



Mount Emerald Wind Farm, Herberton Range North Queensland

Environmental Impact Statement - Volume I (EPBC 2011/6228)

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Glossary

Term	Description / Definition
AADT	Annual Average Daily Traffic
Access Roads	Roads connecting public roads to the Site and the Site Roads
ACH Act	<i>Aboriginal Cultural Heritage Act 2003</i>
Aquifer	A water-saturated geologic unit that is capable of transmitting significant or usable quantities of groundwater under ordinary hydraulic gradients.
Arboreal	Living in trees.
ASL	Above Sea Level (referring to altitude).
Assembly Area	Areas on site where rotor blades are attached to the hubs prior to the installation of the complete rotor to the nacelle. The area is only relevant for the rotor assembly installation method.
ATSIHPA	<i>Aboriginal and Torres Strait Islander Heritage Protection Act 1984</i>
Bagasse	A by-product of sugar cane
Batching plant	Operational area where concrete and other aggregated materials are prepared.
Biodiversity	Totality of genes, species, and ecosystems of a region. A contraction of biological diversity.
Biological diversity	The totality of genes, species, and ecosystems of a region.
Bioregion	An area of land that comprises broad landscape patterns that reflect major structural geologies and climate, as well as major floristic and faunal assemblages (from Sattler and Williams 1999).
Biota	All the plant and animal life of a particular region.
Buffer	Area of vegetation providing protection from disturbance.
Catchment	The term used to describe the area which is drained by a river. It is sometimes called the river basin or watershed. The catchment is the most significant factor determining the amount or likelihood of flooding.
CHMP	Cultural Heritage Management Plan
Climate Change	Any long-term significant change in the 'average weather' that a given region experiences. Average weather may include average temperature, precipitation and wind patterns. It involves changes in the variability or average state of the atmosphere over durations ranging from decades to millions of years.
Community	A number of definitions depending on the context: a) Used to describe that stakeholder group which is comprised of both individual community members and community groups. Community groups are regarded as members of the public or a group of citizens that have united to form an identifiable group, due to a common interest (as defined in the Social Impact Assessment chapter). b) Group of populations of plants and animals in a given place (as defined in the terrestrial ecology chapters).
Compound for substation and control building	The base area for the site management and technicians. The area consists of restroom facilities, parking, site offices, tools and spare parts containers

Term	Description / Definition
Consequence	Outcome or impacts of an event. There can be more than one consequence from one event. Consequences can range from positive to negative. Consequences can be expressed qualitatively or quantitatively. Consequences are considered in relation to the achievement of objectives (<i>AS/NZS ISO 3100:2009 Risk management - Principles and guidelines</i>).
Conservation significance	Species or community listed as endangered, vulnerable, rare, near threatened or migratory under either the EPBC Act or the NC Act
Controlled action	A term used under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> to determine whether an action is likely to have an impact on matters of national environmental significance. If a project is declared a 'controlled action', development approval is required from the Minister for the Environment, Heritage and the Arts.
Construction Area	The part of the Installation Area located at each wind turbine generator (WTG) foundation position which is required for assembling the cranes and area for operating cranes, containers for lifting equipment, generator unit, working area with tools and containers etc.
Corridor	A continuous link of suitable habitat between vegetation patches allowing movement by fauna.
Connectivity	The connectedness between patches of suitable habitat for an individual species or group of species.
Crane Hard Stand	An improved/stabilized area with a prepared surface where plant and cranes can operate, vehicles can be parked and material can be stored.
Cultural heritage	The legacy of physical artefacts and intangible attributes of a group or society that are inherited from past generations, maintained in the present and bestowed for the benefit of future generations.
Culverts	Reinforced structures (usually concrete) to provide sealed access over watercourses.
DEHP	Department of Environment and Heritage Protection (Queensland)
Development envelope	The area of the project site in which the wind farm infrastructure (turbines, hardstands, access roads, electrical cables and substation) could potentially be sited, comprising an area of approximately 57 ha.
Development footprint	The final locations of the wind farm infrastructure. This includes the infrastructure footprint - the area occupied by turbines, access tracks, substation etc. during the operational phase - and other areas that will be affected by construction (for example, cable trench easements, construction phase access track width, construction compound, crane pads) which can be rehabilitated post-construction.
DNRM	The Queensland Government Department of Natural Resources and Mines
DotE	The Federal Government Department of the Environment
Ecologically sustainable development	The environmental component of sustainable development. It can be achieved partially through the use of the 'precautionary principle', namely that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
Ecology	The scientific study of the distribution and abundance of life and the interactions between organisms and their environment. The environment of an organism includes physical properties, which can be described as the sum of local abiotic factors such as insolation (sunlight), climate, and geology and biotic factors, which are other organisms that share its habitat.

Term	Description / Definition
Economic Impact Assessment	Assessment of the measured effect on the economy of a region of an impacting agent.
Ecosystem	A natural unit consisting of all plants, animals and micro-organisms (biotic factors) in an area functioning together with all of the non-living physical (abiotic) factors of the environment.
Ecosystem function	Processes including soil formation and stabilisation, nutrient cycling, water infiltration, pollination and seed production.
Endemic	A species native to a particular place or region.
Environmental values	An aspect of the environment that is to be protected.
EIS	Environmental Impact Assessment -An environmental impact assessment is an assessment of the possible impacts that a proposed project may have on the environment, consisting of the environmental, social and economic aspects.
EMI	Electromagnetic Interference -is disturbance that affects an electrical circuit due to either electromagnetic induction or electromagnetic radiation emitted from an external source
EMF	An electromagnetic field is a physical field produced by electrically charged objects. It affects the behaviour of charged objects in the vicinity of the field.
EMP	Environmental Management Plan
Environmental Impacts	Impacts that could be caused to the environment when a development project is constructed; in operation or when decommissioned.
EP Act	Environmental Protection Act 1994
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth)
ESCP	Erosion and Sediment Control Plan
ESD	Ecologically Sustainable Development
Fauna	Animal life
Flora	Plant life
Geotechnical	Technologies and sciences relating to geology.
GQAL	Good Quality Agricultural Land
Gravity Foundations	A standard type of reinforced concrete slab which support the wind turbine tower by gravitational mass. Excavation is required to a depth of approximately 2.5 m.
Greenfield developments	Developments that occur on land that primarily holds natural values (e.g. remnant vegetation, forested, undeveloped with human infrastructure).
LA90	The A-weighted statistical noise level exceeded for 90% over the measurement period (normally 10min), measured in dBA.
LAeq	The A-weighted constant noise level over the time period, equivalent to the actual fluctuating noise level, measure in dBA.
Landscape	Natural and manmade features of the urban, rural or natural environment, such as vegetation, topography and land use elements.
Landscape Character Area	A distinct, recognisable and consistent pattern of elements, be it natural (soil, landform) and/or human (for example settlement and development) in the landscape that makes one landscape different from another, rather than better or worse.
Least Concern	A remnant vegetation conservation status under Queensland's <i>Vegetation Management Act 1999</i> .

