to be moved from waterway channel or banks. • Hygiene controls (vehicle and footwear) to avoid the introduction of Chytrid fungus on-site. • A minimum 55m buffer will be applied to all dams, waterways and minor tributaries to minimise impacts to habitat and on the species during the construction and operation of the wind farm. • Temporary drift fences beside roadways/ access tracks will be installed when in regular use for construction, to minimise the risk of injury to animals caused by traffic. • Any excavations left open overnight will be inspected regularly.
24-06	Impacts to the Corangamite Water Skink in relation to the construction and operation of the wind farm.	Project activities will be undertaken in accordance with a Construction and Operational Environmental Management Plan and a Fauna Management Plan. • Mitigation measures will be implemented as listed above in *Impact 24-05* for the Growling Grass Frog. Further, dry stone walls in close proximity to wetlands and drainage lines will be avoided. If dry stone walls are to be removed within 55m of a wetland a zoologist is to be present to salvage and relocate lizards (if present).

Impact number	Impact	Mitigation measures
24-07	Impacts to the Golden Sun Moth in relation to the construction and operation of the wind farm.	• Project activities will be undertaken in accordance with a Fauna Management Plan. • The area identified as potentially suitable habitat for the Golden Sun Moth will be retained where possible and excluded from access of both personnel and vehicles during construction and operation. • WTGs and associated structures will be micro-sited to avoid GSM habitat if required.
24-08	Impacts to Flora and Fauna, Ecological Communities and specifically the Spiny Rice-flower, Striped Legless Lizard, Corangamite Water Skink and Golden Sun Moth as a result of the Transmission Line	• Project activities will be undertaken in accordance with a Construction and Operational Environmental Management Plan. • With regards to vegetation, Project activities will be undertaken in accordance with a Vegetation Management Plan, which will include, but not limited to, the following requirements. ○ Removal of indigenous remnant patch vegetation will be avoided. ○ Removal of scattered trees will be avoided. ○ In areas where removal of indigenous vegetation cannot be avoided, the area to be removed will be minimised. • Where practicable, transmission line works will be sited at least 30m away from wetlands, lakes, creeks and significant drainage lines. Where this is not practicable and ephemeral wetlands may be unavoidably impacted, works will be undertaken when the wetlands are dry and the risk of altering the ground surface is lowest (i.e. when the ground is hard and dry). • In relation to fauna, project activities will be undertaken in accordance with a Fauna Management Plan. Specific mitigation measures will be implemented as detailed in *Impacts 24-04, 24-05, 24-06* and *24-07* above. • Once final transmission line pole sites are determined, targeted surveys will be undertaken to confirm whether these species are present within the transmission line. These surveys will inform mitigation measures to be implemented, such as the micro-siting of poles if required. The final details of the transmission line will take into account the results of these surveys in order to minimise impacts to threatened species. • In relation to impacts to avifauna, markers will be utilised on the wire to increase visibility, if required and where necessary.

25.6 Conclusion

A number of potential environmental impacts have been identified throughout the EES process. The implementation of the proposed environmental management framework, including the development and implementation of comprehensive EMPs will assist to avoid and or minimise such impacts.

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 26 - CONCLUSION

This page is intentionally blank

26 CONCLUSION

The Dundonnell Wind Farm is expected to deliver significant environmental and economic benefits. The Project will make an important contribution to the achievement of State and Commonwealth policy objectives by providing electricity to the National Electricity Market, reducing GHG emissions and stimulating local and regional economies.

The Dundonnell Wind Farm will increase Victoria's supply of renewable energy. The Project will be capable of generating up to 1000GWh per annum, enough to provide for the electricity supply of 150,000 households. In doing so, it has the potential to displace more than 770,000 tonnes of CO_2 per annum.

