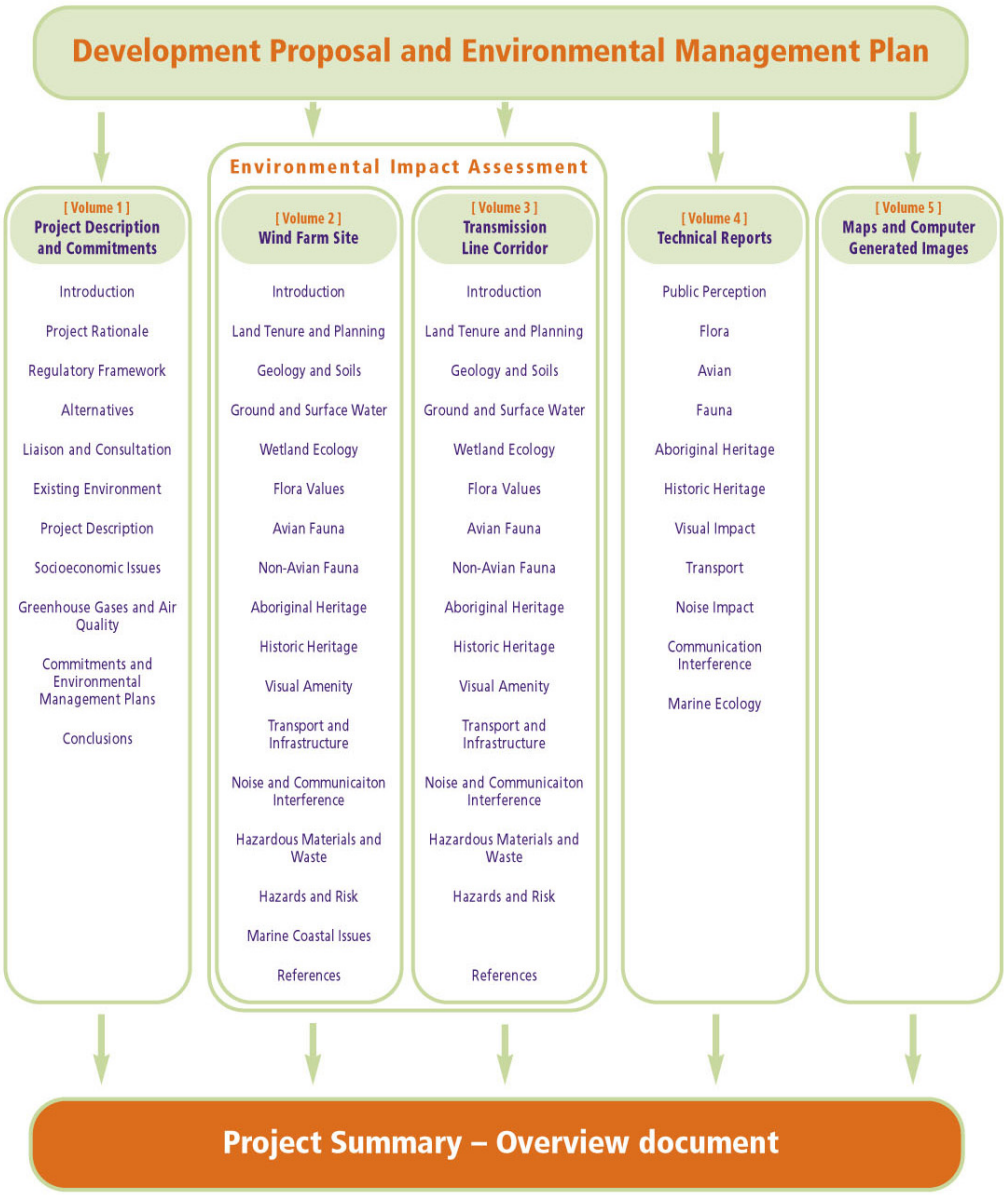
Musselroe Wind Farm



This document is a summary of the Development Proposal and Environmental Management Plan (DPEMP) for the proposed Musselroe Wind Farm. The DPEMP is produced in five volumes as shown above. The Project Summary is not part of the DPEMP but provides an abridged version of its contents. The Project Summary includes a brief description of the proposed development, assesses the likely impacts of the Project on environmental and socio-economic factors, and summarises the commitments process made by Hydro Tasmania in relation to the management of potential environmental impacts.

Foreword

The project proposed is for the construction of a $270 million wind farm on private land near Little Musselroe Bay at Cape Portland in north-east Tasmania. As a renewable energy project the Musselroe Wind Farm (the Project) will contribute to the Commonwealth Government's Mandated Renewable Energy Target (MRET). The MRET is based on the recognition that renewable energy is a global key to long-term reduction in greenhouse gas emissions. This Project will generate approximately 400,000 MWh of renewable electricity and displace an estimated 368,000 tonnes $CO_{2\text{-}e}$ per year. In addition, the Project will provide considerable revenue to the State of Tasmania, facilitate the generation of temporary and long-term employment opportunities, and create indirect flow-on benefits to a number of service industries in the region.

Hydro Tasmania is seeking a planning permit from Dorset Council for the establishment of the wind farm and a corridor of land for the construction of a 110 kV transmission line to connect the wind farm to the Tasmanian electricity grid at the Derby Electricity Substation. Under provisions of the *Environmental Management and Pollution Control Act 1994* the Project has been determined a Level 2 Activity[1]. This means that the Board of Environmental Management and Pollution Control (Board) will assess the environmental impact of the Project. In August 2002, the Board issued guidelines for the preparation of a Development Proposal and Environmental Management Plan (DPEMP) to meet the requirements of that Act.

This document summarises the potential environmental, social, and economic effects of the Project (both positive and negative) and outlines proposed avoidance and mitigation strategies. Detailed discussion of these issues is expanded upon in volumes 1, 2, 3, 4 and 5 that form the DP&EMP submitted to the regulatory authorities.

Based on the information contained in the DPEMP Council will determine the development application following receipt of a determination from the Board. The Board's environmental assessment of the Project must be undertaken in accordance with Environmental Impact Assessment principles (Section 74 EMPCA) and must seek to further the objectives of the Resource Management and Planning System (RMPS) and the specific objectives of the *Land Use Planning Approvals Act 1993 (*LUPAA).

Commonwealth approval is also required under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBCA). On June 28, 2002, the Commonwealth Minister determined the Project was a controlled action (that is, that the development had the potential to affect a matter of national environmental significance) and that the controlling provisions were:

[1] Level 2 Activities are those specified in Schedule 2 of the Environment Management and Pollution Control Act 1994, which may cause environmental harm or an environmental nuisance.

- sections 18 and 18A (listed threatened species and communities); and
- sections 20 and 20A (listed migratory species).

On 10th May 2000, the Tasmanian Environment Minister advised the Commonwealth Environment Minister that, in accordance with the Bilateral Agreement between the two governments, the Project would be assessed by Tasmania under the bilateral agreement. The agreement aims to minimise duplication of environmental impact assessment processes, strengthen intergovernmental cooperation and promote a partnership approach to environmental protection and biodiversity conservation. Environment Australia will principally rely on the accredited Tasmanian assessment processes in assessing actions under the EPBCA.

The DPEMP for the Musselroe Wind Farm aims to provide:

- a source of information from which individuals and groups may gain an understanding of the proposal, the need for the Project, the alternatives, the environment that it affects, the effects that may occur and the avoidance and mitigation strategies to be taken to minimise any adverse effects;
- a basis for public consultation and informed comment on the proposal; and
- a framework against which decision-makers can consider the proposal and determine the conditions under which any approval may be given.

Exhibition

The DPEMP for the Musselroe Wind Farm will be exhibited for public comment for a 28 days from the date advertised by the EMPC Board. Copies of the document will be made available as advertised.

Public Submissions

In accordance with Section 57(5) of the *Land Use Planning and Approvals Act 1993* (LUPAA) any person may make a representation relating to the permit application (including the DPEMP) by 5pm on the last day of the advertised exhibition period.

Representations should be made in accordance with the notice of application for permit under s.57 of the LUPAA by Dorset Council and should be made as advertised in notices of exhibition

Copies of all submissions received will be forwarded to Hydro Tasmania, Environment Australia and the EMPC Board.

It should be noted that representations in relation to the Musselroe Wind Farm will be public documents unless a valid argument is put to the contrary in a letter attached to the submission.

Appeals

In accordance with the *Land Use Planning and Approvals Act 1993*, any person (including the proponent) who makes a formal representation in relation to the Project will:

- be advised in writing of the decision of Dorset Council to grant or to refuse a permit for the Project within 7 days of the making of that decision by the Council; and
- has the right to appeal to the Resource Management and Planning Appeal Tribunal against the decision of the Dorset Council on the permit for the wind farm within 14 days after the day on which notice of the decision of Council was served upon them.

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Introduction 1

1.1 Introduction

This document provides a summary of the information contained in the Development Application and Environmental Management Plan (DPEMP) submitted to Dorset Council for the construction of a wind farm at Cape Portland. The DPEMP has been written in response to guidelines provided by the regulator and addresses the environmental, social and economic issues associated with implementing the Project.

The document is structured to reflect the principle Chapters in Volumes 1, 2, and 3 of the DPEMP. Volumes 4 and 5 contain maps and technical reports. Readers requiring more specific discussion of the issues taken into account in the planning for the development and its operation should refer to these volumes. The background to the Project is as follows.

1.2 Background

The Hydro-Electric Corporation (trading as Hydro Tasmania) is seeking a planning permit to establish a $270 million wind farm on the 'Cape Portland' property near Little Musselroe Bay in north-east Tasmania. Wind investigation and development rights have been secured by Hydro Tasmania under a long-term agreement with the landowner. The Musselroe Wind Farm Project (the 'Project') also incorporates associated infrastructure including a substation and a transmission line to connect the Musselroe Wind Farm Site (the 'Site') to the electricity grid at Derby. The transmission corridor is approximately 46 km long and passes through vegetation dominated by agricultural land, dry eucalypt forest and heath. The transmission line will be installed within a planning corridor varying in width from 300 m to 3600 m wide but will have a final easement of 50 m.

In addition to significant investment, the Project, if approved, will have direct and indirect employment benefits, and will eventually lead to downstream investment in local manufacturing facilities for wind turbine components in Tasmania. The incentive for wind farm developments is provided by the introduction of the Federal Government's Mandated Renewable Energy Target (MRET). MRET requires an additional 9,500 GWh per annum of electricity to be provided from renewable resources by 2010 and was introduced to help cap growth in Australia's greenhouse gas emissions.

This Project is consistent with Commonwealth initiatives to curtail the increase in greenhouse gas emissions under the National Greenhouse Strategy and MRET. It is also consistent with Goal 4 of the Tasmanian Greenhouse Statement, which is to develop alternative renewable energy sources in Tasmania. Further, it accords with the *Tasmania Together* process, in which the community has called for maximum use of renewable energy sources and a reduction of greenhouse gas emissions.

This document provides a summary of detailed information contained within the Development Proposal and Environmental Management Plan (DPEMP). It covers the proposed wind farm, transmission line and associated infrastructure developments. The DPEMP has been submitted to Dorset Council as supporting documentation for the Development Application and forms the key approval documentation for the Project. It contains a detailed description of the Project, as well as a discussion of potential social, economic and environmental impacts, and how they can be managed.

The DPEMP, produced in 5 volumes with supporting appendices, is for the use of local, state and federal government authorities to assess the Project against planning and environmental criteria. The DPEMP is also the main source of information for communities and stakeholder groups that may have an interest in the proposal, many of whom have participated in community consultation processes conducted by Hydro Tasmania leading up to the preparation of this DPEMP

1.3 Overview of Proposal

Hydro Tasmania's vision is to be Tasmania's world-renowned renewable energy business. The construction and operation of the Musselroe Wind Farm will make a significant contribution to the realisation of this vision. Hydro Tasmania is therefore seeking approval to construct and operate a wind farm and a transmission line in the project area shown in Figure 1.1.

The purpose of the Project is to:

- construct a 140 MW wind farm and sub-station together with a 46 km transmission line to Derby
- supply electricity to the State of Tasmania and assist with drought-proofing the State's existing hydro-electric storages;
- transfer electricity into the grid for use around the state, and to mainland Australia via the Basslink cable;
- generate clean renewable electricity, which will reduce greenhouse gas emissions that would otherwise be generated by the burning of fossil fuels;
- contribute to meeting the demand for new renewable electricity created by the Commonwealth Government's mandatory renewable energy target (MRET)requiring that 2% of electricity is to be generated from new renewable sources by 2010;
- through the above, contribute to Australia capping greenhouse gas emissions at 108% of 1990 levels and meeting its international commitments under the Kyoto Protocol;
- produce a financial return to Hydro Tasmania and thus, the State of Tasmania. This would be through the sale of electricity directly, particularly into the new renewable market, and through the sale of the renewable energy certificates; and
- target opportunities to use this project to lever other benefits, such as manufacturing investment in wind turbine components, and ensure that any undesirable effects are maintained within acceptable limits.

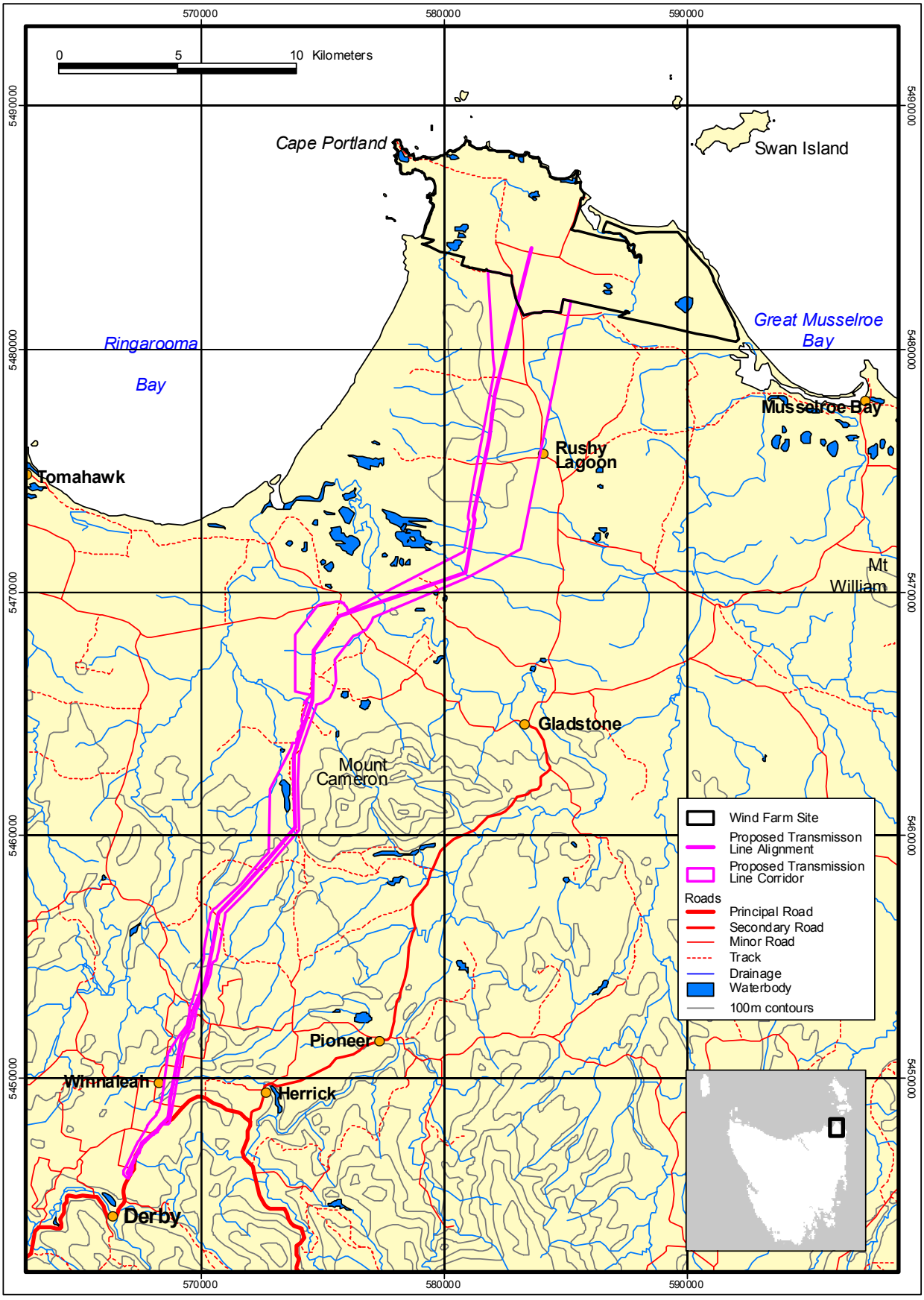


Figure 1.1: Overview of the Project area.

As part of the project 'rationale' the 'no development' option was considered, together with a number of alternative proposals. In brief it was concluded that:

- other renewable energy options were not as economically attractive;
- the no development option would have adverse investment, employment and greenhouse consequences for the State;
- the world class potential to generate electricity from wind at Musselroe would be lost;
- the opportunity to achieve significant greenhouse gas savings would be lost;
- an opportunity for Tasmania to export electricity from a new renewable resource via Basslink to the mainland (through the national electricity market) would be lost along with associated economic benefits;
- the direct and indirect economic and employment benefits to the Dorset Municipality would be lost together with potential local manufacturing opportunities; and
- another source of electricity would be needed in the future to meet demand which may either be based on non-renewable sources or be more costly than the current proposal.

1.4 Regulatory Framework

The Project will be subject to a rigorous assessment process prior to obtaining development approval. Permits for the development are required from the local, state and federal governments, prior to the development proceeding. This process will ensure that the Project complies with the following legislative and policy requirements:

- Dorset Council Planning Scheme 1996 and Dorset Sustainable Development Strategy;
- Tasmanian legislative requirements particularly the *Land Use Planning Approvals Act 1993* (LUPAA) and the *Environmental Management and Pollution Control Act 1994* (EMPCA);
- Tasmanian State Policies, guidelines and codes of practice;
- Commonwealth legislative requirement under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA), particularly sections 18 and 20 dealing with threatened and migratory species;
- international conventions to which Australia is a party;
- Commonwealth agreements, strategies and policies; and
- existing management plans prepared by Forestry Tasmania and the former Department of Environment and Land Management.

The Development Application (DA) for the Project (together with the DPEMP) will be submitted, as required under Tasmania's Resource Management and Planning System, to the

Dorset Council. The DPEMP will also be submitted to the Board for assessment as the Director of Environmental Management has determined the Project is a Level 2 activity under EMPCA. Assessment will include a period of public consultation. Commonwealth approval is also required under provisions of the EPBCA. On completion of the assessment process, the Board will:

- notify the Council of any environmental conditions or restrictions it requires to be included in the permit granted by the Council; or
- direct the Council to refuse to grant a permit for the Project [s.25 EMPCA].

The Council will assess the Project against the planning requirements of the Dorset Planning Scheme and LUPAA. The Council can grant a permit, grant a permit with conditions or refuse the permit application. If granted, the permit will incorporate any conditions that may be required by the Environmental Management and Pollution Control Board and the Commonwealth under the EPBCA.