Term	Description / Definition
Likelihood	Used as a general description of probability or frequency. Can be expressed qualitatively or quantitatively (AS/NZS ISO 3100:2009 Risk management – Principles and guidelines).
LVIA	Landscape and Visual Impact Assessment which is to assess the nature and extent of visual impacts and qualities relating to locations and proposals
MEWF	Mount Emerald Wind Farm
MNES	Matters of National Environmental Significance, as defined under the <i>Environment Protection and Biodiversity Conservation Act 1999</i> (Commonwealth).
Microhabitat	A small localized habitat within a larger ecosystem.
Micro-siting	Accurately positioning infrastructure in order to take advantage of least environmental impact areas and positions in otherwise constrained areas.
Moisture Conditioning	Adding water to a soil or construction medium to improve its working/forming capability.
Montane heath	A rare plant community hosting numerous important species and restricted to exposed ridges above 900 m ASL.
MSC	Mareeba Shire Council
MW	Megawatts
Nacelle	The housing for the generating components of the wind turbine. This includes the generator, gear box, drive train and brake assembly.
Narrow endemic	A species with very limited and restricted distribution, and often confined to a unique or poorly represented habitat (e.g. <i>Melaleuca uxorum</i> and montane heath on the site).
NC Act	<i>Nature Conservation Act 1992</i> (Queensland)
NC Plan	Nature Conservation (Protected Plants) Conservation Plan 2006
NTA	<i>Native Title Act 1993</i>
Offsetting	Anything that balances, counteracts, or compensates for something else; providing compensation. For example carbon offsetting is the process of reducing greenhouse gas emissions by purchasing credits from others through emissions reductions projects, or carbon trading schemes.
Of Concern	A remnant vegetation conservation status under Queensland's <i>Vegetation Management Act 1999</i> .
Potable water	Water deemed safe for human consumption/drinking.
Project site	The land within the cadastral boundaries of all properties involved with the Proposal, comprising an area of 2,422 ha.
Proponent (the)	RATCH Australia Corporation Limited (RACL)
QH Act	Queensland Heritage Act 1992
RACL	RATCH Australia Corporation Limited
RCA	Radio Communications Act 1992
Regional ecosystem	Vegetation communities that are consistently associated with a particular combination of geology, land form and soil in a bioregion.

Term	Description / Definition
Regrowth	A native vegetation community that has regrown after clearing, in which native species that would have naturally occurred within this vegetation community dominate but have not reached the height and canopy cover necessary to be regarded as remnant as defined in the Queensland <i>Vegetation Management Act 1999</i> .
Rehabilitation	Relating to mitigating the impacts caused to the environment following disturbance (e.g. removal of vegetation cover, soil profiles, natural land features)
Remnant vegetation	Vegetation which is mapped by the Queensland Department of Environment and Resource Management as being within a remnant endangered regional ecosystem, a remnant of concern regional ecosystem, or a remnant not of concern regional ecosystem map. Vegetation remaining after an area has been cleared or modified.
Revegetation	The practice of direct-seeding or planting tubestock into the ground as part of the landscape rehabilitation process.
Riparian	Any land which adjoins or directly influences or is influenced by a body of water.
Sensitivity	The relative susceptibility to adverse impacts to environments.
Soil profiles	The 'layers' of soil as they are viewed in a vertical projection.
SPA	Sustainable Planning Act 2009 (Queensland)
SPP	State Planning Policy (Queensland)
Sustainable Development	Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
Table drains	An erosion and sediment control measure - a flat-bottomed drain constructed adjacent to a road or track to slow down water velocity and reduce the rate of soil erosion, as well as capture transported soil.
Topographical	Relating to the various types of landform and features (e.g. mountains, ridges, watercourses).
TRC	Tablelands Regional Council
Turbine Footing	The stable horizontal platform for the towers sections and elements to be mounted. Foundations will be of either a gravity or rock-anchor type, depending on the geotechnical conditions at each wind turbine site.
Visual impact	Measure of a joint consideration of both visual sensitivity and visual effect that considered together determines the visual impact of a development.
VMA	<i>Vegetation Management Act 1999</i> (Queensland)
vpd	Vehicles per day
Weeds	Plant species that invade native ecosystems and can adversely affect the survival of indigenous flora and fauna. . A species not native to Australia. Sometimes referred to as naturalised species.
WTG	Wind Turbine Generator(s) - A wind turbine is a device that converts kinetic energy from the wind into electrical power.
WTWHA	Wet Tropics World Heritage Area - The Wet Tropics of Queensland World Heritage Site consists of approximately 8,940 km ² of Australian wet tropical forests growing along the north-east Queensland portion of the Great Dividing Range.

1.0 Introduction

RPS East (Australia) has been commissioned by RATCH Australia Corporation Limited (RACL) to prepare this Environmental Impact Statement (EIS) to accompany a project application under the Sustainable Planning Act 2009, for the proposed Mount Emerald Wind Farm (MEWF). The project was referred under the *Environment, Protection and Biodiversity Conservation Act 1999* (the EPBC Act), to the Minister for Sustainability, Environment, Water, Population and Communities (now the Department of Environment or DoE) on 21 December 2011 (**Appendix 1**). A delegate for the Minister determined on 24 January 2012 that the proposed development constituted a controlled action under the provisions of the EPBC Act, as the action has the potential to have a significant impact on a number of matters of National Environmental Significance. The controlling provisions for the proposal under the EPBC Act were:

- World Heritage properties (sections 12 & 15A);
- National Heritage places (sections 15B & 15C);
- Listed threatened species and communities (sections 18 & 18A); and
- Listed migratory species (sections 20 & 20A).

On the same date a delegate of the Minister determined, that the proposed activity be assessed by an Environment Impact Statement (EIS).

This EIS has been prepared in accordance with the requirements disclosed in the EIS Guidelines (EPBC 2011/6228, February 2012) and provides information about the action and its relevant impacts, to allow the Minister to make an informed decision on whether or not to approve, under Part 9 of the EPBC Act, the taking of the action for the purposes of each controlling provision (refer **Appendix 2**).

1.1 EIS Objective

The objectives of an EIS are to 'adequately define those elements of the environment that may be affected by a proposed development, particularly the significance, risks and consequences of the potential impacts of the proposal at a local, regional and national level and measures proposed to minimise, mitigate and offset those impacts. It is expected to be a significant source of information on which the public and government decision-makers will assess the potential environmental impacts of the proposal.

The EIS is informed by a range of ecological and socio-economic investigations. In accordance with the Guidelines, the nature and level of investigations undertaken are related to the likely extent and gravity of the potential impacts (likelihood, consequence, magnitude, extent and scale of impacts, including worst case scenarios). The Guidelines (or terms of reference) for the drafting of the EIS are based on the formal requirements for the contents of an EIS provided in: *Section 102 of the EPBC Act; Schedule 4 of the EPBC Regulations*.

The draft EIS must be approved for publication by the Minister prior to it being published in accordance with the EPBC Regulations. There is no specified timeframe for this approval to occur.

An invitation for anyone to provide comments relating to the draft report within a period specified must also be published along with the draft report. The minimum period for public comment is 20 business days; however there is no specified maximum period.

After the period for comment, RACL must take account of the comments received in finalising the EIS. Once finalised, the EIS is then submitted to the department for assessment.

A recommendation report for the controlled action is then prepared by the department. Following this, in accordance with Part 9, Division 1 of the EPBC Act, the Minister will decide whether to approve the proposal and attach any conditions required. A decision must be made by the Minister within 40 business days of receiving finalised documentation.

1.2 The Proposal

The project application is for construction and operation of a wind farm located approximately 20 km SSW of Mareeba on the Atherton Tablelands in north Queensland (**Figure 1.1**), and consists of 63 wind turbines, associated access tracks and an electricity substation that will feed into the main electricity grid (Powerlink's Chalumbin –Woree 275 kV transmission line).

Adjustments to the layout of the wind farm have been made to accommodate outcomes of technical assessments of noise, visual amenity, flora and fauna and constructability. A final preferred layout has been identified (refer **Figure 1.2**); however, subject to the conditions of approval which may be imposed on this proposal, the installed capacity of this wind farm is yet to be confirmed. These conditions of approval are imposed and administered by the local authority being Mareeba Shire Council. Changes to the layout are unknown, however, it is not expected the number of turbines would increase.

This project is intended to supply approximately 650, 000 megawatt hours which should supply sufficient renewable energy to power the equivalent annual needs of approximately 75,000 north Queensland homes over a 20 year period. The site has been selected primarily as it displays an excellent wind resource, there are few residences in close proximity to the site, and the site is traversed by the existing 275 kV Powerlink transmission line infrastructure, which further provides for ease of connection.