With a generating capacity of approximately 312MW and an estimated capital value of approximately $670 million, the Project will also provide significant benefits to the broader State, regional and local community by:

- providing value added contributions in terms of labour and returns to capital including a net contribution of $309 million to the Gross State Product;
- supporting increased direct and indirect employment opportunities at the State, regional and local development levels during the construction and operation phases of the Project;
- increasing demand for local goods and services during construction and operation; and
- diversifying existing income streams for farmers and local businesses whilst supporting the continued use of land for productive agricultural operations.

The Project location is ideally suited to the development of a wind farm. Wind monitoring and associated modelling at the wind farm site has confirmed high and consistent wind speeds that are ideal for the generation of electricity. It is also located in relatively close proximity to the electricity grid to enable connection to the 500kV Heywood-Moorabool network.

Commencing in 2009, the Proponent has undertaken extensive wind monitoring at the wind farm site in accordance with best industry practice utilising two meteorological monitoring masts.

Additionally, Dundonnell is isolated from major townships and tourist areas. The wind farm site is bordered by relatively few landholders, and there are only a small number of dwellings within and surrounding the site. These factors have combined to reduce visual and amenity impacts.

Trustpower is committed to ongoing and thorough community engagement with all Project stakeholders. A community engagement program has been implemented including open days and individual meetings with stakeholders, the distribution of newsletters, and a Project website and a free call information number. Community engagement will continue throughout the public notification of the EES, post approval, and during construction and operation of the Project.

Detailed environmental studies have also been undertaken in accordance with the requirements of the EES Scoping Requirements and relevant legislation and guidelines including the Wind Energy Guidelines and Clause 52.32 'Wind Energy Facilities' of the *Moyne Planning Scheme.*

An interactive design process has been adopted which has allowed the results of the community engagement program and the environmental studies to be incorporated into the design of the Project. Some of the key design responses include:

- setback distances between WTGs and surrounding dwellings were defined at an early stage to ensure compliance with defined standards concerning landholder agreements, noise, shadow flicker and blade glint, and to reduce associated impacts on properties neighbouring the wind farm site;
- WTG-free buffer zones and exclusion areas were identified to avoid impacts to the Brolga, to minimise native vegetation removal and reduce habitat disturbance for other fauna;
- buffer zones were provided between all wind farm infrastructure and any aquatic habitat including wetlands, creeks and drainage lines;
- WTG layout was designed to avoid rocky outcrops and other areas with geomorphological values;

- WTGs and the transmission line corridor were sited to avoid identified heritage places and sensitive areas and 'no go' zones are proposed to be established for ground disturbance during the construction of the Project; and
- the main access track was located to avoid areas of high geomorphological value adjacent to the southern boundary of the wind farm site and to reduce construction traffic impacts on roads and landholders.

Potential environmental impacts arising from the Project have been identified and corresponding mitigation measures proposed where avoidance strategies have not been feasible. In summary:

- The wind farm site and adjoining areas are primarily unimproved pasture used for grazing and the Project will not impact on the continuation of these land uses. The Project is compatible with the zoning of the land under the Moyne Planning Scheme and is consistent with facilitating sustainable agricultural activity in the area.
- The Project layout, including the location of the quarry pits, off-site substation and transmission line corridor, has been sensitively designed taking into account the constraints imposed by the identified geoheritage sites and is not likely to significantly impact on the geoscience values of the Project area.
- The majority of water required for the construction of the Project is expected to be sourced on-site. Groundwater investigations indicate that the Project works (specifically the quarry pits) are unlikely to intercept the water table, however should this be intercepted, necessary licenses and approvals will be obtained by the Proponent, thereby addressing any potential impacts as part of that process.
- The local catchment is not within a designated water supply protection area and does not drain to a designated water supply catchment. Appropriate sediment control mitigation measures have been identified to minimise the potential construction related impacts in relation to increased runoff to waterways and wetlands.
- Impacts to previously registered Aboriginal cultural heritage places have been avoided by ensuring there is no proposed construction or ground disturbance in these areas. Additional Aboriginal cultural heritage places have been identified during assessment for the Project and will be subject to management measures detailed in the approved Cultural Heritage Management Plans (CHMPs). In addition, mitigation measures will be implemented, including the management of unregistered Aboriginal cultural heritage encountered during works. Any impact to Aboriginal cultural heritage as a result of the construction of the Project will be appropriately managed through the approved CHMPs.
- There are five statutory registered historic heritage places inside or within a 10km radius of the centre of the wind farm site. The Historic Heritage Assessments (HHAs) found that there were two historic heritage places within the wind farm site (Fasham House Complex and dry stone walls) with the potential to be impacted by the Project. These places are considered to be of low historic significance, and residual impacts on historic heritage will be minor.
- The majority of the wind farm site is dominated by improved pasture and common agricultural and environmental weeds. Remnant native vegetation is limited to scattered patches throughout the site. Project infrastructure has been designed to minimise and, avoid where possible, impacts to significant vegetation. The removal of native vegetation will be appropriately offset where required, to ensure no net loss results to Victoria's biodiversity.
- The majority of the wind farm site is of low quality habitat for fauna as the extensive modification of the site for agriculture has resulted in the removal of most suitable habitat elements. Nonetheless, 21 threatened species have the potential to occur within the Project area; including 15 birds, two mammals, two reptiles, one frog and one invertebrate. The Project has been designed to minimise impacts to suitable habitat for threatened fauna species where possible and mitigation measures will be implemented to ensure impacts are appropriately managed and can be reduced to an acceptable level so not to significantly impact threatened species.
- The Project area contains a number of threatened species listed under the EPBC Act, referred to as matters of National Environmental Significance (MNES). A total of seven listed flora species were identified as having potential to occur within the transmission line route, with the Spiny Rice-flower recorded. In addition, two ecological communities have been recorded within the wind farm site and have the potential to occur within the transmission line corridor. In terms of fauna, a total of nine listed migratory bird species have been recorded within the vicinity of the wind farm and specifically, the Southern Bent-wing Bat, Striped Legless Lizard, Growling Grass Frog, Corangamite Water Skink and the Golden Sun Moth are all listed species which have potential to occur, or have been recorded within the Project area. Potential impacts to these species will be addressed through mitigation measures as part of a robust Environmental Management Plan (EMP). The assessment and targeted surveys undertaken to date have identified that the overall residual impact on MNES for the wind farm site and main access track is likely to be minor. As the detailed design of the transmission line is not yet confirmed, targeted surveys will be undertaken

prior to construction and once pole and access track locations are determined, to assess the impact of the transmission line. These will inform detailed mitigation measures which will be adopted, such as the micro-siting of poles and access tracks, to ensure there will be no significant impact to threatened species or communities.