In accordance with the *Land Use Planning and Approvals Act 1993*, any person (including the proponent) who makes a formal representation in relation to the Project in the prescribed time-frame has the right to appeal to the Resource Management and Planning Appeal Tribunal against the decision of the Dorset Council on the permit for the wind farm within 14 days after the day on which notice of the decision of Council was served upon them.

1.5 Community Consultation

Hydro Tasmania has engaged in a comprehensive community consultation program over the past 18 months. Hydro Tasmania's land liaison program facilitated direct landowner input to project development, particularly the corridor selection process and detailed alignment of the transmission line.

Input regarding current and proposed agricultural activities, and the potential impact the Project may have on these activities, was taken into consideration during project planning and a number of changes were made as a result.

The community consultation program has consisted of:

- four major public meetings held at Derby, Gladstone, Scottsdale and Launceston;
- detailed surveys to collect views on issues and perceptions at the local community level;
- opening a shopfront in Derby to provide information;
- newsletter and mail-outs to a broad range of stakeholder groups;
- special interest meetings targeted at specific issues;
- meetings with members of the Aboriginal community;

- ongoing liaison with key groups via telephone, email and correspondence; and
- a state-wide community perceptions survey to capture the views of the broader community on wind farms.

Wind farms are relatively new to Australia, and it is for this reason that Hydro Tasmania has acknowledged that gaining community support and acceptance, as well as the sensitive design of wind farms, is critical to the sustainability of the industry.

An independent state-wide survey of community attitudes showed strong support for wind farm developments in the State (see Volume 4: Technical Appendices, Appendix 1 for the full report). Surveys following meetings in Tasmania revealed that 85% of respondents in the local community in the north-east, and 93% state-wide, favour wind farm developments.

There was, however, some concern expressed by a small number of survey respondents about issues of visual amenity, cultural heritage and flora and fauna. Similar concerns have been identified in overseas studies. Questions about noise were raised at the meetings but most people were satisfied with explanations given regarding potential noise effects. Only 7% of the sample considered noise to be a likely negative effect, while 74% believed it would have no effect or a negligible effect (see Table 1.1).

Table 1.1: Opinions on potential positive and negative impacts of the wind farm.

Potential impact	Positive		Negative		No/negligible effect		Don't know/ undecided	
	no.	%	no.	%	no.	%	no.	%
Tourism	19	70	4	15	3	11	1	4
Property prices	4	15	4	15	15	56	4	15
Visual amenity	7	26	9	33	10	37	1	4
Turbine noise	2	7	2	7	20	74	3	11
Local employment	17	63	2	7	7	26	1	4
Local economy	21	78	3	11	2	7	1	4
State economy	25	93	1	4	1	4	0	0
Native flora and fauna	2	7	4	15	17	63	4	15
Cultural heritage	1	4	4	15	17	63	5	19

The table shows the range of issues and opinions expressed. The positive aspects of the proposal identified through the consultation process were specifically related to tourism and the local economy.

Project Description 2

2.1 Overview

The proposed wind farm and transmission line are planned for construction within a sparsely populated area of mostly improved pastures and undulating grazing land. These are interspersed with smaller areas of remnant native vegetation, mostly coastal scrub and heath. The site is located within the Musselroe-Ansons and Ringarooma catchments and contains a number of wetlands. There are very few residences in the surrounding area.

The Project, for which approval is being sought, consists of the following principal elements:

- up to 90 Wind Turbine Generators (WTGs) placed on towers at a suitable height to generate electricity;
- hardstand areas at the base of each turbine tower
- underground high voltage (22 kV) cables between turbines;
- one electrical substation adjacent to the turbine areas;
- a control room and associated buildings;
- access roads, fences and other associated infrastructure;
- temporary facilities within the wind farm site including a site office and amenities, waste transfer facilities, secure and bunded hazardous materials storage facilities and a concrete batching plant;
- a communication tower and two wind monitoring towers; and
- a transmission line connecting the wind farm to the existing grid at the Derby Electricity Substation together with associated access roads.

It is anticipated that the wind farm will be constructed in two stages, with up to 90 turbines installed, depending on the size of machine selected. Three turbines sizes are being considered: Vestas V66 (1.75 MW), V80 (2 MW) and V90 (approximately 3 MW) machines (the model number indicates the diameter in metres of the swept area, for example, the V80 has an 80 m diameter rotor).

Planning approval is being sought for the full development, however the wind farm may be developed in two stages over a three to seven year period.

Indicative phasing for a two-stage development is as follows:

Stage 1: Initial development of a nominal 50 MW wind farm and the construction of a double circuit 110 kV transmission line to Derby, energizing one circuit only; and

Stage 2: Second phase of 90 MW for full development of a nominal 140 MW wind farm.

This timing is subject to external factors such as the implementation of Basslink (an undersea cable that will link Tasmania to the Victorian energy market) and negotiations with Transend Networks. The timing is also partly dependent on the land agreement with the owner of the Cape Portland property. Stage 2 may commence immediately following Stage 1.

2.2 Related Infrastructure Developments

Infrastructure developments related to the Project that are not included in this development application include:

- upgrades to offsite access roads necessary to enable passage of construction vehicles;
- up to 6 quarries located on the Rushy Lagoon and Cape Portland properties for the supply of gravel and aggregate required for construction of foundations and roads;
- upgrades to the existing Norwood to Derby transmission line to meet the required standard to transmit energy from the wind farm; and
- upgrades to the Derby substation.

These developments will be the subject of separate development applications as required.

2.3 Site Selection

Based on wind monitoring studies that have been conducted for more than 6 years the Musselroe site at Cape Portland has excellent potential for wind-generated electricity production. The location was selected for the following reasons:

- the world class wind energy potential of the site;
- large areas of suitable land with vegetation communities which are well represented across the state and do not contain threatened species;
- existing road access;
- a supportive local community which can significantly benefit in socioeconomic terms from the Project;
- remoteness from urban or rural residential areas and few visitors;

- suitable land zoning; and
- no major impediments to establishing a connection to the electricity grid.

The selection of the transmission corridor is also an important part of the Project and was determined in an iterative way using a number of techniques. These included aerial photography, development of a geographic information system (GIS) to incorporate data sets of landform, vegetation communities, threatened species and planning scheme details together with a range of other information. Alignment was refined following meetings with landholders and land management agencies such as Forestry Tasmania.

2.3.1 Wind Farm Development Area

Within the wind farm site, approximately 87% of the total area can physically accommodate wind turbines although only 1 to 2% of this will actually be used. The remainder is made up of wetlands, sand dunes, steep hills and ridges where it is not practical to erect the machines using current best practice without excessive earthworks to create roads, hardstand and laydown areas.

The optimal size of a wind farm depends on a number of variables including:

- cost of construction and operation of the transmission line to connect to the grid;
- cost and specifications of the wind turbine generators (WTG);
- construction and operation costs of the wind farm;
- environmental and technical constraints on the area available for construction; and
- impact of the wind farm on the electricity grid and costs necessary to upgrade the grid to accommodate the proposed wind development.

The development area for the Musselroe Wind Farm also takes into account the environmental and cultural heritage (both Aboriginal and European) constraints identified within the site. For operational management purposes the wind farm site has been divided into three management areas described in Table 2.1 below and further illustrated in Figure 2.1. The management areas are defined to account for physical, environmental and social constraints identified within the site.

The Development Area is where all construction activities can take place. This includes all land on the Cape Portland Property not excluded below. Within the Development Area some areas are identified as having environmental, cultural or social sensitivities that require specific avoidance, mitigation or compensation measures during construction and operation of the wind farm. These issues are identified and discussed in relevant chapters of Volume 2 and technical reports (Volume 4).

Table 2.1: Wind farm site management areas.

Area	Commitment
Development Area	Hydro Tasmania will commit to standard mitigation measures to account for general environmental impacts plus specific avoidance/mitigation or compensation measures with respect to potential impacts on identified sensitive environmental issues within the Development Area.
No Development Areas	Hydro Tasmania will commit to avoiding all development within these areas. On occasions, depending on wind direction, the blades of adjacent WTGs may be within the no development areas.
No Wind Turbine Generator Areas	Hydro Tasmania will commit to avoiding location of towers and hardstands of WTGs in these areas. Other infrastructure such as roads, underground cables and low level buildings may be constructed in this area. On occasions, depending on wind direction, the blades of adjacent WTGs may be within the no WTGs areas.

The No Development Areas consist of areas that hold significant Aboriginal heritage values, high migratory bird utilisation, other significant conservation or ecological values, and/or visual prominence. The No Development Areas are:

- the Lagoon zone and Dune and Marshland zone defined in the management plan for the Cape Portland Private Sanctuary (WD2) (heritage, birds, conservation and visual values, the boundary is defined by fencing that excludes stock);
- the area of Cape Portland west of Charmouth Hill (WD3) (heritage, birds, conservation and visual values, the boundary is defined by fencing that excludes stock);
- the foredunes with wetlands and remnant native vegetation along the north-western boundary of the property (WD4) (heritage, birds, conservation and visual values, the boundary is defined by fencing that excludes stock);
- an area within 500 m of the coastline (defined by MHWM) between Petal Point and Tree Point, and 250 m of the coastline south of Tree Point (WD5) (heritage, birds, conservation and visual values);
- areas within 30 m of wetlands identified as significant for aquatic ecology including Tom's Dam, unnamed lagoons 1, 2 and 4, (WD6) (other significant wetland areas are already included within No Development Areas);
- the areas of remnant vegetation between Unnamed Lagoon 4 and the Little Musselroe River (WD7);
- the area of remnant *Allocasuarina* woodland vegetation on Three Mile Hill identified as significant threatened fauna habitat (WD8);
- all areas of eucalypt forest/woodland (WD9);
- riparian vegetation along the Little Musselroe River and its tributaries, except where road and cable crossing is essential. (WD10); and

- the area within 100 m of the Tregaron Lagoon cemetery (WD11) (heritage).

'No development areas', that are not already protected by existing fencing and are within 50 m of construction areas, will be delineated with flagging prior to and during construction activities.

The No Wind Turbine Generator Areas (WD12) consist of:

- areas within 200 m of the Little Musselroe River (heritage, birds, and conservation values); and
- areas within 200 m of all wetlands identified as significant avian habitat (birds).

2.3.2 Wind Farm Site Layout

The site layout will be determined on the basis of the optimal location of turbines taking account of a range of technical, environmental and economic factors. Details will be confirmed at final design phase and impacts will be managed through strategic micro-siting of the infrastructure within the 'Development Area'.

Three sizes of Vestas wind turbines are being considered for the Project: V66, V80, and V90 units. The number represents the diameter in metres of the swept area of the blades.

Micro-siting refers to the fine-tuning of turbine locations to their final position for construction. This is done once the layout is nearing its final configuration towards the end of the design phase. This involves assessing each turbine position in turn on site so that small-scale technical and environmental features can be considered on the ground. In this way important habitat is protected for species such as Skink.

More information on site layout considerations and micro-siting criteria are provided in Volume 1, Chapter 7.

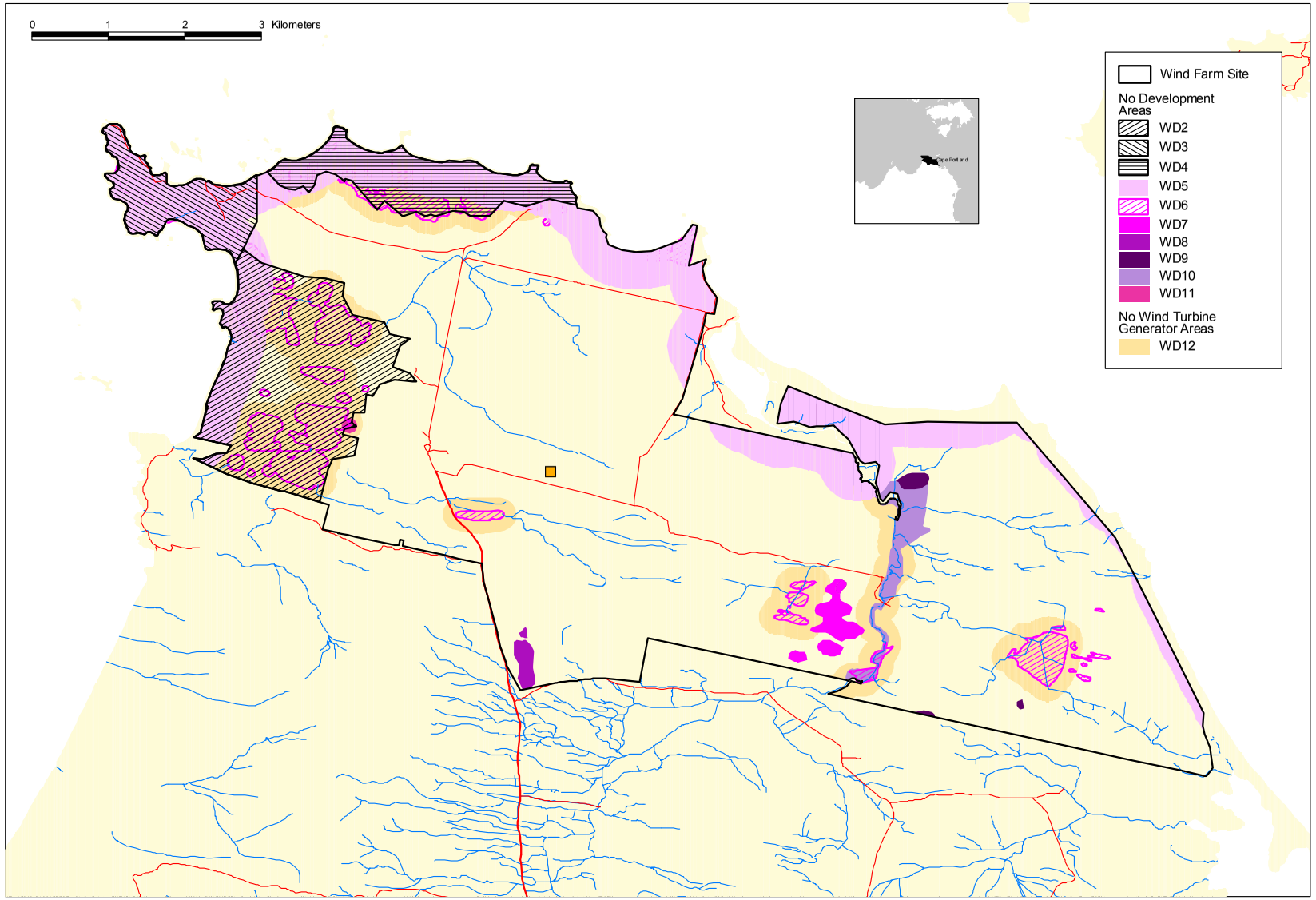


Figure 2.1: Development areas for Musselroe Wind Farm Site.

2.4 Transmission Line Corridor

An overhead, 110 kV transmission line (approximately 46 km in length) is required between the wind farm site and the Derby substation to transmit electricity generated at the wind farm site to the Tasmanian Electricity grid.

For the overhead line, a combination of 'compact' steel poles and lattice type towers is proposed. The transmission line will be a double circuit construction, but only strung on one side initially. The second circuit is to allow for future development in the area, without the requirement for an additional transmission line.

The development application submitted to Dorset Council seeks approval for a planning corridor ('the corridor') to allow for the design and construction of a transmission line, within a 50 m wide easement, and associated access roads between the wind farm site and the Derby electrical substation. The proposed corridor varies in width from less than 300 m up to 3600 m and has been selected following desk-top and field investigations of broad environmental, cultural, social, land use, geological, commercial, economic and engineering issues. Key landholders have also been consulted. A preferred transmission line alignment is proposed, but is subject to finalisation during the detailed design phase of the Project following issue of all required planning permits.

The proposed alignment passes through the large grazing properties of Rushy Lagoon and Boobyalla. It then progresses to the west of Mt Cameron through the Mt Cameron Regional Reserve, State forest, and the Martins Hill Forest Reserve before crossing smaller, irrigated grazing and vegetable production properties around Winnaleah. Finally, it terminates with connection to the Norwood to Derby transmission line at the Derby Electricity Substation (Figure 1.1).

It should be noted that this alignment is only preliminary. The final alignment will require detailed engineering and geotechnical surveys during the final design phase of the Project. The final alignment will fall within a 50 m permanent easement. The easement will be contained within the corridor. Engineering, environmental and land use issues will determine the exact location of each structure.

2.5 Description of Infrastructure

2.5.1 Wind Farm

The function of the wind turbines is to generate electricity by harnessing the energy from the wind. The energy is extracted from the wind by converting the wind flow through the blades into a clockwise circular motion. The nacelle houses the generator, gearbox and the rotor. Electricity from the generator flows via underground cabling to a centrally located substation. The electricity then flows by the transmission line to the electricity grid.

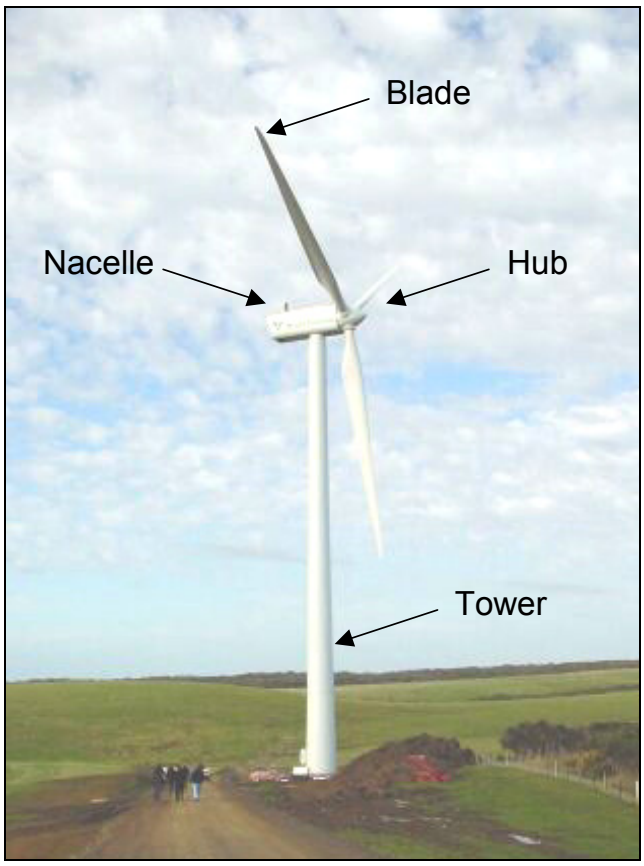


Figure 2.2: Elevation view of major wind turbine components.

The tower, nacelle and blades will be painted white, off-white or very light grey and have a mat non reflective finish. Turbine components are manufactured for coastal environments and have a high standard of protection against the elements in accordance with appropriate international standards.

2.5.2 Transmission Line

The 110 kV transmission line will consist of an overhead line running from the wind farm to the Derby substation. The transmission line will be a double circuit construction, but only strung on one side initially. This is to allow for future development in the area, without the requirement for an additional transmission line. The 110 kV transmission line could be energised at 88 kV, until Transend Networks have upgraded the Derby substation and the Derby to Norwood transmission line from 88 kV to 110 kV (the upgrade has been approved by the Transend Board and is pending the Reliability and Network Planning Panel's acceptance of the Project).