1.3 The Proponent

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RATCH-Australia Corporation Limited (RACL) is owned by a major Thai power generation company, Ratchaburi Electricity Generating Holding PCL and Transfield Services Limited; an ASX listed engineering services company. The company is an independent power producer in Australia and owns a portfolio of power generation assets totalling 815 MW, including ownership or an interest in four thermal power stations, three wind farms, as well as the development rights to over 1,000 MW of wind farms and other renewable projects. Ratchaburi's international assets have a total output of 5700 MW principally in the form of thermal and hydro power production in Thailand – where it is one of the leading power producers. The company also has power generation interests in Laos.

The company is strongly focussed on the investment in and development of first class thermal, hydro, wind and solar power generation assets – one of its notable wind farms being Queensland's first operational wind farm: Windy Hill, which was commissioned in 2000 with 20 turbines producing up to 12 MW power on land leased from local farmers on the Atherton Tablelands. The land remains in agricultural use, and the publicly open wind farm is a key visitor attraction.

RACL's other assets in Australia include:

- The highly energy-efficient Townsville power station which uses clean coal seam methane fuel and a combined cycle configuration inputting 234 MW to Queensland's electricity supplies;
- The Collinsville (Qld) and Kemerton (WA) power plants;
- A 30% interest in BP's low carbon signature Kwinana Plant in Western Australia;
- The Starfish Hill (SA) and Toora (VIC) wind farms.