- A specific assessment was undertaken of the potential impacts to Brolga in accordance with the three levels of assessment as prescribed in the Brolga Guidelines (DEPI, 2013). The Brolga Guidelines have informed the layout of the wind farm to ensure a zero net impact on the Victorian Brolga population over the life of the Project.
- The noise generated from the construction and operation of the Project will comply with the relevant noise standard (NZS 6808:2010) for all residential properties that require assessment according to the Wind Energy Guidelines and NZS 6808:2010. Thus, any noise and vibration impacts to the surrounding area will be acceptably managed so not to unduly impact amenity.
- Only two dwellings are predicted to receive in excess of the recommended theoretical maximum of 30 hours per year of shadow flicker. These dwellings are owned by participating landholders, and impacts will be dealt with through appropriate mitigation measures. In addition, any potential blade glint impacts will be minimised or eliminated by the use of a non-reflective surface treatment for the blades.
- The Project may have an initial impact on digital television reception through the introduction of electromagnetic interference (EMI). In the event that impacts are identified post the commissioning of the wind farm, mitigation strategies have been identified and will be implemented to ensure that any impacts to reception are minimised.
- The Project has been sited to ensure visual impacts are acceptable within the landscape. The wind farm is located within a highly modified rural landscape and the existing rural activity, associated structures and other infrastructure have created a landscape that can readily absorb change. The greatest potential for visual impacts to occur is to neighbouring, non-participating residential properties within 4km of a wind turbine. If required post construction, landscape mitigation measures can be used for affected dwellings. These would be agreed between the Proponent and the affected landowner, funded by the Proponent and implemented by the affected landowner.
- Traffic impacts will be predominantly limited to the construction phases of the Project, with construction expected to have only minor impacts on traffic generation. In order to minimise further impacts to local roads, it is expected that over dimensional (OD) vehicles will utilise haulage routes previously approved for other projects. Nonetheless, minor upgrades to some roads and intersections, as well as post-construction repairs may be required, and these will be identified in consultation with Moyne Shire Council and VicRoads. Vehicle movements associated with the construction and operation of the on-site quarry will largely be contained within the wind farm boundary and are not expected to impact on the local road network. A Traffic Management Plan will be implemented which will appropriately manage traffic impacts and ensure the Project will not unduly impact road safety or movement.
- The creation of over 200 direct and 100 indirect local jobs (full time positions) are expected during the construction phase of the Project. In addition, up to 10 direct and six indirect jobs (full-time positions) will be created once the Project is operational. This will have a direct and beneficial impact to the local economy through direct job creation and increased demand and support for local businesses and services.
- The Project will result in a direct positive impact into the local and regional economy through the direct injection of approximately $33 million to Moyne Shire during the construction of the wind farm, and approximately $1.7 million per annum once operational.
- The Project is located outside the Obstacle Limitation Surfaces of the nearest airport; Warrnambool Airport located approximately 32.3nm (59.3km) south-west of the proposed wind farm site. The location of WTGs and monitoring masts will be made available to local and regional aircraft operators, so they can plan their operations accordingly. Following consultation with relevant authorities, the Project is not expected to impact on radar systems or communication services within its vicinity and the Civil Aviation Safety Authority (CASA) has confirmed that the wind farm does not represent a hazardous obstacle to aviation activities in the area.
- The Project area is not affected by a Bushfire Management Overlay; however it is designated as 'bushfire prone' by the Victorian Government. There may be an increased bushfire risk during construction of the Project, however mitigation measures will be implemented and restrictions will be places on certain activities to reduce risk where possible. In terms of operation, the WTGs will incorporate a range of safety features, including continuous external monitoring to enable remote shut down in the event of exceedance of temperature and speed thresholds. While the Project may prevent aerial fire-fighting operations within the wind farm site, the network of internal access roads will improve vehicle access and enhance ground based means of fighting bushfire. A Wildfire Prevention and Emergency Response Plan, prepared in consultation with the CFA, will be implemented and will include bushfire prevention measures during both construction and operation of the Project.

- There are a number of operational, existing and proposed wind farms in the region surrounding the Project and thus, cumulative impacts have been considered. All approved Projects will have identified environmental safeguards, which are developed in accordance with the relevant environmental standards and in response to the conditions of approval. This will ensure that any potential adverse cumulative impacts will be minimised.

Trustpower is committed to the responsible environmental implementation of the Project. The environmental management framework addresses the matters specified in the EES Scoping Requirements, with clear accountabilities for managing potential environmental impacts. Project specific environmental management and mitigation measures have been identified to reduce and manage potential risks to the environment. These will be incorporated in an EMP for the construction and operation of the Project, with environmental monitoring and reporting requirements clearly identified.

The Dundonnell Wind Farm is consistent with State and Commonwealth policies as well as local planning policies. The Project will make an important contribution to Victoria by providing the State with renewable energy in an environmentally sustainable manner.

Thus, based on a balanced assessment of economic, social and environmental outcomes, it is considered that the Dundonnell Wind Farm will result in a net community benefit over both the short and long term, and will result in a significant increase in the generation and supply of renewable energy in Victoria.