For the overhead line, a combination of 'compact' steel poles and lattice type towers is proposed. Compact poles have been traditionally used in residential and densely settled rural areas, and Hydro Tasmania has chosen them because their visual impact is considered to be less than that of the lattice type towers. Compact poles also have a smaller footprint on the landscape, and will be used through the grazing and vegetable properties around Winnaleah, with the poles placed where possible on fence lines. Lattice towers provide longer span lengths, which reduces the number of poles and therefore total land disturbance. Although it is likely

that only steel poles will be used, lattice towers will be considered in the forestry area where a benefit can be achieved through long span lengths or in other areas where a greater span length is required to cross gullies.

The transmission line comprises suspension poles and tension poles. The conductors that transmit the electricity are generally strung between suspension poles while tension poles are designed to handle the forces associated with turning corners. Due to their greater strength requirements, larger dimensions, and more substantial foundations, tension poles are more expensive to construct and can create greater disturbance during construction. Therefore a route with few changes in direction is preferred.

Engineering, environmental and land use issues will determine the exact location of each structure.

Figure 2.3 shows the typical configurations for the double circuit line structure options that are currently available.

Figure 2.3: Steel lattice tower (left); double circuit rolled steel pole (middle) and steel pole strung one side (right).

2.6 Construction

2.6.1 Wind Farm

Subject to the Project being approved the construction works for Stage 1 and 2 of the wind farm would consist of the following main activities.

The turbines arrive on site disassembled into the four main components:

- tower (in 3 - 4 sections);
- nacelle;
- hub; and
- blades.

The turbines will be erected by use of cranes. An area around the base of each turbine is required for the assembly of the turbine. Figures 2.4 – 2.7 shows the installation stages of the Tower and Wind Turbine Generators (WTG).

Table 2.2: Main construction activities by stage.

Activity
Establishment including temporary site buildings and facilities such as a concrete batching plant for foundations
Road works – upgrade roads on proposed wind farm site
Road works – new access roads on proposed wind farm site
Turbine foundation excavation and concrete plus required hardstand and laydown areas for erection of wind turbines
Supply of wind turbines
Wind turbines installation (assembly & erection)
Control and maintenance building
Substations
Underground cabling
Site revegetation and restoration

Figure 2.4: Turbine erection - tower installation.

Figure 2.5: Turbine erection - nacelle installation.

Figure 2.6: Turbine erection - rotor assembly.

Figure 2.7: Turbine erection - rotor installation.

2.6.2 Connecting Turbines

The underground 22 kV cabling and substations within the wind farm will use standard equipment and methods where possible that are currently employed in similar works for typical housing and commercial subdivisions, as shown in Figure 2.8.

Figure 2.8: Typical 22 kV underground cable installation.

2.6.3 Transmission Line

The transmission line will require an easement 50 m wide. However, it is not necessary for all vegetation within this 'strip' to be removed. Only vegetation growing within three to four metres of the conductors and large trees or branches, that may fall onto the line and cause outages, need to be removed for safety and reliability reasons.

Low scrub and undergrowth that does not interfere with the clearance requirements of the conductors will be retained to preserve the natural habitat and appearance of the area and the soil binding benefits of vegetation. In sensitive areas, clearing will accommodate habitat issues,

and hollow-bearing trees and habitat trees will be retained where practicable, and lopping and scalloping of vegetation will be carried out.

Compact steel poles are prefabricated (rolled, drilled and galvanised) in factories and will be transported in sections by truck and joined together on site. The pole will be pre-assembled in sections on the ground, pressed together and installed as one piece using a crane.

2.7 Wind Farm Operation

Modern wind turbines can be operated using skills similar to those currently used for hydro power stations. Initially the wind farm would be operated by the local autonomous controls. When the wind farm is of sufficient installed capacity to warrant its installation, the wind turbines will be operated automatically from Hobart. All necessary operating strategies would be programmed in the automatic controls. The operator would only be required to monitor operation on a routine basis by checking data displays and accessing condition monitoring data.

2.7.1 Turbine Maintenance Requirements

The scheduled maintenance requirements will depend primarily on the number and design of the turbines. Scheduled maintenance is typically broken down into different maintenance periods such as semi-annual, annual, and four-yearly maintenance.

Monthly maintenance is required on each WTG and electrical infrastructure. Routine scheduled maintenance is usually required every six months. It involves the inspection of all machinery, greasing of bearings, checking of hydraulic oil, and so on. For generator maintenance activities, access is via an internal ladder within the tower.

From recent trends with the current V66 design, replacement of 10% of the gearboxes within a 5-10 year period can be expected. This would mean around seven major replacements at the Musselroe Wind Farm during that period. Some design alterations have been made to the V66, which will be reflected in the V80, and this should reduce the number of gearbox replacements required in the future.

Periodic painting of the tower structure is another major maintenance procedure to be considered. Patch painting is expected to be necessary at regular intervals. The tower structure may need repainting after fifteen years. It is unlikely that the fibreglass blades or the fibreglass nacelle will require repainting during the design life of the wind turbines.

Other minor maintenance would be carried out as required. This includes activities such as the replacement of electronic components such as computer boards or sensors and electrical components such as contactors and circuit breakers.

In principal, the site visits will be minimised where possible but when the full development is in place, maintenance for up to 90 turbines will effectively involve full-time employees working on each turbine on a rotational basis.

2.7.2 Other Maintenance Activities

Roads and hardstand areas, including drainage and erosion control structures, will be maintained to ensure that access is available to all structures. The maintenance requirements that are identified during periodic inspections will be arranged by the local maintenance patrols. Procedures to be implemented for the monitoring of site access roads and hardstand areas will be detailed in the Operation Environmental Management Plan.

The substation will require routine maintenance including insulator cleaning, removal of debris from the switchyard, greasing of contacts, and other works will need to be carried out.

2.8 Decommissioning

The WTG are designed to have a life span of 20 - 25 years. After this time the wind farm may be replaced, subject to relevant approvals processes, or decommissioned. Decommissioning of the wind farm after this period would firstly involve electrically isolating the turbines from the substation.

Rotors and nacelles would be lowered to the ground using a suitable crane and removed from the site for appropriate disposal or recycling.

The steel tower sections would be disassembled and would be cut off at the top of the foundation concrete. The hardstand area would then be rehabilitated.

Access tracks not required for ongoing land use activities would be rehabilitated and light scarifying, fertilising and seeding may be appropriate in some circumstances. Natural regrowth will be encouraged, and planting of local provenance species may be appropriate in some areas. A weed control program would be carried out for several years after all infrastructure is removed if required.

All the substation above ground infrastructure would be removed and reused if appropriate, recycled or disposed

A site contamination assessment of the switchyard area would be carried out at this stage, and any contaminated material removed from site to an appropriate disposal facility.

Foundations in the substation would then be broken up and buried on site or removed for disposal, and below ground substation infrastructure will be dug up and removed. A validation survey will then be carried out to ensure that all contaminated material at the substation has been removed. Any contaminated material identified will be removed from site to an appropriate disposal facility.

Land Tenure and Planning 3

3.1 Introduction

The Project falls entirely within the area covered by the Dorset Planning Scheme and intersects a number of Resource Management Areas (RMAs) under the scheme (see Figure 3.1). RMAs reflect dominant land uses, land capability or special natural or other resource features such as biodiversity. The Project is not in conflict with the objectives of these RMAs because a precautionary approach has been taken and the development will not impact on physical integrity or biodiversity. It also enhances community development and infrastructure along with the economy of the municipal area.

Legal advice received confirms that for the purpose of the development application to Dorset Council, Hydro Tasmania is regarded as a statutory authority exercising a public function in the provision of:

> "… A major electrical substation, power generation station, and transmission lines of greater that 66kV…"

Within the area covered by the planning scheme a Utility Service (Major) is a discretionary use within the Rural Plains Resource Unit and the Rural Coastal and Rivers Resource Unit. The development of the wind farm is required to demonstrate compliance with the performance criteria specified in each of the RU's. Readers requiring more information are directed to Volume 2 Chapter 2 of the DPEMP.

Dorset Council also have in place a Sustainable Development Strategy, and this Project is entirely compatible with that strategy. The Project will contribute to diversification of the local economy, potentially increase tourist activity, is sustainable as the energy generated will be from a renewable resource, and has no adverse impact on natural resource values. Whilst visual amenity is an issue, there is wide spread community support for the development and the wind farm itself could become a visitor attraction.

Construction of the wind farm is to take place on private land under a lease arrangement with the landholder. The land is primarily used for grazing purposes and, as the turbine towers occupy only a small area of the total site, there is opportunity for multiple use of the land. There will be no significant adverse impact on grazing activity, except during construction activities.

The proposed alignment of the transmission line intersects the Mt Cameron Regional Reserve, State Forest, the Martins Hill Forest Reserve and private land. Discussions have been held with the relevant management authorities to avoid particularly sensitive areas or minimise potential adverse effects. Affected landholders have also been consulted.

Ongoing communication with network management authorities will enable the construction and operation of the transmission line to avoid, mitigate or compensate adverse impacts on sensitive areas.

Figure 3.1 provides a map of the resource management areas and specific resource units that will be impacted by the wind farm and transmission line to Derby. The following section 3.2 provides a summary of the land tenure for the wind farm and transmission corridor.

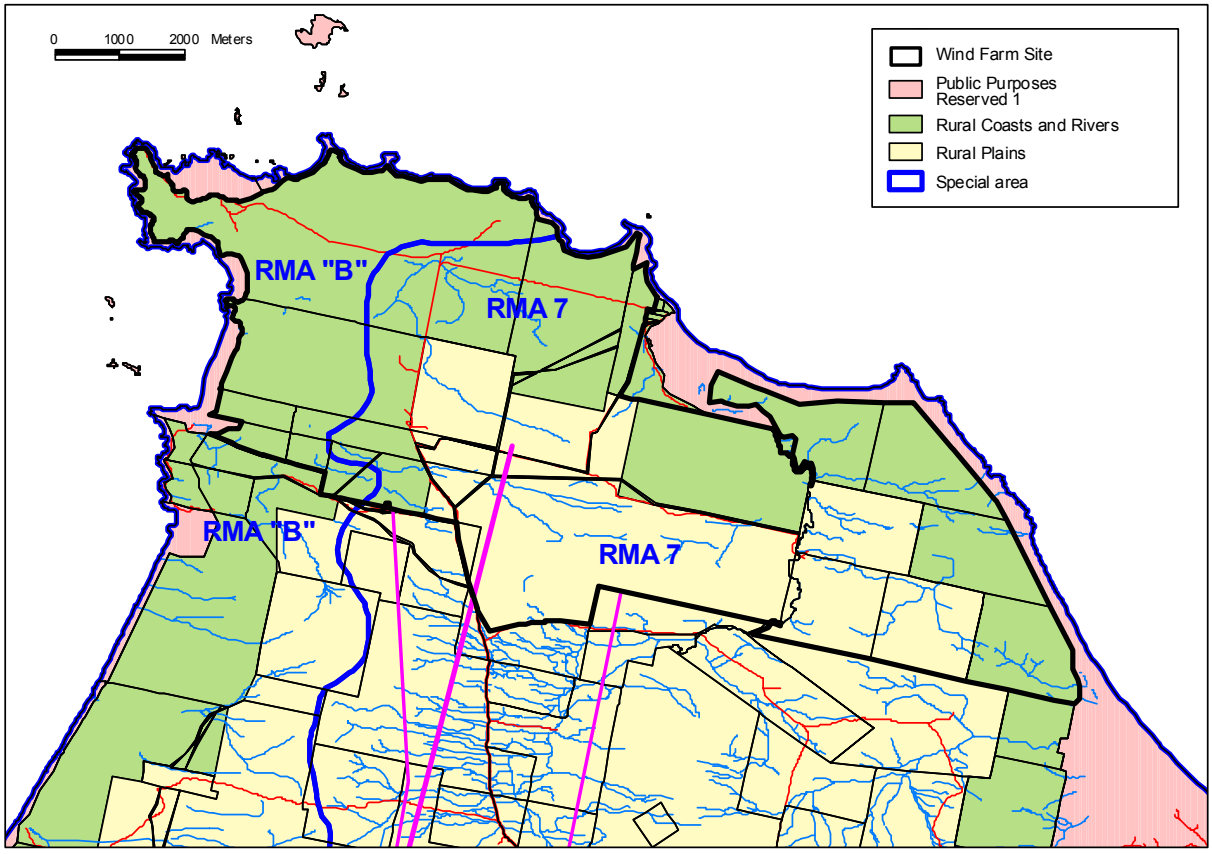


Figure 3.1: Dorset Planning Scheme Resource Management Areas in the Project area.

3.2 Land Tenure

The wind farm site is contained within private land and encompasses the Cape Portland Wildlife Sanctuary. The Sanctuary is divided into 3 zones, Lagoon, Dune Marshland and pasture. No wind turbine generators will be placed within the Lagoon zone and Dune and Marshland zone. Transportation of wind turbine components, construction materials and machinery may have direct impacts upon some adjacent land tenures types during the construction process, but will be managed through a detailed Construction Environmental Management Plan (CEMP) . The CEMP has to meet with the permit conditions of the regulatory authorities and is therefore directly linked to the project approval process.

The land tenure adjacent to the Site includes:

- conservation area;
- coastal reserve;
- unallocated crown land; and
- crown reserve.

The other component of the Project, the transmission line, intersects or is adjacent to the following land tenure types:

- private land;
- Mt Cameron Regional Reserve;
- Little Boobyalla Conservation Area;
- Lower Ringarooma River Flood Plain Ramsar Wetland;
- State Forest;
- Martins Hill Forest Reserve; and
- Great Northern Plain Register of National Estate.

As with the construction of the wind farm, similar CEMP requirements will be met as the transmission line is constructed. A summary of the major management issues is presented below.

3.3 Management Issues

The Project seeks to further the objectives of the Rural Plains, Rural Coasts and Rivers, Mixed Rural and Intensive Agriculture Resource Units of the Planning Scheme. The Project demonstrates that it will meet all scheme standards by virtue of complying with the performance criteria of each Resource Unit.

The Project will have minimal adverse impacts on the current land use activity within the transmission line corridor. Any impacts will be primarily localised and for a short period of time, mainly during construction works. Grazing activities will remain largely unhindered during the operation of the wind farm and transmission line and current recreation activities will continue.

The Project also seeks to further the objectives of Tasmania's RMPS and LUPAA, which are detailed in full in Volume 2, Chapter 2 and Volume 3, Chapter 2 of the DPEMP.

Many of the planning scheme objectives are also addressed in other chapters of each volume of the DPEMP and should be referred to by readers requiring detailed information addressing specific issues. Avoidance, mitigation or compensation will be considered for all impacts identified.

The following measures will be adopted (as commitments) in regard to land use issues associated with the transmission line development:

- placement of poles will be discussed with landowners to reduce the impact to farm operations and agricultural production;
- compensation will be paid to affected landowners in connection with the acquisition of an easement based on the level of impact of the transmission line and structure locations;
- construction and maintenance crews will be instructed to leave gates as they found them, keep vehicles to the agreed access roads and easement, to take all their rubbish with them and to avoid disrupting farming activities;
- wherever damage to soils and roads occurs, Hydro Tasmania will repair the damage or provide the landholder with funds and materials to repair the damage;
- NPWS and Forestry Tasmania will be consulted with regard to the transmission line passing through the Mt Cameron Regional Reserve and Martins Hill Forestry Reserve respectively; and
- Hydro Tasmania will liaise with the appropriate authorities prior to construction to determine the appropriate construction procedures where the transmission line crosses roadways and other infrastructure. Statutory clearances of the power line above roads will be maintained.

Physical Environment 4

4.1 Topography, Soils and Climate

The climate, topography, geology and soils largely determine the physical environment of the wind farm and transmission corridor. The topography of the Project area extends from coastal dunes, to undulating plains and low hills rising to some 300 m. Annual rainfall in the area generally ranges from 625 to 800 mm but can be as high as 1 250 mm inland. The combination of topography and rainfall impacts on the characteristics of ground and surface waters.

4.2 Geology

The geology for the wind farm site and the transmission line corridor are very similar. The geology is generally comprised of Quaternary sediments overlying Jurassic dolerite, Tertiary basalt and Devonian granitoids. The area also has significant geo-heritage values. A detailed survey of geo-heritage sites was conducted by referring to the Tasmanian Geo-conservation Database, examination of air photos, topographic and geological maps, site visits to key areas and a light plane overview of the entire corridor.

Neither wind turbines nor power poles will be erected where activities could impact on these geo-heritage values. The Hasties Eocene Fossil Site will not be impacted upon with the intended alignment of the proposed transmission line. The Cape Portland Cretaceous Volcanics site near Tank Hill, however, may be impacted upon by mechanical disturbance or by the covering of the surface outcrops. The potential for wind farm construction to impact on this site will not be known until detailed tower siting has been completed. Some disturbance to the site on Tank Hill will not significantly affect the geo-conservation values of the Cape Portland Cretaceous Volcanics as a whole, and may provide the opportunity for additional subsurface material (made available during foundation excavation) to be made available for research.

4.3 Soils

An analysis of soils within the proposed wind farm development area and transmission corridor was carried out using the 'Land Systems of Tasmania' data published by the Department of Agriculture and the Department of Primary Industry (both precursors to DPIWE - Department of Primary Industry, Water and Environment). Descriptions and soils characteristics of land systems on the Site and in the Corridor are shown in Tables 4.1 and 4.2. Readers requiring more information are directed to Chapter 3 in both Volume 2 and Volume 3 for further discussion.

Table 4.1: Description and soils characteristics of land systems traversed by the Site.

Name	Description	Soils	Risks
Low Head	Low hills formed on Jurassic dolerite, characterised by flat crests. Numerous areas, too small to map occur along the coast between Cape Portland and Great Musselroe Bay. Grazing is the major land use, with recreation important in particular localities.	Typically gradational soils.	Sheet erosion is the main hazard.
Cape Portland	Undulating plains formed on Quaternary siliceous marine sands and clays. These plains are generally found directly behind the present coastal dunes of the Waterhouse Beach Land System, but in some cases form on the coast itself. The system has an average altitude of around 60 m, and is generally poorly drained with numerous intermittent lakes and small creeks scattered throughout.	The soils are deep. Ridges of pale yellow sand are generally found close to the coastline and are sometimes found in the form of low coastal dunes. The sandy soil on the flats has an iron organic layer at depth, while on the gently sloping plains it is mottled. A duplex soil with an iron-organic B horizon has developed in the drainage lines. Most of the area is either sown to improved pasture or used for grazing, or remains unimproved.	The major hazards are moderate wind, gully and stream bank erosion.
Waterhouse Beach	Numerous small patches of coastal dunes and beaches formed on Recent sands.	Deep sand soils have developed on all components. The calcareous sands on the beach and foredunes are undifferentiated, while those on the hinddunes are weakly differentiated.	The major hazards are wind and water erosion. 'Blow-out' dunes have developed in areas where the protective barrier of marram grass has been broken. These dunes are migrating inland, causing problems in some areas.

4.4 Potential Impacts on Geology and Soils

The most likely potential impacts of the Project on geological features and soils result from wind, gully and stream bank erosion. These issues can be managed through the development of appropriate construction environmental management plans, rehabilitation where necessary and monitoring.