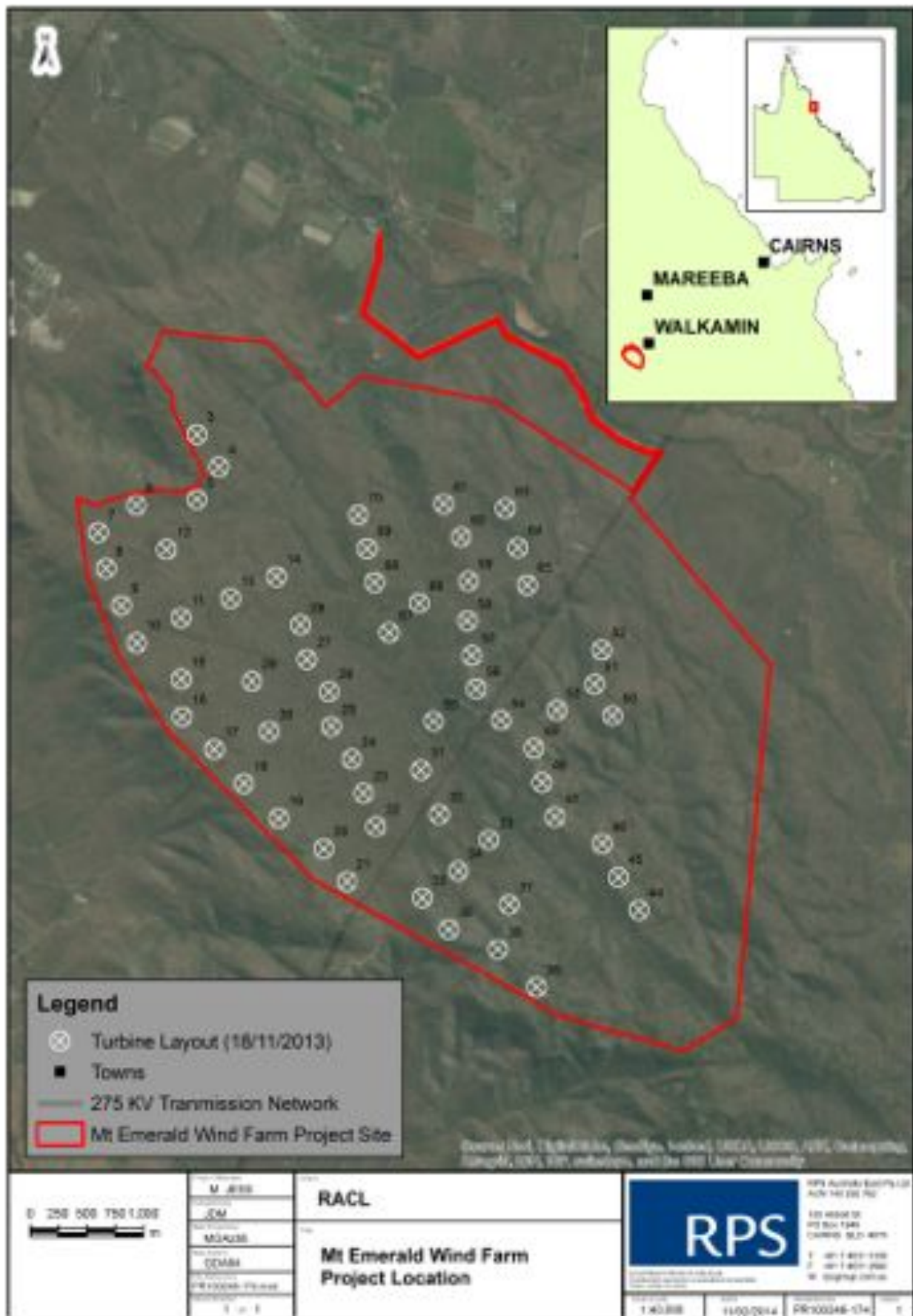


Figure 1.1 Site Location Map Mt Emerald Wind Farm

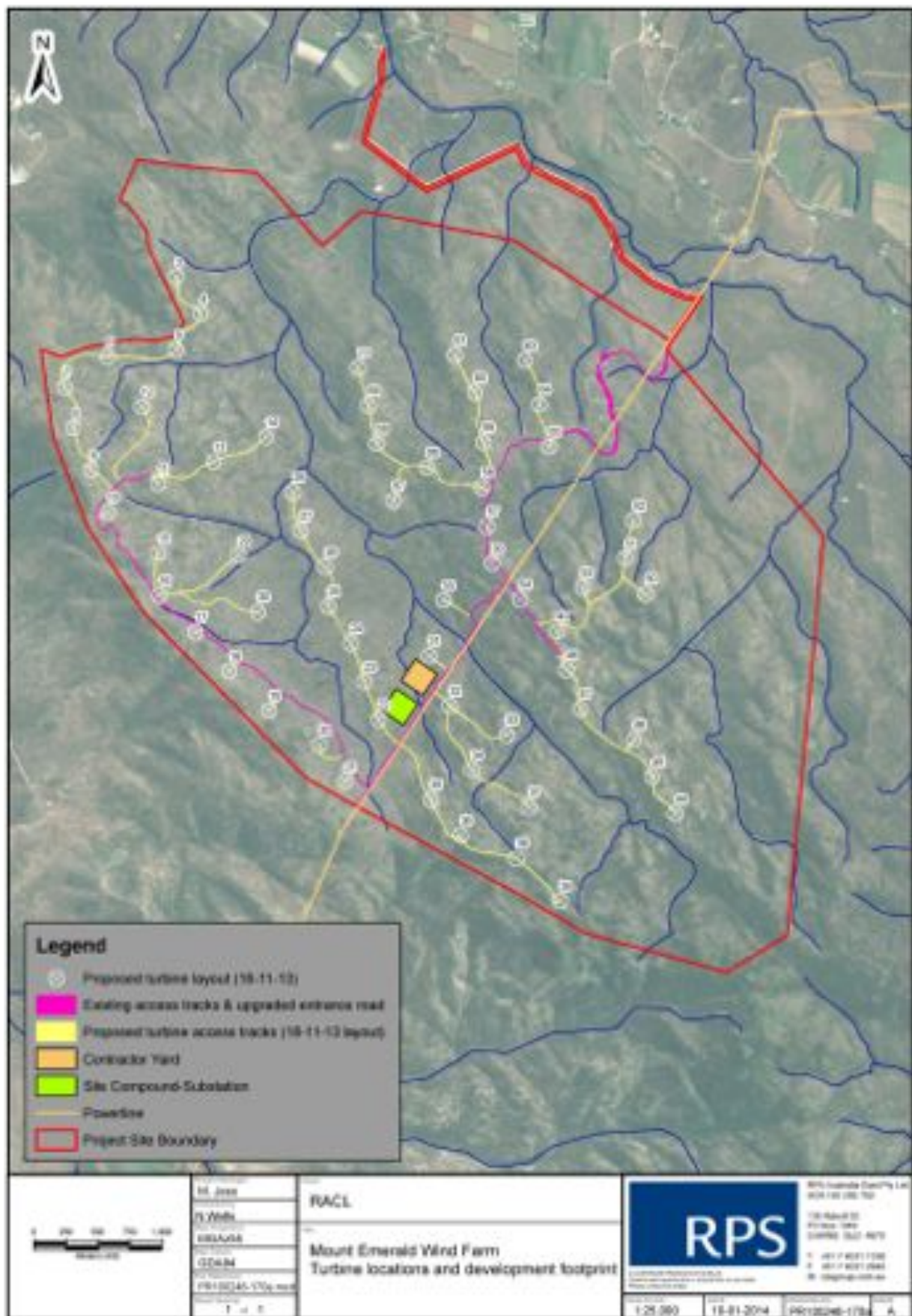


Figure 1.2 Development Footprint

1.4 RACL Environmental Statement

As a developer of renewable energy in Australia, implementing sustainable measures and ensuring the protection of the environment are fundamental to RACL's long-term objectives and philosophy. Investments in renewable energy are both environmentally and commercially sustainable and RACL currently owns three wind farms that are significantly reducing Australia's greenhouse emissions. In addition, RACL continues to improve the environmental ratings of its other power generation assets by continuously revising for economically possible ways of reducing its carbon emissions.

As RACL continues to grow, it strives to promote preservation and restoration of the environment, by managing and minimising the environmental impact of its operations and activities and fully respecting environmental laws and regulations.

RACL encourages employees to take care and demonstrate responsibility towards the environment and to report any incident that may have a hazardous effect. RACL continuously strives to ensure its employees are aware of how they can reduce the consumption of energy and resources and implement strategies focused on waste minimisation and recycling where possible. Ensuring the protection of the environment and implementing sustainable solutions are paramount to the success of RACL, its people and the communities in which it serves.

1.5 Document Structure

This document has been prepared in accordance with the EIS guidelines (**Appendix 2**). The EIS considers:

- Compliance with the objectives of the EPBC Act and the principles of ecologically sustainable development and use;
- All potential impacts on the environment are to be investigated and analysed; and
- An evaluation of the potential environmental impacts using an accepted risk-based methodology and describes proposed measures to avoid, minimise or offset the expected, likely, or potential impacts.

The EIS consists of an Executive Summary and three volumes: Volume 1 – Chapters 1-11 (this document), Volume 2 – Chapters 12-23; and Volume 3 – Appendices. These documents have the following structure:

- Executive Summary
- Volume 1 - Environmental Impact Statement
 - » Glossary
 - » Introduction and Project Description (Chapters 1 and 2)
 - » Planning and Justification (Chapters 3 -4)
 - » Strategic Justification and Proposal Alternatives (Chapters 5-6)
 - » Impact Assessments (Chapters 7 – 9)
 - » Cultural, Social and Economic Assessments (Chapters 10-11)

- Volume 2
 - » Glossary
 - » Environmental Assessment (Chapter 12)
 - » Matters of National Environmental Significance (Chapter 13)
 - » Ecological Impact Assessments (Chapters 14-18)
 - » Hazards and Risks (Chapter 19)
 - » Risk Assessment and EMP (Chapter 20)
 - » Cumulative Impacts (Chapter 21)
 - » Offsets (Chapter 22)
 - » Environmental Record (Chapter 23)
 - » Conclusion (Chapter 24)
- Volume 3 – Technical Appendices

1.6 Project Team

1.6.1 EIS Preparation

The following organisations and companies were responsible for the preparation of various components of the EIS:

- RPS Australia East
- RATCH Australia Corporation Limited (RACL)

1.6.2 Specialist Investigations

A number of specialist and technical assessments have been prepared regarding the Mount Emerald Wind Farm, and include:

- RPS Australia East:
 - » Flora and Fauna Technical Reports;
 - » General Environmental reporting;
 - » Town Planning Assessments; and
 - » Environmental Management Plan.
- Rehbein Airport Consulting – Aeronautical Assessment
- SKM - Transport and Traffic Impact Assessment
- Parsons Brinkerhoff Australia Pty Limited - Shadow Flicker Assessment/Electromagnetic Interference Assessment/Energy Yield Assessment
- Biosis – Collision Risk Modelling
- Balance Environmental – Bat Call Interpretation
- University of the Sunshine Coast – Quoll Specialist Studies
- ETS Geotechnical – Geotechnical Investigation
- Visual and Landscape Assessment –Green Bean Design
- Marshall Day Acoustics – Noise Assessment

- Converge - Cultural Heritage Assessment
- The Missing Link Resource Coordinators - Community Consultation
- Cummings Economics - Social and Economic Assessment
- Ecofund – Offsets Program
- Aurecon – Road Design

2.0 Description of the Proposal

This chapter provides a detailed description of the proposed development including construction, operational and decommissioning components.

2.1 Location

The project area comprises both Lot 7 SP235224, Easements A, C & E in Lots 1, 2 & 3 on SP231871 and part of Lot 905 as shown on **Figure 2.1**. The coordinates detailed in **Table 2.1** below delineate the boundary of the proposed wind farm site which covers an area of 2,422 ha.

Table 2.1 Boundary Coordinates for the Proposed MEWF

Latitude Degrees	Minutes	Seconds	Longitude Degrees	Minutes	Seconds
17	9	8.67	145	21	55.7
17	9	11.95	145	21	53.02
17	9	13.24	145	21	48.25
17	9	12.63	145	21	42.47
17	9	16.96	145	21	22.82
17	9	15.07	145	21	17.6
17	9	37.15	145	21	20.56
17	10	0.4	145	21	29.71
17	10	20.3	145	21	42.5
17	11	4.35	145	22	27.19
17	11	43.83	145	23	40.34
17	11	53.94	145	24	17.47
17	11	44.78	145	24	33.37
17	10	3.86	145	24	44.1
17	9	16.56	145	24	2.93
17	9	2.88	145	24	12.61
17	9	2.63	145	24	8.02
17	8	58.92	145	23	59.4
17	8	52.97	145	23	51.89
17	8	45.33	145	23	48.94
17	8	37.89	145	23	43.89
17	8	29.17	145	23	26.45
17	8	24.21	145	23	24.07
17	8	34.9	145	22	59.96
17	8	22.91	145	22	44.15
17	8	7.47	145	22	48.71
17	7	59.65	145	22	49.11
17	8	3.18	145	22	47.91
17	8	7.31	145	22	47.7
17	8	23.27	145	22	42.99
17	8	36.03	145	22	59.83
17	8	25.51	145	23	23.58
17	8	29.88	145	23	25.67
17	8	38.64	145	23	43.18
17	8	45.77	145	23	48.03
17	8	53.55	145	23	51.03
17	8	59.76	145	23	58.86
17	9	3.6	145	24	7.78
17	9	3.76	145	24	10.76
17	9	14.07	145	24	3.46
17	8	48.58	145	23	23.05
17	8	40.73	145	22	42.89
17	8	49.38	145	22	32.2
17	8	30.86	145	22	15.15
17	8	27.35	145	21	43.6
17	8	37.54	145	21	38.92
17	8	38.73	145	21	40.98
17	8	45.45	145	21	46.05
17	8	49.65	145	21	46.33

Lot 7 is a large rural allotment, situated (at its closest point) approximately 3.5 km south-west of Walkamin, off Springmount Road at Arriga on the Atherton Tablelands. Topographically, the site is situated at the northern most end of the Herberton Range (part of the Great Dividing Range) with the north-western section of the site being dominated by Walsh's Bluff.

The site is characterised by rugged terrain with elevations of between 540 m up to 1089 m ASL (above sea level). The town centre of Mareeba is situated approximately 18 km to the north of the site, with the town of Atherton approximately 11.5 km south-east of the site.