TRUSTPOWER
AUSTRALIA (NZ) LTD

DUNDONNELL WIND FARM

June 2015

0107773 EES EXHIBITION

CHAPTER 27 - REFERENCES

This page is intentionally blank

27 REFERENCES

ABARE (Australian Bureau of Agricultural and Resource Economics) (2010) *Australian Energy Projections to 2029-30,* Australian Government, Canberra.

ABS (Australian Bureau of Statistics) (2012) *Energy Account Australia,* Report prepared for the Clean Energy Council.

AMA (Australian Medical Association) (2014) *Position Statement – Wind Farms and Health*.

Archaeology at Tardis (2015a) *Dundonnell Wind Farm – Draft Cultural Heritage Management Plan* (CHMP No. 12393).

Archaeology at Tardis (2015b) *Dundonnell Wind Farm Transmission Line – Draft Cultural Heritage Management Plan* (CHMP No. 12394).

Archaeology at Tardis (2014a) *Dundonnell Wind Farm – Historic Heritage Assessment* (HV No. 4253).

Archaeology at Tardis (2014b) *Dundonnell Wind Farm Transmission Powerline – Historic Heritage Assessment* (HV No. 4430).

Aviation Projects Pty Ltd (2014) *Aeronautical Impact and Night Lighting Assessment - Dundonnell Wind Farm*.

Baerwald et al. (2008) *Barotrauma is a significant cause of bat fatalities at wind turbines*, Current Biology 18(16): R695-R696.

Baxter N and Robinson N (2001) *A Land Resource Assessment of the Glenelg Hopkins region*, Agriculture Victoria – CLPR.

Birdlife International (2015) *IUCN Red List for Birds,* viewed 19 January 2015, http://www.birdlife.org

BL&A and AIRA Professional Services (2005) *Wind Farms and Birds: Interim Standards for Risk Assessment.* Report prepared by AusWEA (Australian Wind Energy Association); Report No. 2003.35(2.2), July 2005.

BL&A (Brett Lane and Associates) (2014) *Dundonnell Wind Farm – Brolga Assessment*.

BL&A (Brett Lane and Associates) (2015) *Dundonnell Wind Farm – Flora and Fauna Assessment*.

Capire Consulting Group Pty Ltd (2014) *Socio-economic Impact Assessment – Dundonnell Wind Farm*.

Cardno (2014) *Environmental Effects Statement - Traffic Impact Assessment*, *Dundonnell Wind Farm Project.*

CASA (Civil Aviation Safety Authority) (2012) *Civil Aviation Safety Regulation (1998) Part 139—Aerodromes and associated Manual of Standards Part 139—Aerodromes*.

CFA (Country Fire Authority) (2012) *Emergency Management Guidelines for Wind Energy Facilities.* Version 4. February 2012.

CK Prowse and Associates (2015) *Draft Quarry Work Plan,* for Work Authority 1540, Dundonnell, Victoria.

Clean Energy Council (2013) *Wind Energy – The Facts,* March 2013, viewed from http://www.csiro.au/Organisation-Structure/Flagships/Energy-Transformed-Flagship/Exploring-community-acceptance-of-rural-wind-farms-in-Australia.aspx

Crump, M and Scott, N (1994) *Measuring and Monitoring Biological Diversity: standard methods for amphibians*, Visual encounter surveys, Smithsonian Institution Press, Washington.

Department of Environment, Climate Change and Water (2011) *NSW Road Noise Policy*, New South Wales Government, Sydney.

Department of Health (2010) *Wind Turbines and Health*: Public Statement, July 2010, Victorian Government, Melbourne.

Department of Infrastructure and Regional Development (2013) *Principles for a National Airports Safeguarding Framework - Managing the Risk to Aviation Safety of Wind Turbine Installations (Wind Farms)/ Wind Monitoring Towers,* National Airports Safeguarding Advisory Group (NASAG), Australian Government.