Wind erosion is a potential risk whenever the protective layer of binding vegetation is removed from surface soils, particularly on the sandy soils of the Cape Portland land system. Several areas where vegetation removal or disturbance has occurred in the past have resulted in "blow outs" or erosion features. Changes to surface drainage during excavation, vegetation clearance or road building could contribute to gully erosion. There is potential for localised soil contamination in the event of an oil or fuel spill or leak from machinery used in the construction of the wind farm or transmission lines.

Table 4.1 Description and soils characteristics of land systems traversed by the corridor.

Name	Description	Soils	Risks
Whiterock Tier	Low rounded hills on Lower Carboniferous - Upper Devonian granite.	Soils are generally stony with gravelly surfaces, and rock outcrops are frequent. In places these granite soils are overlain with windblown sands. The stony and gravelly nature of these soils combined with the relatively low rainfall has prevented land development, although some areas are used for light grazing.	Areas of sandy soils are highly susceptible to wind erosion. Other erosion mechanisms are also present within this land system.
Low Head	Low hills formed on Jurassic dolerite, characterised by flat crests.	Typically gradational soils.	Sheet erosion is the main hazard.
Cape Portland	Undulating plains formed on Quaternary siliceous marine sands and clays.	The soils are deep. Ridges of pale yellow sand are generally found close to the coastline and are sometimes found in the form of low coastal dunes. The sandy soil on the flats has an iron organic layer at depth, while on the gently sloping plains it is mottled. A duplex soil with an iron-organic B-horizon has developed in the drainage lines. Most of the area is either sown to improved pasture or used for grazing, or remains unimproved.	The major hazards are moderate wind, gully and stream bank erosion.
Mt William	Low hills on Devonian granite and granodiorite.	Gradational soils have developed on all four components. Those on the upper slopes and crests are gravelly, while those on component 4 are mottled. The main land uses are grazing and forestry, with large areas set aside as zones of nature conservation.	Sheet and rill erosion are the main hazards.
Gladstone	Undulating plains formed on Tertiary clays and gravels.	Whole coloured or mottled duplex soils have developed on these plains. Although this system does not contain the large gravel component so characteristic of the Bridport Road Land System, small areas of white gravel soil do occur. Approximately half of the area has been cleared and is used for grazing. The rest remains undeveloped or is used for hardwood forestry and firewood production. In the past large areas where used for alluvial tin mining.	Massive erosion of old mine workings is occurring as they are devoid of vegetation, with subsequent siltation of creeks and rivers that drain the area. The eroded material forms large deposits of silt at the mouths of many of the major rivers in the north-east.
Elliot	Formed on Tertiary basalt these low hills trend mainly NE - SW.	Deep red gradational soils are found on the crests, scarps and slopes. The soils on the crests and scarps are often rather stony, with floaters of basalt scattered throughout the soil profile. The clay soil in the drainage lines has a low permeability. Minor areas of yellowish brown duplex soils with a coarse structure occur throughout the system. This system is one of the most important agriculturally in the region. Almost the entire area has been cleared and is used for cropping and grazing.	Sheet erosion, mass movement and stream bank erosion are the major hazards. Small slumps and landslips are scattered throughout the system, especially on the scarps.
Waterhouse Beach	Numerous small patches of coastal dunes and beaches formed on Recent sands.	Deep sand soils have developed on all components. The calcareous sands on the beach and foredunes are undifferentiated, while those on the hind-dunes are weakly differentiated.	The major hazards are wind and water erosion. 'Blow-out' dunes have developed in areas where the protective barrier of marram grass has been broken. These dunes are migrating inland, causing problems in some areas.

4.4.1 Mitigation Options

The potential impacts identified can be avoided or mitigated with appropriate erosion control, rehabilitation and other management measures. The aim of rehabilitation after the wind farm's construction is to return the Site's hydrological characteristics to a similar state to before construction. This will involve rehabilitating disturbed areas not required for ongoing operations and maintenance activities by reinstating the land's original contours as far as possible, and revegetating and returning the land surface to acceptable permeability.

The management strategies for the Project will be contained within the Construction Environmental Management Plan (CEMP); erosion and sedimentation management and general construction requirements.

In addition to the CEMP proposed for both the wind farm and transmission line, Hydro Tasmania proposes to make a number of commitments that are likely to be incorporated in the planning permit once the Project is approved by Council. The Commitments process is illustrated in consolidated form at the end of this project summary.

4.5 Ground and Surface Water

4.5.1 Surface water

The wind farm site is located within the Musselroe-Ansons and Ringarooma Catchments, where rainfall is about mm per annum. The Site is generally poorly drained, containing a number of small water bodies, drainage lines, farm dams and wetlands. The predominant land use is grazing. Due to stock grazing, the streams and drainage lines within the area are subject to land use influences, with some impacts on drainage patterns, local hydrology and water quality. In some areas there is substantial surface erosion, particularly along stream banks.

The proposed transmission corridor is located within the Musselroe-Ansons, Ringarooma and Boobyalla-Tomahawk Catchments. The area traversed by the proposed transmission line primarily consists of undulating plains and low hills, less than 300 m above sea level, and receives between 625 and 1 250 mm of rain per annum. Drainage is constrained by the low topography and reduced permeability of the clay soils that have formed in the drainage lines and as a result, a number of small drainage lines, wet areas and intermittent and perennial swamps have formed in the area.

4.5.1.1 Ground Water and Salinity

Groundwater at the wind farm site is predominately used for stock watering and is considered to have a high saline content. An 18-month salinity study by Mineral Resources Tasmania over a 3 km^2 westward draining catchment in the central north of the Site has identified a number of areas of heavily saline groundwater which occur close to the surface.

Likewise, groundwater along the proposed transmission corridor is also predominantly used for agriculture and stock watering. Waterlogging can be prevalent in some areas of the north-east region due to high water tables (<1 m in some areas), low relief, poor drainage and low soil permeability. Salinity is a hazard in the area, particularly on the undulating plains. The extent of salination in north-east Tasmania has not been quantified, except for the studies done by Dell (2000) and Howlett (2000) at Cape Portland (see Volume 2 Chapter 4). These studies indicated that flat lying areas at the base of low hills are most likely to contain heavily saline groundwater, which results in surface salt precipitation and scalding. Currently, there is no evidence of damage to infrastructure as a result of dry land salinity in Tasmania.

4.5.2 Potential Impacts

4.5.2.1 Surface water

The main threat to surface water quality is increased sediment loads as a result of construction activities, installation of underground electricity cables and/or transport related issues. Most disturbances will be temporary, arising as a result of construction activities.

The use and storage of fuels and oils on site creates a potential threat to surface water quality during the construction and maintenance phases of the Project. Physical disturbance to river and stream banks could also arise as a result of the construction of tracks and vehicular movements along the transmission line easement. This could lead to erosion of banks, increased turbidity levels and downstream sedimentation.

These issues are discussed in detail in chapters dealing with Hazard and Risk in volumes 2 and 3, and are generally controlled by the adoption of recognised management procedures. These procedures are also documented in Hydro Tasmania's ISO 14000, certified, environmental management system.

4.5.2.2 Groundwater and salinity

Changes in surface water hydrology could potentially lead to changes in groundwater levels. As the total area of wind farm infrastructure and construction activities will affect less than 1% of the Site and will be mostly confined to more elevated areas, the Project is unlikely to cause a significant impact on groundwater levels or conductivity.

Movement of heavy machinery along the transmission line easement could result in an increased rate of sheet and rill erosion by reducing infiltration rates and increasing the potential for overland flow. The installation of the transmission line poles may alter the local groundwater flow, potentially resulting in the desiccation, swamping and/or salination of some areas. These changes in surface hydrology may, in turn, lead to changes in groundwater levels.

4.5.2.3 Hydrology

As the wind farm will affect only 1% of the Site the alteration to drainage patterns will be minimal and the Project will not significantly alter flood patterns at the Site.

4.5.3 Mitigation options

The management strategies for the Project will be contained within the Construction Environmental Management Plan (CEMP). In addition to the CEMP Hydro Tasmania proposes a number of commitments. These commitments are detailed in Chapter 10, Volumes 1 of the DPEMP with the process summarised at the end of this document.

Biological Environment 5

5.1 Wetland Ecology

5.1.1 Description

The assessment of hydrology and wetland issues was derived from desktop studies, reviews of existing information, including the draft management plan for the Cape Portland Wildlife Sanctuary, and field survey.

As stated earlier the transmission corridor and wind farm site are located within the Musselroe-Ansons, Ringarooma and Boobyalla-Tomahawk catchments. The low topographic relief combined with low rainfall means that most of the streams in the region are ephemeral, flowing mainly in winter and during summer storms. The Cape Portland property contains a number of wetlands, six of which are listed in the Directory of Important Wetlands in Australia, and have been nominated for their ecological values.

There have been no large-scale hydrological studies conducted at Cape Portland, but it is known that the water table varies from depths of < 1 m on the flats to < 2.5 m on the top of hills. Lagoons on the wind farm site along with other wetlands in north-east Tasmania represent an environmental mosaic of different habitat types. With regard to fauna, the threatened wetland species known or likely to occur in the Project area are the Green and Golden Frog, Dwarf Galaxid and Striped Marsh Frog.

The Ringarooma River is the main drainage line intersecting the transmission corridor draining into Ringarooma Bay. Others include March Creek, Vicarys Creek, Little Boobyalla River, and Walpole Creek. Water quality in these water bodies is influenced by land management practices such as grazing and soil disturbance. Small scale drainage diversions, irrigation dams and flow regulation structures are present on some drainage lines.

5.1.1.1 Potential Impacts

The potential hydrological and wetland impacts of the Project result from activities associated with construction. These are particularly associated with sedimentation caused by run-off resulting from road construction, the formation of hardstand areas for turbine towers and the construction of transmission lines. The potential negative impacts on wetlands are:

- degradation of wetlands by movement of machinery;
- decline of water quality due to sedimentation caused by construction activities;

- loss of amphibian breeding habitat; and
- decline in vegetation integrity through the introduction of weeds.

With regard to the transmission corridor, the potential negative impacts result from physical disturbance to river and stream banks due to construction tracks and vehicle movement along the easement. Disturbance to soil and riparian vegetation during the erection of power poles is a further potential problem unless corrective action is taken to prevent sedimentation, turbidity and the adverse consequences for aquatic ecology. The main threat to groundwater is through construction activity where the water table is shallow.

Compaction caused by passage of heavy machinery may result in increased sheet and rill erosion and could also disrupt groundwater flow. The greatest risks are in the flatter areas where sub-surface salt could rise to accumulate at the surface causing scalding of grasslands.

5.1.2 Mitigation Options

The mitigation strategies to manage the above mentioned risks will be contained within the Construction Environmental Management Plan (CEMP). In addition to the CEMP prepared for both the wind farm and transmission line, Hydro Tasmania will implement a number of major commitments that are listed in Chapter 10 of Volume 1 covering both the wind farm and transmission corridor. More information on ground and surface water and wetland ecology can be found in Chapters 4 and 5 of Volumes 2 and 3.

5.2 Flora Values

5.2.1 Description

Information on the flora present at, or near, the proposed wind farm site and within the transmission corridor was derived from both desktop and field studies.

Much of the wind farm site and transmission corridor have been substantially modified as a consequence of land clearing for agriculture. Nevertheless, the entire wind farm proposal has been subject to an iterative design process aimed at avoiding further habitat and remnant vegetation disturbance.

5.2.1.1 Wind farm site

The 'Cape Portland' Property is largely cleared of native vegetation and supports extensive areas of introduced pasture. The remnant vegetation falls into 12 recognisable native communities:

- *Allocasuarina* forest;
- *Eucalyptus amygdalina* forest;

- *Melaleuca ericifolia* swamp forest;
- *Melaleuca squarrosa* short swamp forest;
- blackwood on flats;
- tall dry scrub;
- shrubby coastal heath;
- wet heath;
- herb field;
- bracken;
- sand dune vegetation; and
- wetlands (generic).

Within these native vegetation remnants 175 native plant species and 21 exotic plant species were recorded. Of these, the following species (see Table 5.1) are listed as significant in State Legislation.

Table 5.1: Flora species of conservation significance recorded on the Wind Farm Site.

Species	Conservation Status[1]
Acacia ulicifolia (juniper wattle)	Rare (TSPA)
Austrostipa bigeniculata (rare spear grass)	Rare (TSPA)
Calocephalus lacteus (milky beauty heads)	Rare (TSPA)
Cotula vulgaris australasica (slender cotula)	Rare (TSPA)
Pomaderris paniculosa paralia (shining pomaderris)	Rare (TSPA)

[1] Tasmanian *Threatened Species Protection Act 1995* (TSPA).

5.2.1.2 Transmission corridor

Nearly half of the native vegetation along the transmission line route has been cleared for pasture (48%) while a further 1.6% is regenerating cleared land. Twelve native vegetation communities were also identified along the transmission corridor including:

- dry coastal *Eucalyptus amygdalina* forest;
- *Allocasuarina verticillata* (she-oak) woodland/forest;
- *Eucalyptus ovata* wet forest (identified and avoided);

- *Eucalyptus obliqua/Melaleuca ericifolia* swamp forest understorey;
- *Melaleuca ericifolia* swamp forest;
- *Melaleuca squarrosa* short swamp forest;
- *Kunzea ambigua* dry scrub;
- shrubby coastal heath;
- wet heath;
- herb fields;
- bracken; and
- riparian vegetation.

Within the corridor 210 native plant species and numerous exotic species were recorded. Of these, the following species are listed as significant in State or Commonwealth Legislation (see Table 5.2).

Table 5.2 Flora species of conservation significance recorded in native vegetation along transmission corridor.

Species	Conservation Status[1]
Acacia ulicifolia (juniper wattle)	Rare (TSPA)
Lepidosperma viscidum (sticky sword-sedge)	Rare (TSPA)
Persicaria subsessilis (knotweed)	Endangered (TSPA)
Spyridium parvifolium molle (spyridium)	Rare (TSPA)
Villarsia exaltata (erect marsh flower)	Rare (TSPA)
Xanthorrhoea bracteata (shiny grass tree)	Vulnerable (TSPA) Endangered (EPBC)

[1] Tasmanian *Threatened Species Protection Act 1995 (TSPA)*; Commonwealth *Environment Protection and Biodiversity Act 1999 (EPBC).*

5.2.2 Weeds and diseases

The following Declared Weeds (*Weed Management Act 1999*) are present on the wind farm site:

- gorse (*Ulex europaeus*);
- spear thistle (*Cirsium vulgare*) and slender thistle (*Carduus pycnocephalus*); and
- African boxthorn (*Lycium ferocissimum*).

Numerous agricultural weed species are present throughout the pasture, beneath the unfenced remnant vegetation and within degraded areas along the transmission corridor. The most abundant are pasture grasses including *Holcus lanatus, Anthoxanthum odoratum, Dactylus glomerata* and *Phalaris* spp.

Evidence of *Phytophthora* is scattered throughout the large remnant of coastal heath in the north-east, other heath remnants on the wind farm site, heaths north of the Ringarooma River and heathy understories south of the river along the transmission corridor. Active infections are evident due to the presence of dead and dying *Xanthorrhoea australis* and *Xanthorrhoea bracteata*. Other susceptible species are also being affected. Older probable infections are evident due to the lack of susceptible species that have presumably been killed in the past leaving a flora dominated by resistant species, most notably *Lepidosperma concavum*.

5.2.3 Potential Impacts

Wind farm and transmission line construction does not require large broad acre clearance but rather patch clearing and a narrow linear disturbance respectively. The impacts on vegetation are, therefore, more associated with edge effects and fragmentation than extensive clearing. Preliminary design for the transmission corridor (based on GIS information, discussions with affected landholders and on ground survey) avoided areas of remnant vegetation as much as possible and is the key mitigation strategy for flora values.

Potential Project impacts on flora values may arise during construction from:

- clearance of native remnant vegetation;
- introduction or spread of weeds or *Phytophthora*;
- disturbance of threatened species and possible destruction of habitat; or
- disturbance of soil and drainage during construction.

Native vegetation may be cleared for construction of turbines, switchyards, towers and roads on the wind farm site and tower foundation and tracks along the transmission corridor.

The potential impacts on significant species are detailed in Table 6.5, Volume 2, Chapter 6 of the DPEMP.

5.2.3.1 Threatened species

A number of threatened flora species have been recorded in the wind farm site and along the transmission line.

Micro-siting surveys and threatened species management processes (see Chapter 6 Volume 2) will be undertaken to reduce the impacts on all significant species where possible.

5.2.3.2 Weeds and *Phytophthora*

There is potential for weeds to be introduced during the construction and operation phases of the Project, particularly in the immediate vicinity of construction sites and along roads and access tracks.

Disturbance and movement of soil infected with *Phytophthora* presents the risk of spreading the pathogen throughout remnants. *Phytophthora* is known to be present in the area and steps will be undertaken to minimise the risk of the disease being spread further particularly in areas that contain susceptible significant species. This will be achieved through contractor training and sanitation programs such as vehicle washdown.

5.2.4 Mitigation Options

General strategies to reduce the impact on flora have been included in the iterative design process and will be carried through to construction and operation phases of the wind farm. Throughout construction and operation phases impacts are mitigated by:

- avoiding habitat disturbance where possible;
- reducing habitat disturbance to essential areas; and
- managing this disturbance where it occurs (by rehabilitation, etc.).

The management strategies for the Project will be contained within the Construction Environmental Management Plan (CEMP) and supported with a number of major commitments. These commitments are detailed in Chapter 10 of Volume 1 of the DPEMP.

Additional mitigation strategies include undertaking rehabilitation of disturbed areas as soon as possible following construction, and using access tracks and formed roads wherever possible. One of the reasons for taking this approach is to control weed invasion and to minimise the risk of spreading *Phytophthora cinnamomi.*

More detailed information on flora values can be found in Chapter 6 of Volumes 2 and 3.

5.3 Avifauna

5.3.1 Description

Regulatory authorities, environmental groups and the community are rightly concerned at the risk of bird strikes associated with wind turbines and transmission lines. This is a key environmental issue and one that has been taken very seriously by Hydro Tasmania. For this reason Hydro Tasmania has gone to great lengths to ensure potential impacts on avian fauna have been identified and can be managed appropriately based on good science.

To this end extensive field surveys to determine avian utilisation of the wind farm and transmission corridor have been undertaken. This information has been augmented by desktop studies and data from 25 years of bird monitoring in the Cape Portland region conducted by Birds Australia. These investigations revealed that 144 bird species (including seven introduced species) have been recorded within the Project area. Of the native species recorded, seven are listed as threatened under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) or the Tasmanian *Threatened Species Protection Act 1995* (TSPA) (see Table 5.3).

Table 5.3: Listed threatened species found in or in close proximity to (within 5 km) the wind farm Site.

Common name	Species name	EPBCA	TSPA
Great Crested Grebe	*Podiceps cristanus*	-	Rare
Fairy Prion (southern sub-species)	*Pachyptila turtur subantarctica*	-	Vulnerable
Little Tern	*Sterna albifrons sinensis*	-	Endangered
Fairy Tern	*Sterna nereis*	-	Rare
White-fronted Tern	*Sterna striata*	-	Vulnerable
Wedge-tailed Eagle (Tasmanian subspecies)	*Aquila audax fleayi*	Endangered	Endangered
Eastern Curlew	*Numenius madagascariensis*	-	Endangered

The White-bellied Sea-eagle *Haliaeetus leucogaster* and Hooded Plover *Thinornis rubricollis* are not listed as threatened under either Act, but are deemed of high conservation significance in Tasmania (Bryant and Jackson 1999) and listed in the Vertebrate Advisory Committee, (VAC) report (1994). Both species occur on the wind farm site.