Other features of the site include a series of ephemeral drainage lines, including the headwaters of Granite Creek. Powerlink's Chalumbin-Woree 275 kV transmission line easement traverses the site and broadly bisects it (**Figure 1.1**). This easement also provides a number of existing access points and tracks.

Virtually the entire site (and all of Lot 7), with the exception of cleared land along the existing access tracks and below the power line is covered by remnant vegetation as defined under Queensland's *Vegetation Management Act 1999* (VMA). Applicable under the VMA is the presence of two bioregions: the Wet Tropics and the Einasleigh Uplands, where the former is mapped at a scale of 1:50 000 and the latter at 1:100 000. Remnant vegetation across the site has a conservation status under the VMA of *Least Concern* and *Of Concern*. The *Of Concern* communities are only found in the Wet Tropics bioregion section. The entire Einasleigh Uplands section is shown on mapping to have a conservation status of *Least Concern*.

Lot 905 is a large parcel of land, and contains both open channel and underground infrastructure associated with the Mareeba-Dimbulah irrigation channel managed by SunWater. Only a section of Lot 905 is included within the project area, being that part (in strata) proposed to be opened as road, referred to in the road opening offer by DERM dated 9 December, 2011 (DERM ref: 2011/006477).

The relevant section of Lot 905 included within the application is generally bounded by the bank of Granite Creek on the eastern side and the edge of the existing concrete open channel to the west. This section contains a siphon beneath the surface of the land and is primarily utilised as an access between Kippen Drive and Springmount Road, used by a number of properties located off Kippen Drive. The site contains a constructed gravel access road with associated table drains and concrete culverts, as well as private tracks. Vegetation adjacent to this unsealed road is primarily regrowth and weeds are common. It is proposed to realign the access across Lot 905, in association with the proposed upgrade to the Springmount Road intersection and new site access from Kippen Drive (see **Figure 2.2** for proposed location).