DELWP (Department of Environment, Land, Water and Planning) (2015) *Policy and planning guidelines for development of wind energy facilities in Victoria,* Victorian Government, Melbourne.

DEPI (Department of Environment and Primary Industries) (2013) *Permitted clearing of native vegetation: Biodiversity assessment guidelines*, September 2013, Victorian Government, Melbourne.

DEPI (Department of Environment and Primary Industries) (Undated) *Victorian Biodiversity Atlas,* viewed from http://www.depi.vic.gov.au/environment-and-wildlife/biodiversity/victorian-biodiversity-atlas

DEWHA (Department of Environment, Water, Heritage and the Arts) (2009a) *Significant Impact Guidelines for the Critically Endangered Golden Sun Moth*, Nationally threatened species and ecological communities EPBC Act Policy Statement 3.12, Canberra.

DEWHA (Department of Environment, Water, Heritage and the Arts) (2009b) *Significant impact guidelines for the vulnerable Growling Grass Frog,* Nationally threatened species and ecological communities EPBC Act Policy Statement 3.14, Canberra.

DEWHA (Department of Environment, Water, Heritage and the Arts) (2009c) *Significant impact guidelines for 36 migratory shorebird species*, Migratory species: EPBC Act policy statement 3.21 (Draft), Canberra.

DSE (Department of Sustainability and Environment) (2004) *Native Vegetation: sustaining a living landscape, Vegetation Quality Assessment Manual – guidelines for applying the Habitat Hectare scoring method (Version 1.3),* Victorian Government, Melbourne.

DSE (Department of Sustainability and Environment) (2005) *Victorian Greenhouse Strategy Action Plan,* Victorian Government, Melbourne.

DSE (Department of Sustainability and Environment) (2006) *Ministerial Guidelines for the Assessment of Environmental Effects under the Environmental Effects Act 1978***,** Victorian Government, Melbourne.

DSE (Department of Sustainability and Environment) (2007) *Applying the rural zones, VPP Practice Note, March 2007,* Victorian Government, Melbourne.

DSE (Department of Sustainability and Environment) (2010) *Biodiversity Precinct Structure Planning Kit*, Victorian Government, Melbourne.

DSE (Department of Sustainability and Environment) (2012) *Interim Guidelines for the Assessment, Avoidance, Mitigating and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population,* Victorian Government, Melbourne.

Douglas Partners (2011) *Report on Desk Study – Geotechnical Assessment*, Rev.1.

DPCD (Department of Planning and Community Development) (2007) *The Environmental Effects Advisory Note: Aboriginal cultural heritage and the environment effects process*, Victorian Government, Melbourne.

DPCD (Department of Planning and Community Development) (2010) *Guidelines for Thematic Environmental Histories,* Heritage Victoria Model Consultant Brief for Heritage Studies, Melbourne.

DPCD (Department of Planning and Community Development) (2012) *Policy and planning guidelines for development of wind energy facilities in Victoria,* Victorian Government, Melbourne.

DPCD (Department of Planning and Community Development) and Planisphere (2013) *South West Victoria Landscape Assessment Study – Landscape Character of South West Victoria* (SWVLAS), Melbourne.

DSEWPaC (Department of Sustainability, Environment, Water, Population and Communities) (2011) *Referral guidelines for the striped legless lizard, Delma impar,* Australian Government, Canberra.

DSEWPaC (Department of Sustainability, Environment, Water, Population and Communities) (2012) *Environment Protection and Biodiversity Conservation Act 1999 – Environmental Offsets Policy*, Australian Government, Canberra.

DTPLI (Department of Transport, Planning and Local Infrastructure) (2013) *Dundonnell Wind Farm Project Environment Effects Statement Scoping Requirements,* Victorian Government, Melbourne.

Environmental GeoSurvey Pty Ltd (2014) *Proposed Dundonnell Wind Farm Geoscience Features Significance and Sensitivity Assessment.*

EPA (Environmental Protection Agency) (2003) *State Environment Protection Policy (Waters of Victoria),* June 2003, Victorian Government, Melbourne.