5.3.2 Potential Impacts

Potential impacts to avian fauna arise during construction and operation of project from:

- disturbance (short-term visual stimulus and noise) to individuals during construction;
- destruction of habitat during construction;
- decline in the quality of habitats by exacerbating existing processes, such as the invasion of weeds (reduce the amount of native sources of food and habitats suitable for breeding) and/or increased access to habitat by introduced predators such as feral cats;
- electrocution; and
- collisions with turbines.

As the transmission cables between turbines for the Project will be underground these do not present a hazard to avian fauna.

5.3.2.1 Disturbance

It is anticipated that disturbance levels to avifauna will be highest during the construction phase of both the wind farm and transmission corridor. However, general disturbance levels will be minimised by restrictions on the movement of people and vehicles outside construction areas. The impact of disturbance at the wind farm site is considered to be of low significance and short term in duration.

Along the transmission corridor the only species identified as being highly sensitive to disturbance was the Wedge-tailed Eagle. The transmission corridor selected specifically avoids a known nesting site of this species. Overall, disturbance arising from the Project will not significantly impact on any avian fauna

5.3.2.2 Destruction of avian fauna habitat

The Project will have no significant impact on avian fauna habitat at the wind farm site or along the transmission corridor. This is due to the low habitat value of most of the development area (because of a history of land clearing, fire and mining activity), the small footprint of the development, and the buffers put in place around areas of significant habitat.

The footprint of the transmission line is a small area around the base of each pylon plus a relatively narrow strip immediately under and adjacent to the transmission line. The potential impact of the transmission line varies depending on the habitat type over which it passes and a significant portion of the corridor passes through cleared or patchy agricultural land, significantly reducing any potential negative impact. Assessment of the various habitat types within the corridor indicates that no significant impacts on avian fauna habitat will occur. Further information is contained in Chapter 7 in Volumes 2 and 3.

5.3.2.3 Collision with turbines

As previously indicated there is potential for birds to collide with the blades of wind turbines. Overseas studies suggest that some guilds of birds are more prone to collision than others, the more susceptible groups are raptors, while ravens, waterfowl and shorebirds are less prone to collisions (Anderson *et al.*, 1999; National Avian Wind Power Planning Meeting IV, 2000).

In the assessment for this Project particular attention has been paid to threatened species, particularly the Wedge-tailed Eagle (Tasmanian sub-species) due to its endangered status, and Commonwealth listed migratory species.

Modelling of the potential collision-risk for listed species likely to use, or observed on, the wind farm site was conducted. The model is based on the approach developed by the National Wind Co-ordinating Committee of the U.S.A, and has subsequently been used for assessing the

potential impacts of wind farms at four sites in Victoria and several sites in South Australia. The model initially assumed that birds fly in straight lines and do not attempt to avoid obstacles even if they see them. However, a conservative avoidance rate of 90% is now used to calculate the potential collision risk. Note that a 90% avoidance rate means that out of ten birds flying directly towards an obstacle, nine will avoid the obstacle and one will collide with it.

Even with the conservative assumptions used in the modelling, no species was determined to have a collision-risk that was ecologically significant at any level.

5.3.2.4 Electrocution and collision with powerlines

Because the intended design of the transmission lines and towers is such that the distance between live-elements is greater then the wingspan of the majority of avian species (particularly raptors), there is little chance of electrocutions occurring. Indeed, transmission lines rarely electrocute raptors (APLIC 1996).

Of the species found in the vicinity of the transmission line easement within the corridor, or likely to migrate through it, none were found likely to be significantly impacted or prone to power line collision.

5.3.3 Mitigation Measures

Strategic siting of project infrastructure aims to minimise the potential impact of project activities on avian fauna. For example, the transmission line alignment was moved to prevent any impact occurring on a Wedge-tailed Eagle nest site located during field surveys.

In summary, the conclusion is that based on the data collected to date in Australia and overseas suggests that birds observe wind turbines and are able to adapt to the structures and avoid them. For example, despite being theoretically an 'at risk' species, the Wedge-tailed Eagle there has been no record of the species colliding with wind turbines at four operating wind farms in Australia where the species occurs. Further, no wind farm using modern large turbines at the wide spacing now used has recorded significant bird fatalities. This Project will have minimal impact on avian fauna.

More information on issues relating to birds can be found in Chapter 7 of Volumes 2 and 3. Also, a range of management strategies have been identified for the Project and these will be contained within the Construction Environmental Management Plan (CEMP). In addition to the CEMP proposed for both the wind farm and transmission line, Hydro Tasmania proposes a number of commitments which readers will find in Chapter 10 of Volume 1 of the DPEMP.

5.4 Non-Avian Fauna

5.4.1 Description

Information on the non-avian fauna present at, or near, the wind farm site and transmission corridor were derived from desktop and field studies. Studies related to the transmission line extended up to 5 km either side of the proposed corridor, and analysis of suitable habitat within 1 km of the corridor. The desktop studies drew on Environment Australia databases, threatened species records, GTSpot, and TasVeg 2000 data sets. The field studies were conducted in October 2001, May and August 2002.

A total of 21 mammal species, four frog species and two reptile species were recorded during the surveys, a further seven species (two mammals, two fish, two invertebrates and one frog) were not recorded during the surveys but are known or considered likely to occur. Of the 21 species identified, ten are threatened species listed under the TSPA or EPBCA, and are known, or considered likely, to occur in the vicinity of the Project site.

5.4.2 Potential Impacts

The impact assessment found that no species were at risk from the development. This is because the "footprint" of the facility is a relatively small proportion of the total Project, and turbines will be not be located in any area of significant habitat. Indeed the majority of turbines will be located on cleared agricultural land. While the transmission line will require an easement 50 m wide within the corridor, it is not necessary for all vegetation within the easement to be removed. Only vegetation growing within three to four metres of the conductors, and large trees or branches that may fall onto the line and cause outages, would need to be cut back. To minimise the potential impact of the transmission line, areas of high quality habitat have been avoided wherever possible. There will not be any significant decline in the habitat quality of any of the vegetation types present as a consequence of this transmission line.

Potential impacts to fauna during construction and operation of the Project could arise from:

- disturbance (short-term visual stimuli and noise) to individuals during construction;
- mortality resulting from construction activities;
- destruction of habitat during construction; and
- decline in the quality of habitats by exacerbating existing processes, such as the invasion of weeds and/or increased access to habitat by introduced predators such as feral cats.
- indirect impact on fauna habitat by the destruction of corridors between patches of habitat, and an increase in the area of edges, which may result in an increase in predation and a decline in habitat quality.

5.4.2.1 Disturbance to fauna

Native fauna may be impacted by disturbance from unusual auditory or visual stimuli such as construction vehicles, which can reduce the habitat values of an area, or impact on breeding success (eg Wedge-tailed Eagles). For most species, if the stimuli are not associated with actual danger to the animal, habituation occurs rapidly (within 2 - 4 weeks) and the reduction in habitat values is therefore short term (as evidenced by the almost complete failure of noise or visual disturbance as a way of controlling pests).

Disturbance levels to fauna will be highest during the construction phase of the Project. However, general disturbance levels will be minimised by restrictions on the movement of people and vehicles outside construction areas.

There are not expected to be significant disturbance effects associated with the noise from the turbines during operation. Wind turbines are very quiet except at higher wind speeds and at these higher speeds the extra noise is difficult to detect over ambient noise.

5.4.2.2 Fauna habitat

While construction of the transmission line will require a corridor of approximately 50 metres width, it will not require all the vegetation within the corridor to be cleared (see Section 5.4.2 above) allowing the impact of the corridor to be reduced. In some types of habitat, such as heath, the transmission line will be able to span extensive areas reducing the impact to the footprint of individual towers and associated access tracks. In addition, wherever possible, infrastructure has been located away from sensitive areas to minimise potential impacts. Overall, there will not be a significant impact on the quality of any habitat type in the corridor.

5.4.3 Mitigation Options

Strategic siting of project infrastructure will minimise the potential impact of project activities on fauna if the Project is approved. Surveys have identified areas of potential habitat for several threatened species, which have been avoided or included in exclusion zones on the wind farm site. Overall, the management strategies for the Project will be contained within the Construction Environmental Management Plan (CEMP). In addition to the CEMP proposed for both the wind farm and transmission line, Hydro Tasmania proposes a number of commitments. These commitments are detailed in Chapter 10 of Volume 1 of the DPEMP.

Human Environment 6

6.1 Aboriginal Heritage

6.1.1 Description

The whole of north east Tasmania has importance to the Aboriginal community for its cultural associations particularly the landscape values, including traditional cultural resources. In discussing the Aboriginal heritage issues associated with this Project it is important to keep in mind that Tasmanian Aboriginal people take a holistic view when considering heritage values. To the Aboriginal community it is the whole area that is important, not just individual aspects such as the animals or Aboriginal sites. This is particularly the case for the lagoon and coastal areas on the western side of the Cape Portland property, which have considerable significance to the present day community for a range of reasons.

The Aborigines of the North Eastern were probably the first tribal unit in Van Diemans Land (i.e. Tasmania) to foster sustained relationships with white Europeans who sailed south to the Cape Portland area as sealers after 1798. These initial links became more profound as the European sealers employed and then lived with members of the North Eastern tribe. This situation changed with colonial policy that required the removal of all Aborigines from their lands by the decree of Governor Arthur in about 1830.

Consequently knowledge of the Aboriginal values of the of the Project area have been derived from background reviews of all existing reports relating to the Aboriginal heritage of the wind farm and transmission corridor and general environs; a review of the Tasmanian Aboriginal Site Index (Summers, 2002; McConnell, 2002); a survey of good visibility areas along the proposed transmission line alignment; and consultation with the Aboriginal community (Summers, 2002).

In relation to the transmission corridor the review of Aboriginal heritage values considered a 2 km wide corridor or 1 km either side of the proposed alignment (McConnell, 2002). Summers (2002) also surveyed areas of good visibility throughout the proposed transmission line corridor. These reports have been provided to The Tasmanian Heritage Office. It should be noted that apart from reviews related to this Project, assessment of Aboriginal heritage values for the corridor and environs is limited, and only two known sites have been identified. These sites (TASI 7768 and 7769) occur in the Marsh Creek area with one an isolated artefact and the other an artefact scatter. Another site (TASI 7767) is approximately 250 m outside the corridor.

The Tasmanian Aboriginal Land Council (TALC) undertook visual assessments of the Project area of the wind farm located entirely within the Cape Portland property. The Survey Area had largely been cleared of vegetation, with the area characterised by fenced paddocks covered predominantly with pasture grasses. At the time of the field survey (November 2002) pasture grasses covered the majority of ground surfaces in the Survey Area. As a consequence, surface

exposures were limited to vehicle tracks, cattle tracks, dune blowouts, areas disturbed by wombat burrows and rocky outcrops.

On the basis of Tasmanian Aboriginal Site Index (TASI) records, and reports on surveys in the wind farm study area, forty six Aboriginal archaeological sites have been identified within, or adjacent to, the wind farm site (including the coastal margin). These sites are mainly middens and middens with artefacts, but include 2 stone quarries, and 8 artefact scatters.

Most of these sites are located within approximately.100m of the coast and fall within one of the Coastal Reserves along the coastline or in the Cape Portland Aboriginal Area (Private Sanctuary). These locations are largely incorporated in the proposed Project exclusion zones. Eleven known sites fall within the wind farm Development Area.

6.1.2 Potential Impacts

Because of the poor ground surface visibility in the study areas, the identified Aboriginal sites are considered to represent only a fraction of the sites that may exist in the Project area. There is the potential for additional sites to be found.

The potential effects on Aboriginal values are detailed below:

6.1.2.1 Identified Aboriginal heritage (non-archaeological)

The project will detract from the spiritual significance that the Cape Portland area has to the Aboriginal community' and impact on visual amenity (and hence the cultural landscape). There is also the potential for construction to impact on traditionally used plants and animals and on remnant native vegetation.

6.1.2.2 Identified Aboriginal sites

Ground disturbance has the potential to negatively impact identified Aboriginal sites within the Wind Farm Site (within 1.5 km of the coast) and the transmission corridor. Potential impacts may arise from construction of hardstands, substations, communications tower, cable installation and site roads, upgrading of existing roads, and power cable installation, and ongoing uses which create ground disturbance over sites and in site areas.

Potential impacts may also arise from the construction of access tracks and the installation of transmission poles and/or towers along the transmission corridor.

6.1.2.3 Potential Aboriginal sites

Potential Aboriginal sites (i.e., as yet unidentified Aboriginal sites) are expected to occur within the Wind Farm Project area and along the transmission line easement. These may be impacted on by the proposed development through ground disturbing construction activities and ongoing

use in the same way as identified Aboriginal sites. These potential sites would be surface sites that have not been identified through previous surveys or sub-surface sites that are not visible without ground disturbance.

6.1.3 Mitigation Options

All infrastructure and development activities will be located to avoid impacting the known Aboriginal sites. The defined *Exclusion Zone* protects the majority of known sites. No development of any kind will be undertaken in the exclusion zone. Prior to works in the development area appropriate buffer zones around known or newly identified sites will be determined in consultation with TALC and the Tasmanian Heritage Office. Areas may be fenced to prevent access but no sites will be sign posted or marked in any way so as to ensure their protection by anonymity.

The management strategies for the Project will be contained within the Construction Environmental Management Plan (CEMP). In addition to the CEMP Hydro Tasmania proposes a number of specific commitments. These commitments are detailed in Volume 1 of Chapter 10 of the DPEMP:

6.2 Historic Heritage

6.2.1 Description

Agriculture and tin mining dominate the historic heritage of the Project area. As with the assessment of Aboriginal values the historic heritage assessment of the Project site and transmission corridor was based on field surveys and a review of databases managed by Forestry Tasmania, the Tasmanian Heritage Office, and Mineral Resources Tasmania. Archival repositories were also searched.

From the 1870's agriculture expanded in north-east Tasmania as the original forest and woodland was burnt and grubbed by settlers. Trees were replaced by sown pasture in order to facilitate the district's pastoral development. After the success of initial activities, some farmers supplemented their income with modest crops of potatoes that also served as a staple winter food for their families. Potatoes also proved commercially successful and in association with other vegetables were welcomed by the growing numbers of incoming tin miners swelling the local population. Pork and tobacco were also specially cultivated for the Chinese tin miners at Moorina, Weldborough and Garibaldi (near Pioneer).

By the early 1900s flax and cereal crops such as oats also became increasingly popular, as did barley as a fodder source for livestock. Prominent post war successes have included the cultivation of vegetable seed and poppies in the Winnaleah district.

Tin mining proved the pivotal factor in the establishment of settled communities between Derby and Cape Portland. The oldest settlements therefore marked the locations of the original tin strikes. For example, Pioneer Township was established after 1876 when William Bradshaw

discovered tin that led to the successful floating of the Pioneer Tin Mining Company. That same year saw perhaps the largest discovery of tin in the region made by the Krushka Brothers at what shortly became the township of Derby.

The establishment of Gladstone in c.1881, Musselroe in c.1884 and South Mount Cameron in c.1904 later followed this earliest generation of tin mining towns. The last township established in the Ringarooma Municipality was Winnaleah, originally known as Taronna when the north-eastern railway reached there in 1919.

6.2.2 Potential Impacts

Despite the extended history of European settlement there are no heritage or declared historic sites listed on the Tasmanian Heritage Register or under the *National Parks and Wildlife Act 1970* within the wind farm site or transmission corridor. Three sites within the boundary of the wind farm development area are listed on the Tasmanian Historic Places Index (THPI). These sites are the mid 19th century Cape Portland Pastoral Property (and associated buildings), Foster Inlet ruins, and Tregaron Lagoon cemetery. All three fall within a designated "no development" zone in the Project area established by archaeological research undertaken for this proposed development. Since Tregaron cemetery is on the edge the zone, a 100 m buffer will be placed around the site. The Project will not impact on any significant vestiges of the Cape Portland Pastoral Property or the other historic features identified.

The following sites listed on the Tasmanian Historic Places Index (THPI) within or near the proposed transmission corridor:

- Little Boobyalla Mine;
- Dry Gut Creek alluvial workings;
- Monarch Mine; and
- Monarch Mine water race.

6.2.3 Mitigation Options

The management strategies for the Project will be contained within the Construction Environmental Management Plan (CEMP). In addition to the CEMP proposed for both the wind farm and transmission line, Hydro Tasmania intends to implement a number of specific commitments. These commitments are detailed in Chapter 10 Volume 1 and readers are directed to this document for further information.

6.3 Visual Amenity

6.3.1 Description

Wind farms, by their nature, require exposed sites to gain the most from the available wind resource and thus stand out in open and visible landscapes. However they also make an impressive visual statement due to their size and the contrast they provide to the surrounding scenery.

Hydro Tasmania recognises that visual amenity is an important environmental concern for many in the community. For this reason independent consultants, employing a formalised Visual Management System (VMS), were used to determine the visual impacts of the Project (both the wind farm and the transmission corridor). Such a system makes an objective assessment of landscape values based on the visual variety of the landform, waterform and vegetation pattern present within a defined landscape unit. Each such unit is then ascribed a high, moderate or low scenic quality value.

Readers requiring more information about the application of the VMS are referred to Volumes 2 and 3 Chapter 11. Sufficient to say here that the VMS used in this study was originally developed by Forestry Tasmania, and has been extensively used as the basis for assessing other types of development and landscape settings. Other assessment methods were also employed by the consultants, and visual amenity issues were addressed through the community consultation processes outlined in detail in Chapter 5, Volume 1.

Consultation demonstrated that there was strong community support for the Project overall, with 89% in favour of the development, although 33% considered the visual impact to be negative, and a further 26% considered the impact positive and (see Volume 1, Chapter 8). Even in situations where impacts are considered negative overseas evidence suggests that concerns about visual impact reduce markedly soon after a wind farm becomes operational (see Simon 1996, Ebert 1999, Dudleston 2000, and National Wind Power 2002; see also Volume 1 Chapter 5 and Volume 1, Chapter 8).

6.3.2 Potential Impacts – Wind Farm

Depending on individual perceptions (or value judgement) some consider that the Musselroe Wind Farm would add scenic interest because of its location in a dramatic low-lying landscape setting. The towers and turbines accentuate the contrast. This notion is illustrated in Figure 6.1 which is a photomontage of the Site with an indicative wind turbine layout as viewed from the shack settlement at Musselroe. Most people believed that the Project does not pose a negative threat to the visual amenity of the area, but some people held strong concerns about the view from Poole.

Figure 6.1: Photomontage of the Site with an indicative wind turbine layout as viewed from the shack settlement at Musselroe Bay.

The visual impact of the wind farm will be relatively significant, and potentially dominant locally, because infrastructure will:

- be seen from a number of publicly sensitive locations, some of which will be in the foreground and targeted, others more distant;
- be a major deviation from the current (and modified) agricultural and pastoral setting of the region, and is of a scale that contrasts with the relatively low lying nature of its immediate surrounds;
- occurs on a site, and is of a scale, that it cannot be screened and in most cases the elements will be located on elevated sites; and
- contrasts strongly with the line, form, colour and texture of the existing landscape.
- affect the sense of space and openness at the wind farm site; and
- may be sited in such a way as to interfere with publicly sensitive views (Petal Point and Little Musselroe Bay) or the views to and from culturally significant features (e.g. the view from the original 'Cape Portland' Homestead).