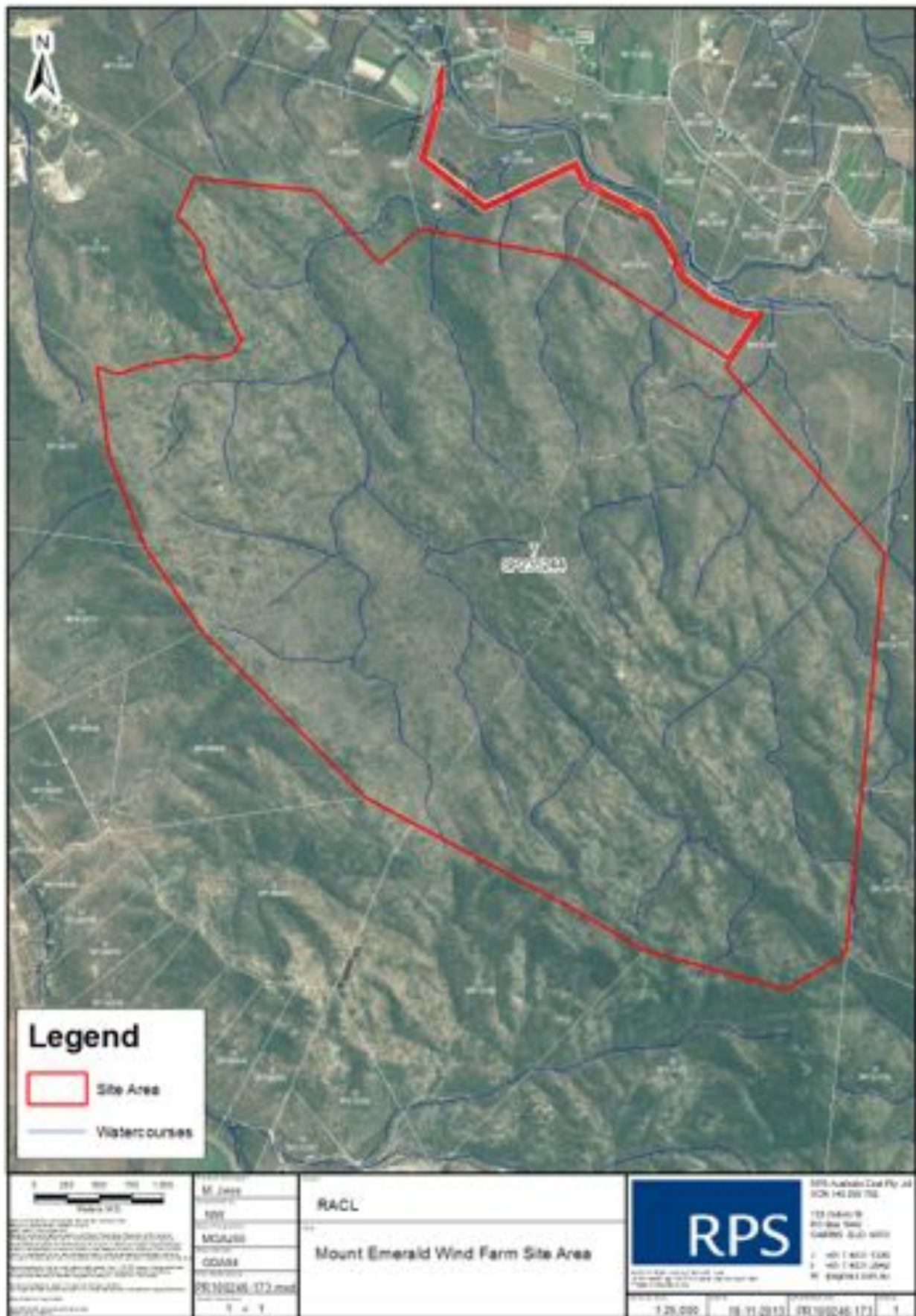


Figure 2.1 Site Area with Property Boundaries

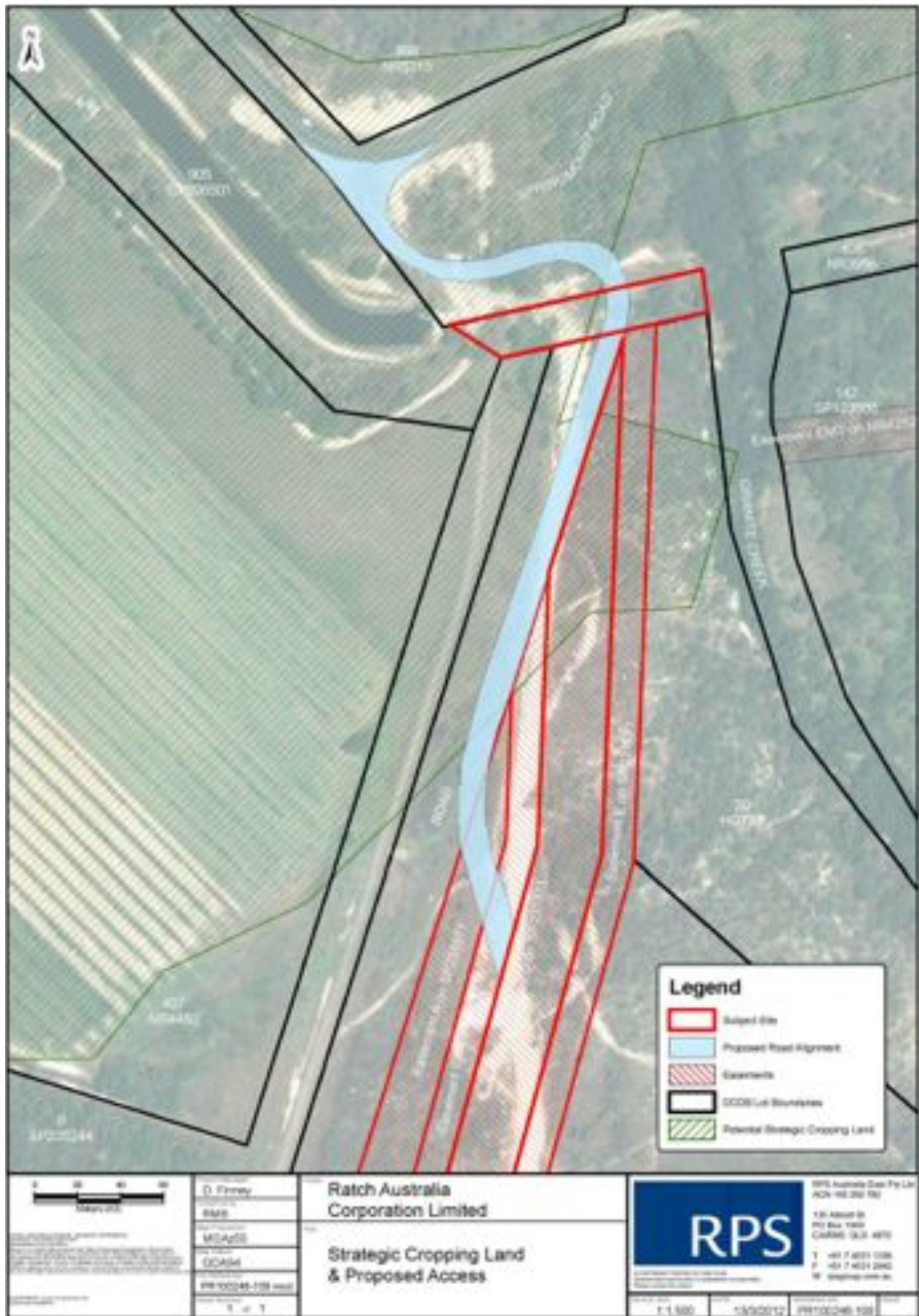


Figure 2.2 Access Road Alignment

The development footprint which includes the indicative turbine locations, cabling routes and internal access ways for the Mount Emerald Wind Farm is shown previously in **Figure 1.2**. The final turbine locations will ultimately be determined by geotechnical and topographical attributes, having regard to environmental values and efficiency of the potential electricity generation capacity of the site. Turbine positions will be micro-sited to take advantage of minimising environmental impacts and maximising wind energy capture.

It is intended that Mt Emerald Wind Farm Pty Ltd (under RACL) will secure a 30 year lease over the entire site, and as it is not intended to render areas of the site for separate occupation or use, the lease arrangement will not trigger the requirement for a Development Permit for a 'Reconfiguration of a Lot (by way of lease agreement)' under the *Sustainable Planning Act 2009*.

That part of Lot 905 on CP896501, which is included within the application, is proposed to be utilised for access purposes only during both construction and operation and is required for legal access to the site from Springmount Road. Eventually, this section of the existing perpetual lease will be excised and opened as public road, managed by the Local Council. As such, the inclusion of this section of land is a temporary measure, until such time as the area is created as road.

Access to the site will be gained from the Kennedy Highway via Hansen Road, then the realigned Springmount Road/Kippen Drive intersection, across a new road within Lot 905, along Kippen Drive and then across Easements A & C to Lot 7, as shown in attached proposed access plan shown in **Figure 2.2**.

During construction, consideration to establishing a temporary concrete batching plant will be given. However, as a determination is yet to be made, and will not be made until procurement of the construction contractor, no approval is sought for this aspect of the development at this stage. The appointed contractor will be responsible for obtaining all necessary approvals to operate a mobile and temporary concrete batching plant (if required). A recent approval for a concrete batching plant at a nearby location, off Springmount Road will also be investigated as a future concrete procurement source.

2.2 Surrounding Land Uses

Land surrounding the subject site is utilised for a diverse array of land uses, as a result of the changing nature of the agricultural industry, the size of surrounding land holdings, topography and soil characteristics. While the majority of the area surrounding the project site has been extensively cleared and is historically used for livestock grazing and agricultural pursuits, a number of recent approvals issued upon adjacent properties reflect the changing land uses in the area, from passive agricultural and pastoral uses to more intensive farming practices and other industrial and agribusiness practices.

Figure 2.3 shows the location of these uses in proximity to the project site, including:

- Outdoor Sport and Entertainment Facility (Drag strip) - Lot 13 on SP103361, Springmount Road, Arriga which includes the potential use of the site for intensive motor racing uses;
- Hard Rock Quarry (greater than 100,000 tonnes per year) and Concrete Batching Plant approval associated with the existing processing activities which have occurred on site for a number of years - Lot 3 on RP741713, Springmount Road and Borzi Road, Arriga;
- Tablelands Sugar Mill over Lot 1 on SP100452, Springmount Road, Arriga, located approximately 3 km from the site;
- Ethanol Distillery (Tablelands Sugar Mill) located on Lot 1 on SP100452, Springmount Road, Arriga; and
- Peanut Shell storage approved over Lot 141 on SP123888, located at Channel/Hansen Road, Walkamin (Lot 141 on SP123888).

Concurrently, there has also been an increase in the intensity of existing farming operations over a number of Lots on Oakey Creek Road, including change from grazing livestock to sugar cane production, as a direct result of the Arriga Sugar Mill increasing its capacity.

Other uses which are currently established within the immediate vicinity of the site on Channel Road, which highlight the diversity of rural uses in the area, include:

- A large poultry farm (Lot 6 on SP101513);
- Diverse nursery/farming operation with workers accommodation (rural workers accommodation) located on Lot 1 on RP717403 and Lot 291 on SP219087;
- Intensive organic farming on Lot 407 on NR4480;
- Banana farm (Lot 1 on RP719462); and
- Nursery (Lot 289 on NR7038 and Lot 407 on NR 4480).

In addition, the existing Springmount Waste Management Facility (Lot 13 on SP103361), located to the north-west of the site on Springmount Road, Arriga has been operating for a number of years and contributes significantly to use of the adjacent roads by heavy vehicle traffic.

The Lotus Glen Correctional Centre property comprises an area of approximately 800 ha and is located approximately 1.5 km to the north of the project area on Hansen Road / Chettle Road. The actual prison facility is located well within the site boundary, with the distance between the wind farm boundary and the low security facility approximately 3 km and the high security facility 3.6 km. Mt Uncle Distillery, located approximately 5 km from the project site boundary, contains a cafe, retail shop and fruit plantations, and generates a number of tourist vehicle movements to the area, seven days a week, throughout the year.

The majority of these uses are not considered typical 'rural' uses. They have the potential to create urban type noise and other urban nuisances, and contribute to significant amounts of frequent heavy vehicle traffic (B-doubles and concrete trucks etc.) which is not characteristic of a typical homogenous rural area where only farming and agricultural activities occur. In this regard, the surrounding area is unique in nature by virtue of the activities which surround the site, and as such, the character of the area is not purely agricultural or rural, but rather an eclectic mix of both traditional farming (including both agriculture and grazing), intensive farming and semi-industrial uses (marked by the presence of the correctional facility, drag strip, concrete batching plant and ethanol distillery).

In addition to the mix of rural, semi-industrial, community and other institutional uses, a number of adjoining sites are also utilised as lifestyle lots, with no farming being undertaken, and primarily used for residential purposes.