EPHC (Environmental Protection and Heritage Council) (2010) *National Wind Farm Development Guidelines – Public Consultation Draft*, July 2010.

Erikson, W et al. (2001) *Avian collisions with wind turbines: a summary of existing studies and comparisons to other sources of avian collision mortality in the United States*, Resource Document of the National Wind Coordinating Committee, Washington.

ERM (Environmental Resources Management Australia) (2015a) *Hydrogeological Study.*

ERM (Environmental Resources Management Australia) (2015b) *Planning and Land Use Assessment.*

ERM (Environmental Resources Management Australia) (2014) *Landscape and Visual Impact Assessment.*

Fenwick, R (Undated) *Expert Witness Statement of Roger Fenwick, retained by Union Fenosa Wind Farm Australia Pty Ltd for the Berrybank Wind farm Project,* viewed from http://www.unionfenosa.com.au/f/PRvicBB/Expert-Witness-Statements /Bushfire.pdf

GLGH (Garrad Hassan Pacific Pty Ltd) (2014a) *Shadow Flicker and Blade Glint Assessment for the Proposed Dundonnell Wind Farm*.

GLGH (Garrad Hassan Pacific Pty Ltd) (2014b) *Assessment of Electromagnetic Interference Issues for the Dundonnell Wind Farm*.

Garnaut, R (2011) *The Garnaut Review 2011: Australia in the Global Response to Climate Change,* Cambridge University Press, Melbourne.

Government of South Australia (2004) *Wind Farm Safety in Australia***,** viewed from http://www.synergy-wind.com/documents/BP11_Safety.pdf

Heard, G, et al. (2010) *Guidelines for managing the endangered Growling Grass Frog in urbanising landscapes*, Report for the Victorian Department of Sustainability and Environment, Arthur Ryhla Institute for Environmental Research, Hiedleberg.

Hudson Howells (2014) *Dundonnell Wind Farm – Economic Impact Assessment.*

Hull C, et al. (2013) *Avian collisions at two wind farms in Tasmania, Australia: taxonomic and ecological characteristics of colliders and non-colliders*, New Zealand Journal of Zoology 40(1): 47-62.

MDA (Marshall Day Acoustics Pty Ltd) (2014) *Dundonnell Wind Farm – EES Noise Impact Assessment*.

Moyne Shire Council (2011) *Draft Major Energy Proposals and their Ancillary Infrastructure.*

Moyne Shire Council (2012) *Environmental Sustainability Strategy***.**

NHMRC (National Health and Medical Research Council) (2014) *Draft Information Paper: Evidence on Wind Farms and Human Health*.

Parsons Brinckerhoff Australia Pty Limited (2012) *Ceres Project – Fire Risk Assessment***.**

Planning Panels Victoria (2004) *Bald Hills Panel Report,* June 2004: 280.

Sinclair et al. (SKM) and MMA (2012) *Benefit of the Renewable Energy Target to Australia's Energy Markets and Economy*.

The Australia Institute (2006) *Wind Farms: the facts and the fallacies,* Discussion Paper Number 91, October 2006.

The Climate Institute (2013) *Global Climate Leadership Review***,** viewed 8 May 2014, from http://www.climateinstitute.org.au/global-climate-leadership-review-2013.html

VicRoads (2011-2012) *Draft Guidelines for Assessing Impacts of Wind Energy Projects*.

Windicator (2014) *Wind Power Monthly*, viewed 8 May 2014, from www.windpowermonthly.com

Water Technology (2014) *Dundonnell Wind Farm Surface Water Assessment*.

Wordwiz (2012) *Dundonnell Wind Farm – Stakeholder Engagement Strategy*.

Wordwiz (2015) *Dundonnell Wind Farm EES Consultation Plan*.

VCAT (Victorian Civil and Administrative Tribunal) (2013) *Cherry Tree Wind Farm v Mitchell Shire Council.*