Computer generated images of potential wind turbine generator layouts viewed from four different locations are shown in Figure 6.2 to Figure 6.5.

Many of these 'visual scale' impacts are inherent in all wind farm developments. Wind farms need to be in windy locations, and therefore by definition the landscape will likely be open and visible. Wind turbines need to be tall to gain maximum advantage of the wind and therefore will be visible from long distances and will contrast, as in this case, with the surrounding low lying topography. However, the use of tower heights of between 93 and 145 m means the apparent height of the development is relatively similar to, and will not overwhelm the scale of, Mt William and Mt Cameron, even when the wind farm is viewed many kilometres to the fore of these features. The Site, itself, however is not pristine, and the landscape has been substantially changed since European settlement due to agricultural, pastoral development and mining in the locality.

Computer Generated Images of potential Wind Turbine Generator layouts.

Figure 6.2: View from Petal Point of Wind turbines in a potential V66 layout.

Figure 6.3: View to the west from the middle of the Cape Portland property, V80 layout.

Figure 6.4: View to the west from Little Musselroe road. Proposed substation is on the left, foreground.

Figure 6.5: View to the west from Charmouth Hill, V80 layout.

In addition, the overall impact of the wind farm on the view from the Musselroe shack settlement (and other views from similar distances) is lessened because the development:

- occupies a very small proportion of the total field of view and is not, therefore, visually dominant;
- occupies less than 10º of the entire horizontally viewed area of the approximately 208º view; and
- is relatively transparent owing to the fact that it consists of a number of individual towers spread across the Site and therefore lacks the visual bulk to compete with the other main elements in the background (e.g. Mt. Cameron).

6.3.3 Potential Impacts –Transmission Corridor

Unlike the wind turbines, the transmission corridor does not add to scenic interest. However the selection of the corridor route has gone through an iterative design process. Landholders and community groups have been consulted, including State agencies such as Forestry Tasmania and the Parks and Wildlife Service, and the route alignment modified as a result of these discussions. In this way adverse visual impacts have been reduced. On the whole, however, the impact of the transmission line is not so overwhelming that it cannot be accommodated within the regional landscape given that there are mitigation measures which can be applied to reduce many (but not all) of the impacts. And, as stated previously, there is strong public support for the overall development, and this has been demonstrated throughout the public consultation process detailed in Volume 1 Chapter 5.

The visual impact of the transmission corridor will vary along its route with the greatest impact being:

- where it traverses areas of dense uniform vegetation requiring substantial easement clearing (e.g. north of Winnaleah);
- where it crosses skylines that are targeted by views (e.g. Ringarooma Tier); and
- where it closely parallels the Tasman Highway.

Higher impacts are associated with more highly visible locations, such as those in the foreground of high-use roads, townships and recreational areas.

As the transmission corridor traverses a range of landscape character types these have been divided into zones based on the landscape units described in the VMS. This approach gives an indication of the public sensitivity of each of the six landscape units along the transmission line corridor. Figure 6.6 illustrates the six zones with the table below providing a summary of the key viewing opportunities from specific locations along the corridor. Table 6.1 summarises viewing sensitivity at points along the corridor.

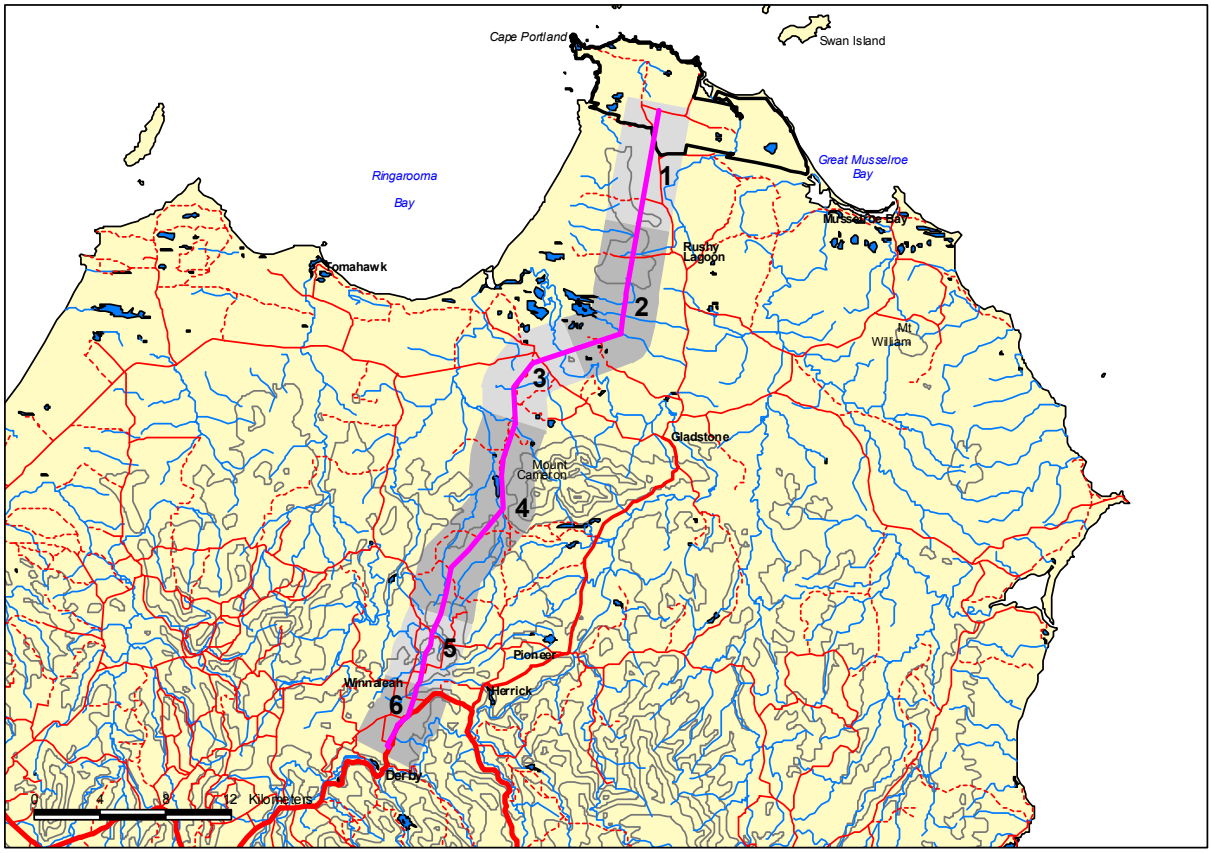


Figure 6.6: Scenic quality zones and prominent landforms along the proposed transmission line corridor.

Table 6.1 Viewing opportunities along the transmission line corridor.

Landscape Zone	Viewing opportunities	Public sensitivity
1. Cape Portland	Foreground views at wind farm site and from Cape Portland Road. Background/distant background views from the road to Musselroe Bay and Mt William National Park.	High
2. Dog Scrub - Mayfield Flats	Viewed in foreground from houses and farmland at Mayfield Flats. Local topography screens most distant views. Some middleground/ background views from Waterhouse Road.	Moderate
3. Waterhouse Road	Seen in middleground and foreground off Waterhouse Road, which is listed as a tourist route. Important views are also available to Mt Cameron from Waterhouse Road.	High
4. Old Port Road	Largely unseen, except from Old Port Road 4WD route and occasional background viewing from walking tracks on Mt. Cameron (potentially also from Mt. Horror which is a 4WD destination). Some higher slopes and ridges of this zone are highly visible from middleground and background.	Low-Moderate
5. Winnaleah	Viewed in foreground of a number of rural roads, houses and one township. Some tourist use of this area.	High
6. Tasman Highway - Derby	Viewed in the foreground of the Tasman Highway, which is a high-use road and highly important tourist road.	Very High

Table 6.1 demonstrates the relatively high viewing sensitivity of the transmission line along much of its length in particular:

- at the start and end of the route (Zone 1) where it is viewed in the foreground and/or middle ground from Cape Portland Road where the landscape is generally open and in the middle ground where it crosses the skyline into the Ringarooma Tier, near Tucker Hill;
- about mid-route where the route crosses Waterhouse Road and is targeted from road in both directions (Zone 3);
- in the area of Winnaleah (Zones 5 and 6) where the route crosses through a more densely populated agricultural area and where there are targeted views from the Tasman Highway; and
- at the end of the route along the Tasman Highway in the area of the memorial avenue (Zone 6).

There are also a number of locations with moderate public sensitivity which occur, and these are:

- through the Mayfield Flats where the transmission line crosses in close proximity to two individual residences;
- walking tracks on Mt Cameron and Mt William; and
- along Old Port Road where recreational use is occasional but where there may be greater use in the future.

6.3.4 Mitigation Options

With regard to the wind farm, Hydro Tasmania will limit the maximum height of wind turbine generators (tower plus blade) to 150 m and comply with the setback requirements of the Dorset planning scheme. Wind turbine generators will not be placed in sensitive coastal environments of the Cape Portland and will be setback at least 500 m from the coastline in these areas. Impacts on sensitive vegetation and fauna habitat will be minimised (see commitments in Volume 1, Chapters 10) and a vegetation management strategy will be prepared. Due consideration will be given to viewing opportunities with improved public access and discreet interpretation signs. Non-turbine infrastructure will be sited to minimise visual intrusion within the rural landscape.

During operation, turbines will be regularly maintained and the Site will be kept free of scrap and rubbish, except where stockpiled appropriately.

Readers should note that a number of recommendations made by the consultants (see Appendix 7, Volume 4) will not be put in place for a number of environmental, economic, operational and practical reasons. These include the fact that wind turbines by reason of their function must be placed on prominent ridgelines to harness the available wind resource.

Much of the existing landscape is highly modified as a result of past land clearing for agriculture and mining activity. Consequently, the visual impacts of the wind farm should be assessed against the major social, economic and environmental benefits on local, regional, state, and national levels

With regards to the transmission corridor, it has been subject to an iterative design process and affected landholders have been consulted with the result that the route has been substantially modified to take account of particular concerns. Existing roadside vegetation will be retained where possible consistent with safety and security of infrastructure. All work will be consistent with a vegetation management plan for the corridor.

Hydro Tasmania will endeavour to minimise visual impacts at Ringarooma Tier by only removing vegetation within 4 m of conductors for safety and security reasons. At Mayfield Flats the transmission line will be located to avoid the existing pivot irrigator. Options for avoiding the targeted view of the historic avenue of trees along the Tasman Highway will be taken into account in the final design. Consideration will be given to the extension of the trees along the Tasman Highway at Derby.

The management strategies to minimise the visual impact of the Project will be contained within a Construction Environmental Management Plan (CEMP). Additional recommendations provided to Hydro Tasmania in the Visual consultants report are discussed in Annex 6. In addition to the CEMP, Hydro Tasmania proposes a number of commitments, which are detailed in Chapter 10 of Volume 1.

More detailed information regarding the visual amenity assessment and mitigation measures available can be found in Chapter 11 of Volume 2 and 3. Readers should also note that the wind farm may not be a permanent feature in the landscape as it has a planned 20-year life and it will comply with the set back requirements of the Dorset Planning Scheme.

6.4 Socioeconomic Issues

6.4.1 Description

The Musselroe Wind Farm Project at Cape Portland has been developed in response to global concerns about climate change. Australia has committed to cap emissions at 108% of 1990 levels and the government is encouraging renewable energy developments through the Mandated Renewable Energy Target (MRET). Located in the Roaring 40's Tasmania is well positioned to meet this demand for renewable energy.

Recent Industry Audits by the State Government identified that the renewable energy industry as an industry that had the potential to grow. Consequently, the proposed Musselroe Wind

Farm is a major component in the planned expansion of Tasmania's renewable energy industry. Indeed, Hydro Tasmania sees the Project as a key step in achieving its goal to be the pre-eminent renewable business in Australia.

As stated previously, in planning this development Hydro Tasmania has actively sought out community views. This has included asking questions about the changes that might result from construction of a wind farm at Cape Portland and a transmission line to Derby. At public meetings and through surveys people were asked about their perceptions of potential changes that may occur if the Project was to proceed. These results are summarised in Table 6.2.

Table 6.2: Public perceptions of likely impacts of the Project, May 2002 survey.

Potential impact	Positive		Negative		No/ negligible effect		Don't know/ undecided	
	no.	%	no.	%	no.	%	no.	%
Tourism	19	70	4	15	3	11	1	4
Property prices	4	15	4	15	15	56	4	15
Visual amenity	7	26	9	33	10	37	1	4
Turbine noise	2	7	2	7	20	74	3	11
Local employment	17	63	2	7	7	26	1	4
Local economy	21	78	3	11	2	7	1	4
State economy	25	93	1	4	1	4	0	0
Native flora and fauna	2	7	4	15	17	63	4	15
Cultural heritage	1	4	4	15	17	63	5	19

Community attitudes to the Project have been positive with people recognising the Musselroe Wind Farm is important because of the employment and investment it will attract. Subject to the project being approved, $270 million will be invested in this development, including associated infrastructure and a transmission line to Derby. The capital expenditure during the construction and operation of the wind farm will provide substantial socio-economic benefits in the Dorset municipal area. As one of several such developments in Tasmania it will also assist in building the critical mass to encourage overseas investment in manufacturing facilities for nacelles, blades and other wind generator components.

6.4.2 Potential Impacts

6.4.2.1 Economic and social

The impacts of the Project will be both direct and indirect. For example, construction activities will require a work force of more than 150 people. Most of the jobs will last between 6 and 12 months and, collectively, the gross take home wages will amount to more than $4M. Indirect

benefits go beyond the provision of income and employment. These include increased demand for services in the area that will have a positive impact on the social and economic prosperity of the region. The purchase of materials, components and contract services is a significant component of total project costs (perhaps as high as 40%). Local contractors are expected to tender for the work, and it is anticipated that component demand will lead to manufacturing investment and job creation. The impact of this additional investment will be felt across the Tasmanian economy, help to secure locally based employment and, over time, lead to export opportunities for consultancy and other services associated with this high technology growth industry.

Once the wind farm is fully operational significant expenditure will also be required to maintain the farm and associated infrastructure. This has been estimated at $40 million over the 20-year life of the Project. Included in this figure is the cost of a four-person full-time maintenance crew. The crew will receive over $3 million in wages, require an office close to the Site, and need to reside nearby. They will also need to procure local goods and services. This will have a positive impact on the local economy long-term.

6.4.2.2 Environmental

Noise and visual impacts are important environmental concerns to the community. Other issues raised related to flora and fauna. These issues have been addressed elsewhere in this summary. The potential for noise to impact on the community is recognised, however this risk is low given the remoteness of the Site. The issue was addressed specifically at the Musselroe public meetings and, given the low level of concern noted in the surveys, it is apparent that attendees were satisfied with the explanations provided and that the consultation process effectively alleviated anxiety about noise.

6.4.3 Mitigation Options

On going community consultation and landholder liaison will continue throughout the construction phase of the Project with the aim of mitigating socioeconomic concerns. More broadly, the mitigation strategies for the Project will be contained within the Construction Environmental Management Plan (CEMP). Specific commitments are detailed in Chapter 10 of Volume 1.

More information about socioeconomic issues is provided in Chapter 8, Volume 1.

Technical Issues 7

7.1 Transport

7.1.1 Description

The Dorset Planning Scheme 1996 requires a traffic impact assessment to be submitted with the DPEMP. At this preliminary stage there are many transport issues that have not yet been finalised. For example, the origin of some wind farm components such as blades. It is probable that the tower sections will be fabricated in Tasmania, however the location of the fabrication will not be finalised until tenders are assessed. A nacelle assembly plant is being constructed near to the Burnie Airport at Wynyard and will assemble the nacelles required for the Project.

The wind turbine blades may be shipped in from overseas or the mainland, alternatively they may be produced locally with establishment of a purpose built blade production facility. The two transformers required would be shipped into Bell Bay and then transported by road to the site. Likewise the conductors and poles will be shipped in to Bell Bay, and then transported by semi trailers to site. The likely route is: Bell Bay Road, East Tamar Highway, Bridport Main Road, Tasman Highway then various local roads depending on actual destination along the transmission line route.

Table 7.1: Typical vehicle requirements during construction.

Equipment	Quantity
Cranes	1 x 20 tonne capacity, 1 x 70 tonne capacity, 1 x 100 tonne capacity and 1 x 600 tonne capacity. These would be expected to stay on-site for the majority of each stage
Trucks	Concrete Agitators, expect to use 5 on-site for each pour Concrete and road material approximately 27,260 - 35,560 trips (including empty return) using truck and trailers for 70 or 90 turbines respectively.
Bulldozer	2 x D7 machine
Excavators	up to 5 (25 tonnes)
Low Loaders	Approx. 100 loads
Rollers	two on-site for the duration of the road construction
Grader	one
Deliveries	Flat bed truck, 350 to 450 deliveries
Cars	1,500 trips

The materials, components and machinery will be sourced locally, or supplied from mainland Australia or overseas. Where possible local contractors will be used. Given the size of some

components such as blades and turbine towers, transport alternatives are being studied including several road options. In most cases existing infrastructure will be used and two potential road systems have been identified which, with some minor works such as bridge strengthening, could accommodate transport of the larger components. The responsibility for sourcing road making material will lie with the civil contractor and is not part of the DPEMP.

7.1.2 Potential Impacts

Building the wind farm and a 46 km transmission line will have short-term transport consequences for other road users. As the Project is staged these are likely to be intermittent. The transport impacts result from:

- transport of oversized and/or overweight components for the wind turbines (tower sections, nacelles and blades) and transmission lines;
- transport of oversized and/or overweight construction equipment such as erection cranes;
- transport of construction materials such as concrete aggregates and sand for tower footings and quarry materials for site roads and hard standings;
- transport of electrical cables, substation and control equipment;
- transportation of workers to and from site; and,
- inspection of the transmission lines via helicopter during the operational phase.

The overweight loads will require an assessment when the actual loads and vehicle configurations are determined. Where road freight is used such loads will be subject to permit conditions as required under the Vehicle and Traffic (Vehicle Standards) Regulations 2001.

The axle loads and frequencies of the larger loads are not anticipated to have a major impact on road pavements. Actual impacts are dependent on a number of variables including sub-grade strength, moisture conditions, pavement materials and thickness, location of loading and other issues. The source of material supply, such as quarry materials for roading, will determine which routes are finally selected and will be subject to tender.

In summary, the potential effects of road transport relate to:

- road pavements;
- bridge structures;
- culverts;
- dust;
- noise;
- vibration; and
- road safety.

7.1.3 Mitigation Options

All transport vehicles will operate to manufacturers design standards. Dust suppression will be carried out on unsealed roads as necessary, and other specific transport management strategies will be contained within the Construction Environmental Management Plan (CEMP). In addition Hydro Tasmania proposes to make a number of commitments and these are detailed in Chapter 10 of Volume 1 of the DPEMP.

Readers requiring more detailed information about issues related to transport for the wind farm and transmission line are referred to Chapter 12 in both Volume 2 and Volume 3.