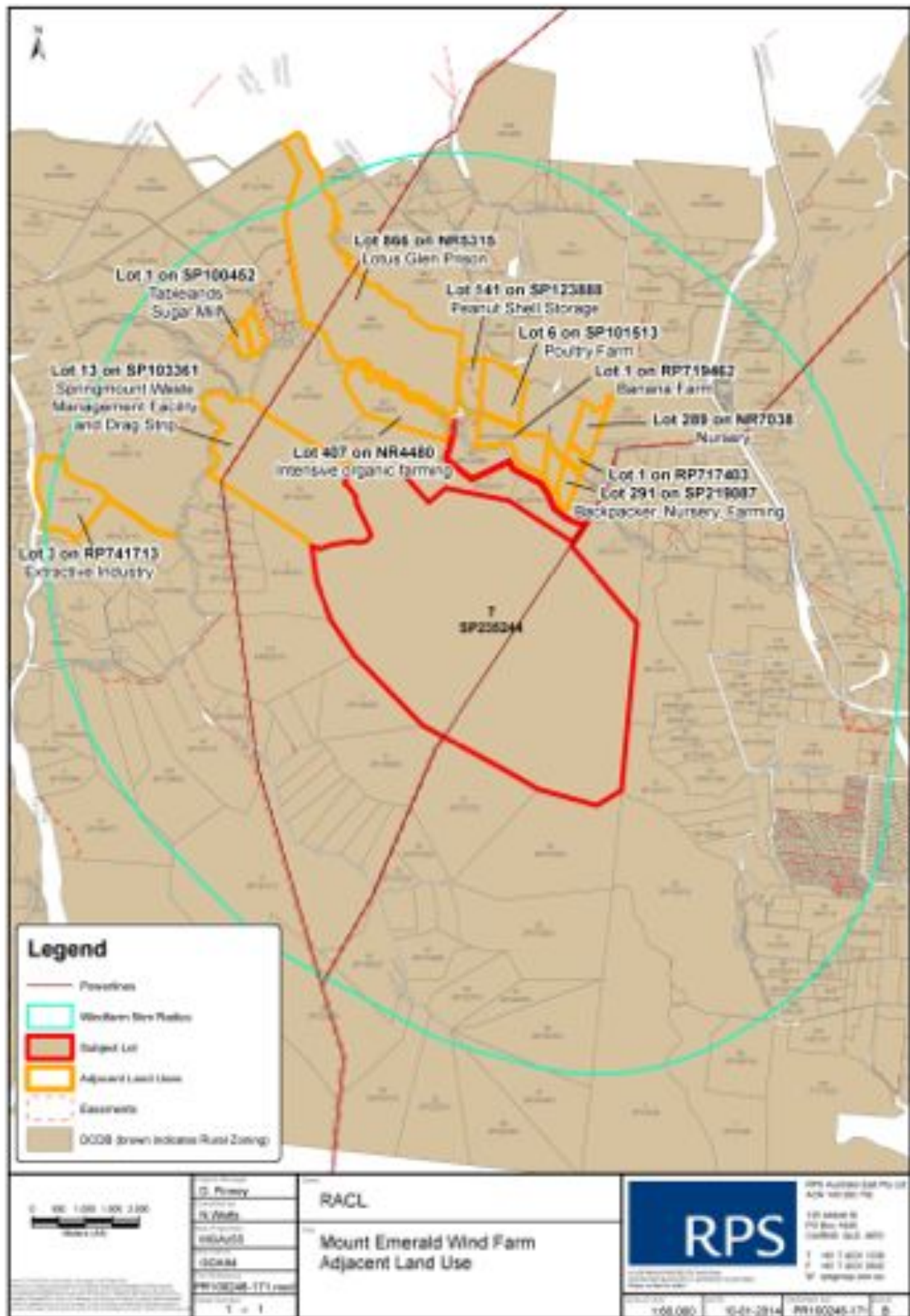


Figure 2.3 Adjacent Land Uses

There are approximately 118 receptors (representing individual residences, or in some cases groups of residences) in total, associated with both farming and other uses located within a 5 km radius of the wind farm, as shown on **Figure 2.3**. A breakdown of their proximity to the nearest proposed wind turbine generator (WTG) is provided below in **Table 2.2**:

Table 2.2 Number of Residences within 5 km from MEWF site

Distance from WTG (m)	No. of Residences
500	0
1,000	0
2,000	11**
3,000	51
4,000	82
5,000	118

** includes the Springmount Waste Management Facility as a receptor

The nearby townships of Rangeview (with approximately 450 residences) and Walkamin (approximately 80 residences) are located approximately 4.5 – 4.8 km from the subject site.

RACL currently own and operate the existing Windy Hill Wind Farm, located 50.5 km south-south-east of the project area and are also progressing a development application for the 'High Road Wind Farm', located approximately 40 km south-south-east of the site and comprising 28 wind turbines, ancillary infrastructure and facilities.

2.3 Other Potential Developments

There are currently no other 'greenfield' developments (deemed public knowledge), under assessment or development in the region surrounding the MEWF project site.

2.4 Wind Farm Infrastructure Description

The following section details the specific requirements of the EIS Guidelines Section 5.5 which requests all construction, operation and decommissioning components of the wind farm to be described in detail.

The project components are provided in **Table 2.3** below. These terms will be used in relation to project elements throughout this document.

Table 2.3 Project Components

Component	Definition
Access Roads	Roads connecting public roads to the Site and the Site Roads
Assembly Area	Areas on site where rotor blades are attached to the hubs prior to the installation of the complete rotor to the nacelle. The area is only relevant for the rotor assembly installation method.
Development envelope	The area of the project site in which the wind farm infrastructure (turbines, hardstands, access roads, electrical cables and substation) could potentially be sited, comprising an area of approximately 57 ha.
Development footprint	The final locations of the wind farm infrastructure. This includes the infrastructure footprint - the area occupied by turbines, access tracks, substation etc. during the operational phase - and other areas that will be affected by construction (for example, cable trench easements, construction phase access track width, construction compound, crane pads) which can be rehabilitated post-construction.
Project site	The land within the cadastral boundaries of all properties involved with the Proposal, comprising an area of 2,422 ha.
Nacelle	The housing for the generating components of the wind turbine. This includes the generator, gear box, drive train and brake assembly.
Turbine Footing	The stable horizontal platform for the towers sections and elements to be mounted. Foundations will be of either a gravity or rock-anchor type, depending on the geotechnical conditions at each wind turbine site.
Crane Hard Stand	An improved / stabilized area with a prepared surface where plant and cranes can operate, vehicles can be parked and material can be stored.
Construction Area	The part of the Installation Area located at each WTG foundation position which is required for assembling the cranes and area for operating cranes, containers for lifting equipment, generator unit, working area with tools and containers etc.
Compound for substation and control building	The base area for the site management and technicians. The area consists of restroom facilities, parking, site offices, tools and spare parts containers

2.4.1 Wind Turbine Generators

A wind turbine generator (WTG) converts the kinetic energy from wind to mechanical energy to drive a generator for electricity production.

The specific wind turbine model to be used in the project is yet to be confirmed. The general characteristics of wind turbines being considered include the following:

- upwind pointing horizontal axis wind turbine;
- three-bladed design with blade lengths between 50 m and 54 m (100 m to 108 m diameter);
- turbine capacity of approximately 3.0 MW;
- cylindrical steel towers providing a hub height of 78 m to 80 m; and
- total height to blade tip between 130 m and 134 m.

Rotor

The wind turbines to be used for the Proposal would have a three-bladed rotor. Each blade is attached to a central hub which is connected via a horizontal axis to a drive train and generator. Blades are generally manufactured from fibreglass or fibreglass composites with a steel flange for attaching to the rotor hub.

Blade lengths are variable depending on the size of the generator and the wind characteristics under which the turbine would operate.

Various wind turbine models are under consideration with blade lengths ranging between 50 m and 54 m, giving a rotor swept area of between 7,850 and 9,160 square metres (m²).

The rotor assembly, comprising the three blades attached to the rotor hub, is connected to a drive train normally comprising a gearbox and generator. The rotor hub contains a pitch control mechanism, allowing each blade to be rotated longitudinally, or feathered, with respect to the wind. Pitch control also allows the rotor speed to be controlled for better performance and braked for emergency and maintenance purposes.

The wind turbines under consideration for the Proposal operate between wind speeds of approximately 11 kilometres per hour (km/h) (3 metres per second (m/s)) – the “cut-in speed” – and 90 km/h (25 m/s). Where wind speeds exceed 90 km/h the wind turbine is shut down for safety reasons. On the Beaufort Wind Scale, 90 km/h is considered a storm-force wind, which is rarely experienced inland.

Nacelle

The nacelle is the housing used to contain the drive train and electricity generator and has dimensions of approximately 10 m length x 4 m width x 4 m height. The nacelle protects the various components from the weather and provides an acoustic enclosure to reduce mechanical noise emission. The various components within the nacelle are shown in **Plate 2.1** and described below.