7.2 Noise and Communication Interference

7.2.1 Potential Impacts

Under EMPCA, noise emissions must not constitute an environmental nuisance. For this Project noise may be associated with construction of the wind farm or transmission line, or with operation of the wind turbines. The proposed transmission corridor lies within a sparsely populated area of mostly grazing land at the northern and southern ends, interspersed with areas of forested and heath country in the central section. There are very few residences close to or on the proposed corridor.

7.2.2 Construction Noise

The main source of noise will occur during construction of the wind farms and the transmission line and will result from truck movements, excavation and general construction activities. The principle activities will be:

- construction of access roads which will involve the use of a grader or a small bulldozer, a roller and trucks delivering road base materials;
- excavation for tower footings/foundations/power poles;
- pouring of concrete;
- digging and backfilling of cable trenches;
- truck movements delivering plant, equipment, construction materials, power poles etc.;
- erection of the power poles, wind turbine towers, generators and blades using a large crane;
- use of excavator and miscellaneous equipment such as chain saws and brush cutting equipment during easement clearing,
- rehabilitation using an excavator; and
- miscellaneous equipment.

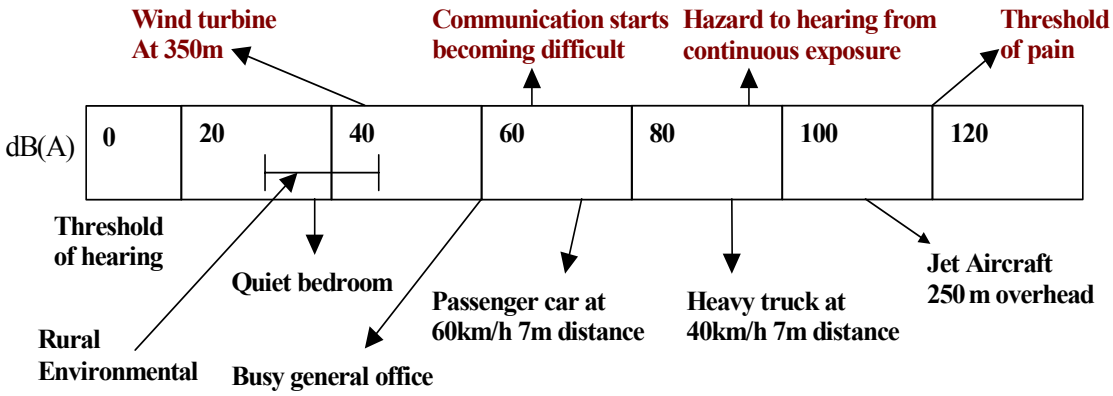
7.2.3 Wind farm noise

Once the wind farm turbines have been commissioned, and the facility is operational, the predominant source of noise will be from the wind turbines. Audible sound results from the aerodynamic movement of the blades through the air. It is a characteristic of wind farm sites in exposed locations that for 70% of the time the speed of the wind is such that the main source of background noise is the wind over the landscape.

When turbine blades are rotating the sound is steady and broadband (i.e. no tones) in nature. A superimposed characteristic of the turbine sound is the "swishing" sound produced by the blades passing the tower. Modern wind turbines make almost no mechanical noise.

With regard to the substation associated with the development, it is expected that the separation distance of the substation from any dwelling will be such that the sound level from it and other sources will comply with acceptability limits derived from background sound levels. To this end the project has been subject to noise impact assessment involved modelling the noise output of the wind farm based on a nominal layout for V66 and V80 machines and combining this data with background noise data to generate an acceptable distance between noise generating infrastructure and dwellings in proximity to the proposed turbine layout. Modelling of a V90 turbine layout has not been conducted at this time as manufacturers information is yet to be received.

A comparison of typical wind turbine noise levels with other common sources of noise is illustrated as follows:



Source: Modified from EECA, 1995.

Currently there are no formal guidelines with regard to wind farm noise in Australia. For this Project the New Zealand Standard NZS 6808: 1998, *The Assessment and Measurement of Sound from Wind Turbine Generators* was selected to form the basis of the assessment as this represents current thinking with regard to best practice.

Once construction is completed the transmission line will not produce any significant noise effects.

7.2.4 Mitigation Options

All equipment will be operated to manufacturers design standards. It is therefore not anticipated that noise from construction activities will be excessive. Work hours will generally be 7am to 6pm, Monday to Saturday for most construction activities. Some construction work may need to be done outside of these hours such as the erection of the wind turbines to take advantage of calm days and low wind speeds.

All indications from modelling suggest that noise from wind turbines will be virtually indistinguishable from background levels at a distance of 350 m. In general terms, distance, topography, vegetation and other shielding reduce noise. Further details regarding noise are provided in Chapter 12 in both Volumes 2 and Volume 3.

7.3 Communication interference

7.3.1 Potential Impacts

In May 2002, Hydro Tasmania conducted an audit of communication services identified as being potentially impacted by the development, before and after wind farm and transmission line construction. The audit included fixed point-to-point and multipoint radio links, mobile radio services and television services. The viewing areas are Cape Portland, Red Hills, Rushy Lagoon and shacks at Little Musselroe and to the north west of the Cape Portland property.

Telstra was contacted in the planning stages of the proposal. Any communication issues associated with Swan Island or the Royal Volunteer Coastal Patrol Link will be further reviewed at the detailed project design stage in consultation with affected parties.

Potential interference problems associated with wind farms emanate from turbines that have metallic or carbon fibre blades. Interference is caused by the rotating action of the blades presenting a large conductive area, which causes the obstruction or reflection. The use of fibreglass/epoxy or plastic blades (i.e. those with limited metallic content) reduces the likelihood of interference caused by the blades, however the risk is not completely eliminated, as to some extent the steel towers also potentially obstruct and/or reflect radio transmissions. Likewise any steel towers used in transmission line construction may have a similar effect.

In the immediate vicinity of the transmission line radio reception could be affected by spurious electro magnetic radiation. Residences should not be affected as they will be at sufficient distance from the line for this effect to be negligible.

7.3.2 Mitigation Options

Any demonstrable loss in standards of radio communication, or TV reception, caused by the wind farm will be overcome by Hydro Tasmania through the upgrading of existing facilities or installation of new facilities as required. In the event that interference to television reception

occurs, Hydro Tasmania will investigate the option of installing `more directional antennae on affected houses, reducing the potential 'ghost image' that may be experienced.

Telstra will be contacted as part of the development process and informed of the possibility of interference effects on the services with a view to negotiating a satisfactory outcome for those affected. It is considered that interference to mobile radio services would be negligible.

Readers requiring more information about the potential impacts of the Project on communication issues, either the wind farm or the transmission line, are referred to Chapter 15 in Volumes 2 and 3 as well as the technical appendix.

7.4 Air Quality and Greenhouse Gases

7.4.1 Description

The enhanced greenhouse effect is generally recognised as the world's most pressing environmental problem and has been addressed through the UN Framework Convention on Climate Change and the Kyoto Protocol to which Australia is a signatory.

The Third International Panel on Climate Change (IPCC) report, published in 2001, has predicted significant changes in local, regional, and global temperatures. Australia will not be immune from these trends and is likely to experience a greater incidence of droughts and floods over the next 50-100 years and international efforts are needed to address the issue.

Australia has the worst per capita emissions of greenhouse gases of any country in the world, but the Federal government has agreed to cap GHG emissions at 108% of 1990 levels as part of its Kyoto commitment. To meet this cap Australia will need to increase the supply of electricity from renewable energy sources. The Commonwealth Government's Mandated Renewable Energy Target (MRET) provides encouragement. MRET requires an additional 9,500 GWh per annum of electricity is to be generated from new renewable sources by 2010.

The Australian Greenhouse Office has outlined the specific objectives of the MRET as follows:

- to accelerate the uptake of energy from renewable or specified waste product sources in grid-based applications, so as to reduce greenhouse gas emissions;
- as part of the broader strategic package to stimulate renewables, provide an on-going base for the development of commercially competitive renewable energy; and
- to contribute to the development of internationally competitive industries which could participate effectively in the burgeoning Asian energy market.

The MRET is based on the recognition that renewable energy is a global key to long-term reduction in greenhouse gas emissions.

Against this background, the Musselroe Wind Farm Project contributes to both the National Greenhouse Strategy and the objective of the *Renewable Energy (Electricity) Act 2000* by

substituting clean, green energy in place of thermal electricity generation which produces harmful GHGs. The Project is also consistent with the Tasmanian Greenhouse Statement; in particular Goal 4, which is to develop alternative renewable energy sources in Tasmania.

7.4.2 Greenhouse Abatement and Energy Balance

By meeting new energy demands with wind generated renewable energy, rather than thermally generated energy, the Musselroe Wind Farm Project will avoid emission of about 370,000 tonnes of carbon dioxide per year. The total reduction in GHG emissions over the 20-year life of the Project is in the order of 7.4 million tonnes ($CO_{2\text{-}e}$). Expressed another way, the annual GHG saving from the Musselroe Wind Farm is equivalent to removing 74 000 cars from the road. This demonstrates the significant local, national and global environmental benefits of the Project. These benefits are considered to outweigh the negative local environmental impacts, many of which can be managed via careful siting of the turbine towers and mitigation measures during the construction program.

One question that does arise is will the wind farm generate more energy over its life than it consumes in manufacture. Danish studies indicate that a modern wind turbine recovers all the energy that it consumed during its manufacture, operation, maintenance, and decommissioning within approximately three months of start up. Consequently the energy produced within the 20 year design life of a wind turbine will exceed by 80 times the energy spent in its manufacture, maintenance, and scrapping. Whilst similar detailed life cycle analysis has not been conducted for this project, because of the complexity in determining transport and local manufacturing content, a broadly similar outcome would be anticipated.

More information on Greenhouse gases and other air quality issues can be found in Volume 1, Chapter 9.

7.5 Hazardous Materials and Waste

7.5.1 Description

Wind farm construction activities do not involve the use of major quantities of hazardous materials, nor do they produce large quantities of hazardous or general waste compared with other forms of electricity generation.

However, hazardous materials will be used during the construction and operation of the Musselroe Wind Farm. Careful management of their handling and storage will be required to mitigate the potential effects on personnel and the environment from exposure to their potentially harmful effects. Control of hazardous materials will aim to minimise the quantities used and to use those with least potential risk.

7.5.2 Potential Impacts

Inappropriate or insufficient management of hazardous materials may result in detrimental effects to soil and water quality. Other materials, land and water may be contaminated by inadequately stored or segregated waste (particularly from controlled waste). This may compromise later use of the Site or involve costly clean up.

The main categories of hazardous materials used will be:

- fuels, lubricating and hydraulic oils for construction and operating vehicles and equipment;
- substation transformer insulating oil;
- other chemicals used during wind farm construction, including concrete admixture chemicals such as surface active agents, plasticisers and form release oil (mineral);
- equipment coolants and maintenance chemicals such as solvent cleaners and paints; and
- herbicides for weed and vegetation control.

7.5.3 Mitigation Options

While the history of wind farms is relatively short in Australia, there is little evidence to indicate any significant risks during the construction and operational phases of such projects from wastes or hazardous materials, which cannot be reduced to an acceptably low level by the adoption of appropriate mitigation measures.

All procedures will accord with those required under Hydro Tasmania's ISO 14001 Environmental Management System as well as environmental laws and regulations. Similar requirements will be placed on contractors.

The management strategies for the Project will be contained within the Construction Environmental Management Plan (CEMP) and specific commitments are detailed in Chapter 10 of Volume 1.

More information on waste and hazardous materials management can be found in Chapter 14 of both Volume 2 and Volume 3.

7.6 Hazards and Risk

7.6.1 Description

Safety, occupational health and environmental hazards are issues that may arise accidentally during the course of the design, construction and operation phases of the Project. For this reason hazard analysis and risk assessment is required to be carried out under the provisions of

the *Workplace Health and Safety Act 1995,* the *Workplace Health and Safety Regulations 1998* and the *Environmental Management and Pollution Control Act 1994*.

The hazard analysis process involved drawing up an inventory of environmental, health and safety hazards identified from previous wind farm projects, discussions with project team members and reference to similar construction projects. On this basis high-risk locations and facilities were identified such as the access roads, turbine and substation sites.

Significant risks from natural hazards such as seismic activity, landslip, and floods are considered unlikely because of the topography and stability of the area. Extreme weather conditions are generally restricted to high (but non cyclonic) winds.

7.6.2 Potential Impacts

The risk assessment highlighted the following (see also Table 7.):

Three hazards were identified as being possible:

- Facilities being damaged by high winds;
- A vehicle accident at or in transit to the site; and,
- Incidents occurring during the construction of phases of the Project by contractors or others.

Further information about these risks are discussed in detail in Chapter 15 of both Volume 2 and Volume 3 and have led to the documentation of a risk analysis matrix. An example is given below.

Table 7.2: Qualitative risk analysis matrix – level of risk.

Likelihood of Occurrence	Severity of Consequences				
	Insignificant	*Minor*	*Moderate*	*Major*	*Catastrophic*
Almost certain					
Likely					
Possible		***2,12***	***6***		
Unlikely			***3,9,10,11,12***	***2,5,7***	
Rare				***4,11,13,16***	

NB: significant hazards shown by scenario number

KEY

Risk Level	***1***	*Low Risk*	*~ manage by routine procedures and general training.*
	2	*Moderate Risk*	*~ management responsibility must be specified, specific training given.*
	3	*High Risk*	*~ senior management attention needed, formal procedures used.*
	4	*Extreme Risk*	*~ immediate action required, physical controls implemented, risk must be avoided.*

7.6.3 Mitigation Options

Project planning, implementation and auditing will ensure that management measures are put in place in order to reduce risks to an acceptable level.

The management strategies for the Project will be contained within the Construction Environmental Management Plan (CEMP). In addition, Hydro Tasmania proposes a number of commitments, which are detailed in Chapter 10 of Volume 1.

Mitigation measures for moderate and high risk levels are outlined in more detail in Chapter 15 of both Volume 2 and Volume 3.

7.7 Other Risks

7.7.1 Fire

7.7.1.1 Description

The majority of the site is pastureland, with some native vegetation remnants and areas of shrubby coastal heath. There is some risk from fires entering the construction area from external sources such as wildfire escapes from the shack areas, or visitors to the area using access roads. Turbine and substation sites will avoid timbered areas and the transmission corridor will be regularly inspected.

7.7.1.2 Potential Impacts

The main bushfire risks that could arise in connection with the proposed Project are those associated with the construction activities and workplace amenities, electrical failure or lightning strike. Some of the risk of fire is reduced in the project area due to the extent of cleared land, however some construction will be required in vegetated areas.

There are also records of fires started within turbines (2 cases in Vestas machines world wide) but this is considered to be very remote and given the cleared areas around each turbine, unlikely to cause spreading. Such a fire, would however, involve the burning of fibreglass and

epoxy resins. Early fire warning systems will be specified with the WTG's, which will shut down the WTG and disconnect energy sources preventing any fire taking hold in the units. Remote alarming of this protection will instigate immediate response to attend the site by the wind farm duty operational officers.

7.7.1.3 Mitigation Options

As the wind farm is sited wholly on private property, Tasmania Fire Services (TFS) will be responsible for wildfire suppression. The successful Contractor and a Hydro Tasmania representative consult with the Tasmanian Fire Service (Regional Officer – North) in the preparation of a Fire Action Plan.

The management strategies for the Project will be contained within the Construction Environmental Management Plan (CEMP). Additional commitments are detailed in Chapter 10, Volume 1 of the DPEMP.

More information on fire management is provided in Chapter 15 of Volumes 2 and 3.

7.7.2 Electric and magnetic fields

7.7.2.1 Description

Electric and magnetic fields (EMFs) are invisible force fields existing in the area surrounding any electrical device. There are four potential sources of electric-magnetic fields (EMF's) associated with the Project. These are:

- the transmission line;
- wind turbine generators;
- generator transformers; and
- underground cables.

7.7.2.2 Potential Impacts

Due to the positioning of the wind turbines some 70 m or more above the ground, the electromagnetic field at ground level can be considered negligible. The largest generator proposed is nominally a 3 MW (V90), and so the generator transformers are not likely to be larger that 3 MVA. These transformers will be mounted within the turbine nacelle, and will have little, if any, effect at ground level. Also, as the windings within the turbine are close together and surrounded by conductive metal, the electromagnetic fields are effectively zero. A 22 kV underground cable network will carry the electricity generated by the wind turbines up to substations within the site. These will be at least 750 m below ground level. Due to the

closeness of the phase conductors in cables, the electromagnetic fields are balanced out to effectively zero.

An assessment of EMFs from the transmission line was conducted. Studies showed that at a distance of 30 m from the conductors EMF levels would be comparable to typical household appliances. Due to the sparsely populated nature of the transmission line route, the EMF impact will be negligible.

No serious or adverse EMF or interference issues are anticipated.

7.7.2.3 Mitigation Options

Hydro Tasmania has adopted a 'prudent avoidance' approach to power line placement. and will locate the power line as far from houses, schools and other sensitive use areas as practicable. A minimum distance of 150 m from residences will be maintained.

Chapter 15 in both Volume 2 and Volume 3 provide further details and Hydro Tasmania has also made a number of commitments to limit potential risks and hazards.

Commitments & Environmental Management Plans 8

8.1 Key Environmental and Social Issues for Management

The Project has the potential for impacts on the physical, biological, cultural and sociological environments of the area. Key issues associated with the Project that are being investigated as part of the environmental impact assessment process (Volumes 2 and 3 of the DPEMP) are listed below:

- potential impact on heritage values and sites in the wind farm area and transmission line;
- potential for impacts to birds, in particular, migratory species and raptors, as a result of collision with turbines and the transmission line;
- potential loss of some native vegetation and fauna habitat;
- noise impacts associated with the construction and operation of the wind farm;
- potential disruption of agricultural infrastructure and land uses, and conversion of agricultural land;
- potential for the spread of weeds and phytophthora dieback into, within and from the area;
- potential for soil erosion;
- potential for sedimentation of waterways and wetlands during construction;
- visual impacts associated with the wind farm and transmission line;
- impact to the recreational values of the area; and
- traffic management of long and numerous loads during the construction period.

Hydro Tasmania will adopt management strategies as part of Construction Environmental Management Plans (CEMPs) and Operation Environmental Management Plans (OEMPs) to address each of the above issues to ensure that the development is consistent with the principles of sustainable development. Current procedures, together with any additional procedures required on the basis of commitments made in this DPEMP, will be implemented as part of Hydro Tasmania's ISO 14001 Environmental Management System.

8.2 Environmental Commitments

A key feature of the DPEMP is a series of commitments made throughout the document at the end of each chapter to address specific environmental concerns. If development approval is granted, these commitments are likely to become Permit Conditions and Hydro Tasmania will have a legal obligation to comply with them. A consolidated table of all commitments appear in Chapter 10, Volume 1. Commitments include monitoring programs to measure compliance with performance requirements. In addition to these commitments, Hydro Tasmania will comply with all legislative and regulatory requirements of the RMPS, Commonwealth Legislation as well as the Planning requirements of the Dorset Planning Scheme.

Following planning approval, and determination of conditions by the regulatory authorities, detailed plans will be prepared spanning the design, construction and operational phases of the Project. These plans will incorporate various statutory and planning requirements together with any agreements that have been created, or commitments that have been made in this document. All work done by contractors and Hydro Tasmania personnel employed on the Project will be required to conform to CEMPs and OEMPs. The CEMP and OEMP will be consistent with Hydro Tasmania's ISO 14001 Environmental Management System.

On-site reporting procedures will be developed and documented to ensure compliance and to ensure that any incidents are addressed promptly and effectively with appropriate authorities contacted where necessary. On-going monitoring of Stage 1 construction and operational practices will be used to inform design and implementation of Stage 2. This iterative process will lead to continuous improvement and delivery of sound environmental outcomes through all stages of design, construction, operation and monitoring. The following section details the process for the implementation of environmental commitments.

8.2.1 Implementation of environmental commitments

Hydro Tasmania has developed a framework for the implementation of Project commitments. Each of the commitments fall within one of the following categories (see Table 8.1):

- design;
- construction; and
- operation.

Design commitments are those relating to how the project is designed and where infrastructure is sited. Design commitments include the studies to be conducted during the design phase and implementation of exclusion zones within which no infrastructure will be sited.

Construction commitments are presented as a series of management strategies that address specific issues associated with the construction phase of the Project. These management strategies form part of the broader CEMP, which will govern all construction activities. Construction management strategies include erosion, traffic and rehabilitation plans.

Operation commitments are presented as a series of management strategies that address specific issues associated with the operation phase of the Project. These management strategies form part of the broader OEMP and include: waste and hazardous materials management, fauna management and bird and bat mortality monitoring.

Table 8.1: Management strategies and monitoring programs associated with construction and operation phases.

Wind Farm	
Construction Environmental Management Plan (CEMP)	**Operation Environmental Management Plan (OEMP)**
Management Strategies	**Management Strategies**
General construction requirements	Vegetation management
Erosion and sedimentation management	Fauna management
Water quality management	Waste and hazardous materials management
Vegetation management	
Fauna management	
Heritage management	
Transport management	
Waste and hazardous materials management	
Safety and risk management	
Monitoring Programs	**Monitoring Programs**
General monitoring requirements	Erosion & sedimentation monitoring program
Erosion & sedimentation monitoring program	Vegetation monitoring program
Water quality monitoring program	Fauna monitoring program
Vegetation monitoring program	Noise & EMI monitoring program
Transport monitoring program	
Waste & hazardous materials monitoring program	
Transmission Line	
Construction Environmental Management Plan (CEMP)	**Operation Environmental Management Plan (OEMP)**
Management Strategies	**Management Strategies**
General construction requirements	General operation requirements
Erosion and sedimentation management	Waste and hazardous materials management
Water quality management	
Vegetation management	
Fauna management	
Heritage management	
Waste and hazardous materials management	
Safety and risk management	
Monitoring Programs	**Monitoring Programs**
Erosion & sedimentation monitoring program	Vegetation monitoring program
Water quality monitoring program	Noise & EMI monitoring program
Vegetation monitoring program	Waste & hazardous materials monitoring program
Waste & hazardous materials monitoring program	

These management strategies and monitoring programs have not yet been prepared in detail, however the commitments within the DPEMP outline the objectives and broad activities to be carried out within each management strategy. The management strategies and monitoring programs will be developed during the design phase of the project and will be submitted to the relevant authorities for review two months prior to the commencement of construction.

The monitoring programs will ensure continual review and improvement of practices. The commitments in this document apply to both Stage 1 and Stage 2 of the Project. The CEMP and OEMP prepared for Stage 1 will also be prepared two months prior to the construction and commissioning periods respectively for Stage 2 and submitted to the relevant authorities. Monitoring and auditing data for Stage 1 and Stage 2 will be used to improve practices adopted for Stage 2. Figure 8.1 and 8.2 illustrate the linkages in the commitments process for the Wind Farm and Transmission line.

8.2.2 Environmental Management System

Hydro Tasmania carries out all of its activities under an ISO 14001 certified, and externally audited, Environmental Management System (EMS). The EMS is a framework for effective environmental performance and continuous improvement. It enables the organisation to control its main processes through a set of procedures. The procedures themselves are designed to meet the organisation's stated policy objectives, and to comply with relevant legislation, regulations and industry standards. The EMS also provides assurance to management and to others that environmental commitments are being met.

Hydro Tasmania's EMS is structured to comply with the international standard for environmental management, ISO 14001. This standard sets out requirements for sound environmental management and is now being applied by industries around the world. The procedures are divided into three categories, relating to general environmental management, management of materials and energy, and management of the physical and biological environment.

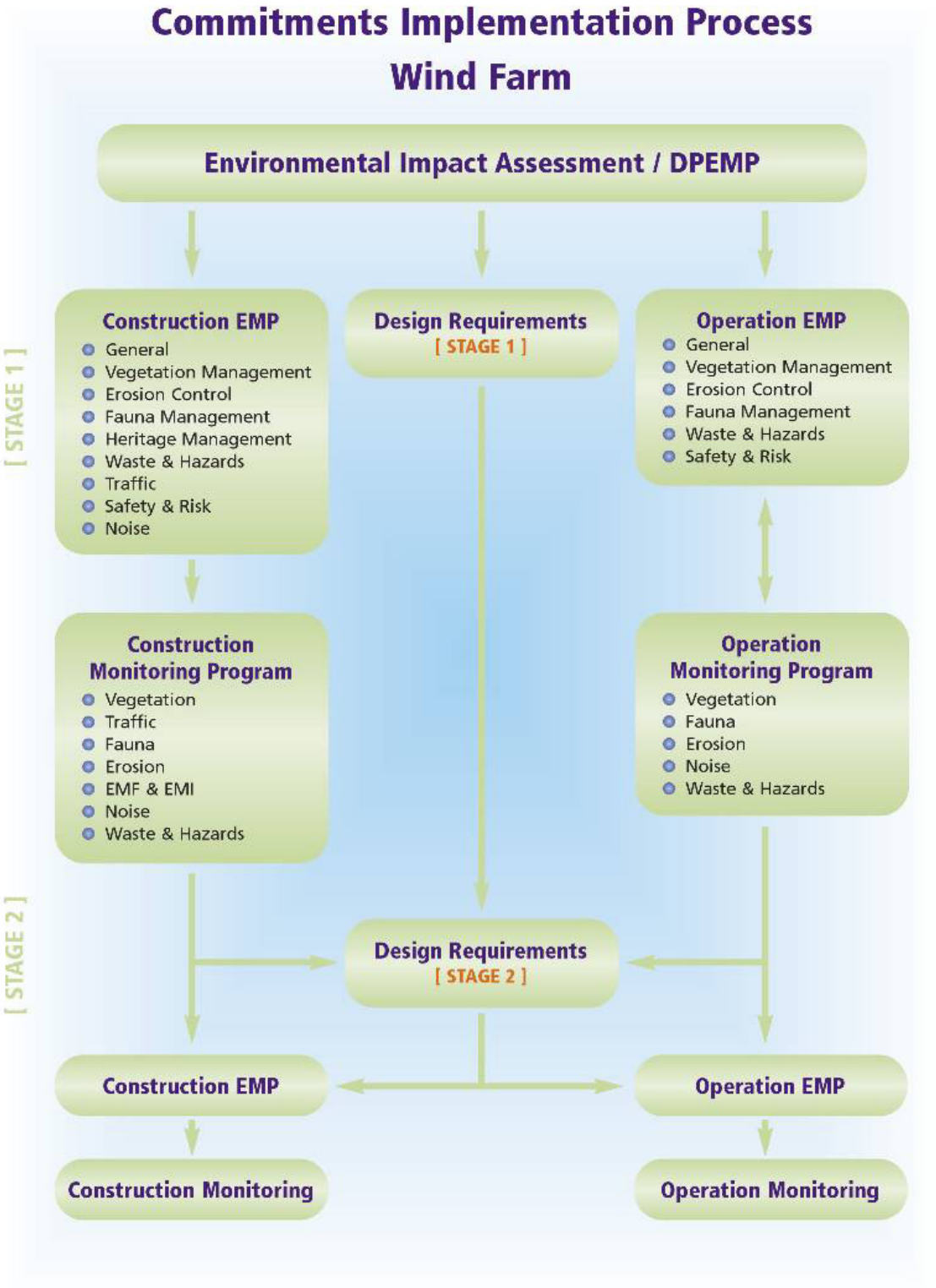


Figure 8.1: Commitments implementation process - wind farm.

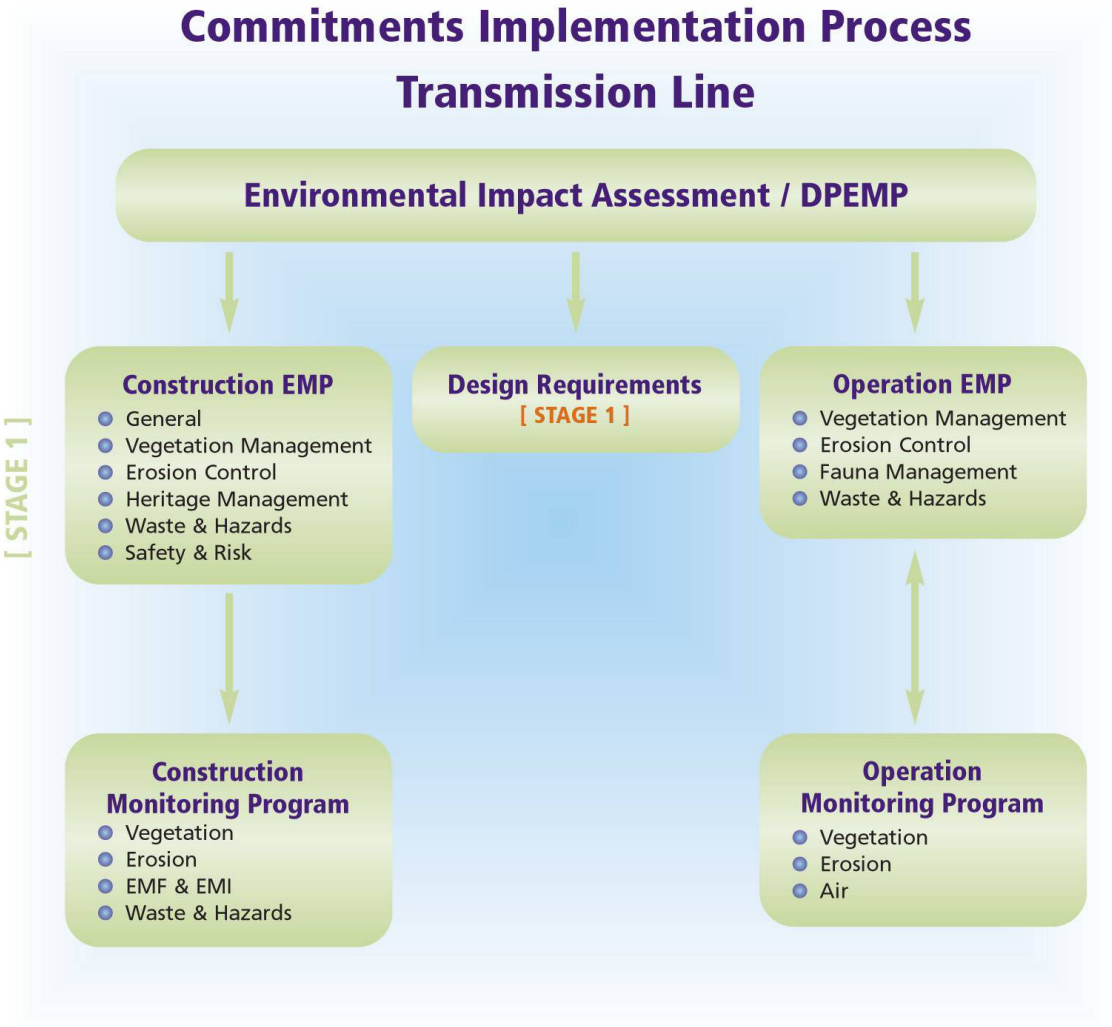


Figure 8.2: Commitments implementation process - transmission line.

The CEMP and the OEMP will be implemented as part of Hydro Tasmania's Environmental Management System. The CEMP is the key document that informs construction contractors in the field how the DPEMP commitments are to be converted into specific construction procedures and construction management strategies. The CEMP will be prepared by Hydro Tasmania and approved by the regulators prior to construction. A contractor CEMP will be prepared by contractors for their activities and will include the management strategies outlined in the CEMP. The contractor CEMPs are limited to providing the systems and framework within which the management strategies will be implemented.

The contractor CEMPs will include the following elements to provide a framework for the implementation of project commitments and to demonstrate how the management strategies are to be implemented:

- organisation and responsibility;
- environmental management strategies (prepared by Hydro Tasmania);
- monitoring, audit and review;
- quality control;
- emergency response;
- induction and training;
- records; and
- communication plan.

Conclusions 9

This document provides a summary of the information provided to regulatory authorities assessing the DPEMP for the Woolnorth Wind Farm and associated infrastructure. The DPEMP was prepared in accordance with guidelines to satisfy the development approval requirements of local, state and Commonwealth governments. It addresses the Project's economic, social and environmental effects.

The Project described is for a large scale renewable energy development that, if approved, would assist Tasmania meet its objectives under the Tasmanian Greenhouse Statement as well as national objectives to cap greenhouse gas emissions.

Fundamentally the Project is about developing Tasmania's renewable energy industry to capture the investment and growth opportunities it provides. Tasmania has been identified as a locality with high potential for large-scale wind energy development because of its location in the Roaring 40's. In the late 1990's the Tasmanian government, concerned about the decline in the local economy, initiated a series of Industry Audits aimed at identifying industry sectors offering growth opportunities. The audit of the environmental industries, which included the renewable energy industry, was identified as a growth prospect. Studies in Australia and overseas consistently show that the renewables industry is one of the fastest growing when expressed in employment and economic terms.

The economic and employment benefits of this Project are:

- $270 million in capital expenditure;
- 150 construction jobs;
- $40 million injected into the regional economy of Dorset over the 20 year life of the Project and $ 4 million during construction;
- 47 % of all capital expenditure in Tasmania amounting to over $ 120 million;
- potentially 44 jobs in turbine tower construction; and
- 70 jobs in manufacturing nacelles.

In addition to these direct benefits, the Project will also assist in building the critical mass needed to encourage further overseas investment in manufacturing facilities for wind turbine blades and other components. A further 400 to 450 jobs could follow this investment.

The Project therefore serves to meet that Tasmanian government's objective to diversify the economy, create jobs growth, and attract investment under the Industry Development Plan.

The Project will save 370 000 tonnes of $CO_{2\text{-}e}$ when compared with an equivalent thermal scheme.

The Project is therefore consistent with Commonwealth initiatives to curtail the growth in greenhouse gas emissions under the National Greenhouse Strategy and MRET. It is also consistent with Goal 4 of the Tasmanian Greenhouse Statement, which is to develop alternative renewable energy sources in Tasmania, and accords with the *Tasmania Together* Process, in which the community has called for maximum use of renewable energy sources and a need to mitigate greenhouse gases.

The Project is not without its environmental effects. These result from three things:

- siting of infrastructure;
- construction activity; and
- operational maintenance.

The key environmental concerns identified from community consultation, landholder liaison, dialogue with stakeholders, desktop and on ground survey work are:

- visual amenity;
- noise; and
- the potential impact on flora and fauna.

Advice is that the visual impact of the Project is not so great that it cannot be accommodated into the regional landscape. And, since community consultation has come out strongly in favour of the proposal, the indication is that visual issues are considered acceptable give the Projects other substantial environment, economic and social benefits.

The best available information from modelling studies suggest that noise from wind turbines will reach acceptable levels comparable to background levels at a distance of 350 metres. Buffer zones round any residential property will ensure that this distance is taken into account in final turbine layout. In general terms, distance, topography, vegetation and other shielding attenuate noise. There will be no noise effects from the transmission line following construction.

Similarly other sensitive environmental issues involving wetlands, the coastal zone, or sensitive vegetation or habitat for birds and other animals, will be protected from the Project by appropriately designed buffer zones. In this way habitat will be protected and breeding and feeding areas avoided.

Much of the area has already been modified by pastoral and agricultural development as well as mining. Areas already modified will be utilised where feasible for turbine siting and other infrastructure including the power line to Derby.

No sites on the Tasmanian Historic Places Index (THPI) will be affected, and Aboriginal Heritage will be respected with any artefacts reported to the appropriate authority if found during construction activities.

All construction and operating procedures will accord with the requirements of Hydro Tasmania's ISO 14001 Environmental Management System. All contractors will be advised of the requirements and procedures together with incident reporting protocols.

Construction environmental management plans will be formalised and spell out mitigation requirements, erosion control and sedimentation measures, and rehabilitation requirements so that the site and the transmission corridor are restored as soon as practicable to their original condition following completion of the Project.

In conclusion Hydro Tasmania, believes that the Musselroe Wind Farm Project is consistent with the Sustainable Development Strategy of the Dorset Council as it:

- contributes significantly to the local economy;
- will lead to increased tourist activity; and
- will cause no adverse impacts on the natural resource values of the region.

Further, and perhaps more importantly, the Project is also consistent with the sustainable development objectives of Tasmania's Resource Management and Planning System (RMPS) as detailed in Chapter 2, Volume 2. The Project is designed to protect biodiversity and cultural heritage, create employment, attract investment , and deliver clean renewable electricity to meet both domestic and interstate needs in keeping with international obligations to cap greenhouse gas emissions.

Readers of the full text of the DPEMP will note that a key feature is a series of commitments made throughout the document. The commitments outline how Hydro Tasmania proposes to manage impacts associated with the Project. For convenience these commitments are brought together in one place in Chapter 10, Volume 1 of the DPEMP.

If development approval is granted, the commitments will become Permit Conditions and Hydro Tasmania will have a legal obligation to comply with them. In addition to these commitments, Hydro Tasmania will comply with all legislative and regulatory requirements of the RMPS, Commonwealth Legislation as well as the Planning requirements of the Dorset Planning Scheme.

The commitments are supported by Construction Environmental Management Plans (CEMP) and the Operation Environmental Management Plan (OEMP). These documents will be used to ensure that Hydro Tasmania and its contractors design, construct and operate the Musselroe Wind Farm to achieve the overall objective of being a clean renewable energy Project with significant environmental, social and economic benefits.

Further the CPEMP and OEMP will become part of the tender documentation provided to prospective contractors and will guide the management of construction and operation and

ensure that the environmental aims and obligations are met. A number of design commitments have also been included.

On the basis of the information provided, Hydro Tasmania believes that the Musselroe Wind Farm Project can meet all the planning and environmental requirements of the Dorset Council as well as those of the Tasmanian and Commonwealth governments during construction, operation and decommissioning. The Project is consistent with the national objective to increase the contribution of renewable energy to the country's energy supply mix under the Mandated Renewable Energy Target.

Readers requiring more detail information about conclusions drawn for specific issues are referred to the "Conclusions" sections at the end of Chapters 3 to 15 in Volumes 2 and 3. The regulatory framework within which the Project will be assessed is addressed in Chapter 3 of Volume 1; Community Consultation in Chapter 5 of Volume 1; and compliance with the RMPS, *Land Use Planning and Approvals Act 1993* and State Policies in Chapter 2 of both Volume 2 and Volume 3.