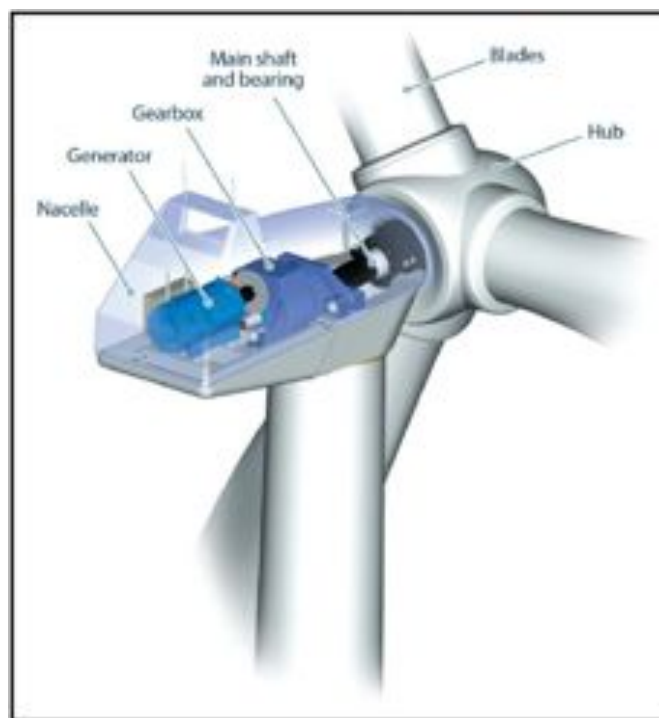


Plate 2.1 Wind Generator Turbine Components

The rotor assembly is connected through a horizontal shaft to a gearbox or via a direct drive to the generator.

The generator produces electrical energy which is transmitted via cable to the base of the tower before entering the underground collection system. The drive train also incorporates a brake mechanism to allow the rotor to be stopped and locked for maintenance or emergency purposes. Each nacelle is fitted with meteorological equipment to allow climatic conditions, such as wind speed and direction, to be measured and used in the operational control of the turbine.

The nacelle's connection to the tower includes a yaw drive which enables the turbine to be rotated toward the prevailing wind direction, allowing maximum power generation from the available wind resource.

Tower

The nacelle and rotor assembly are mounted on a tubular steel tower of approximately 80m in height. The tower diameter ranges from approximately 4.5 m at the base to 2.5 m at the nacelle. Towers are generally manufactured in three or four sections to allow transport to the project site, where they are bolted together. The tower houses control and power cables and is fitted with either an access ladder or lift for maintenance purposes.

2.5 Wind Farm Layout

The proposed wind turbine layout used as the basis for the environmental assessment of the Proposal – comprised 70 WTG's with the coordinates identified in **Table 2.4**. Modifications to this layout were undertaken with a resultant layout of 63 WTG's as shown previously **Figure 1.2**. In developing this layout a number of factors were taken into consideration including:

- ecological considerations;
- the project site extent, comprising the cadastral boundaries of the involved landowners;
- the location of non-involved residences in the vicinity of the project site;
- site topography; wind speed data collected from two monitoring towers over a three-year period;
- turbine spacing;
- compliance with noise criteria;
- telecommunications paths from nearby installations.

In the preliminary planning stages, the layout of the wind farm was determined to produce the maximum amount of energy production across the site. During the development of the MEWF project proposal the original layout (of approximately 100 turbines) has been changed to accommodate provisions such as:

- Noise – turbines removed to keep noise levels below goals set by applicable standards;
- Visual – turbines have been moved or deleted to reduce the views from surrounding areas. Turbines along the western ridgeline were moved further into the site to reduce their visible prominence to residents to the west. Turbines were also removed altogether due to proximity to residents to the east of the site;
- Flora and fauna – turbines have been removed from particular areas of known avian activity; and to avoid areas of high flora significance;
- Constructability – areas of very rugged terrain to the south deemed too difficult to access and construct.

The individual wind turbine locations may still be subject to minor adjustments, or 'micro-siting', prior to construction in response to various factors including:

- environmental constraints, such as avoidance of significant vegetation, quoll denning habitat and prevailing geotechnical conditions;
- final wind speed and energy yield analysis;
- detailed site survey and geotechnical/civil engineering considerations;
- turbine manufacturers recommendations; and
- resource and cost-efficiency.

Table 2.4 Wind Turbine Generator Locations

Turbine Number	X	Y	Turbine Number	X	Y
1#	325792	8103791	36	328292	8098872
2#	325927	8103500	37	328824	8099088
3	326071	8103211	38	328726	8098695
4	326263	8102926	39	329067	8098362
5	326071	8102642	40#	329705	8098561
6	325535	8102589	41#	329600	8098212
7	325197	8102351	42#	330338	8097956
8	325266	8102037	43#	330401	8098594
9	325402	8101713	44	329970	8099041
10	325539	8101383	45	329790	8099328
11	325930	8101603	46	329648	8099620
12	325803	8102201	47	329228	8099859
13	326364	8101775	48	329113	8100157
14	326771	8101965	49	329043	8100457
15	325931	8101065	50	329738	8100745
16	325941	8100734	51	329581	8101021
17	326222	8100448	52	329644	8101320
18	326484	8100150	53	329242	8100793
19	326793	8099845	54	328753	8100703
20	327187	8099577	55	328157	8100695
21	327392	8099290	56	328537	8100981
22	327652	8099773	57	328498	8101272
23	327542	8100066	58	328458	8101575
24	327436	8100361	59	328466	8101926
25	327254	8100649	60	328402	8102310
26	327232	8100956	61	328248	8102601
27	327039	8101238	62#	328130	8102902
28	326982	8101539	63	328792	8102560
29	326556	8101046	64	328903	8102219
30	326708	8100606	65	328983	8101892
31	328045	8100267	66	328031	8101732
32	328206	8099881	67	327768	8101472
33	328648	8099655	68	327640	8101915
34	328376	8099384	69	327574	8102211
35	328058	8099149	70	327496	8102505

Turbines removed from previous layout.

2.5.1 Hardstands

At each WTG site a number of permanent and temporary hardstand areas will be required for foundations, crane operations during the erection of the towers and wind turbine components and also for scheduled maintenance activities during the wind farm operational and decommissioning phases. The hardstand configuration at each WTG site will be based on two different construction methods: the triangular and rectangular hardstand methods, as determined by topography and terrain. Triangular hardstands are approximately 1000m² and rectangular hardstands are approximately 1200m². Hardstand elements requiring permanent hardstand and therefore full vegetation clearing include the Foundation Pad, Main Crane and the Assist Crane. Temporary elements will include rotor assembly, main crane boom supports and blade trestle

hardstands; it may be possible to only clear trees and taller shrubs for these areas, thereby allowing for retention of the ground layer and faster natural revegetation.

2.5.2 Foundations

Each wind turbine tower will be erected on a concrete and steel foundation. Foundations will be of either a gravity or rock-anchor type, depending on the geotechnical conditions at each wind turbine site.

Gravity foundations are essentially reinforced concrete slabs which support the wind turbine tower by gravitational mass. This type of foundation is a standard type for wind turbines and requires approximately 450 cubic metres (m³) of material to be excavated to a depth of approximately 2.5 m. The foundation is constructed from concrete with reinforcing steel.

Rock anchor foundations utilise a series of tensioned steel cables (or tendons) installed into competent rock to a depth of approximately 20 m below ground. Each cable is secured to a concrete slab at the surface and tensioned prior to erection of the tower. Rock anchor footings require excavation of approximately 100 m³ of material.

A combination of both these foundation types may be required, depending on the specific geology at each wind turbine site; however it is expected from preliminary investigations and field assessments that the majority of foundations will comprise the rock anchor type. Geotechnical investigations have indicated that little blasting will be required as the substrate is sufficiently weathered to be removed using ripping and non-explosive rock splitting.

Topsoil from the footing excavation will be stockpiled separately adjacent to the excavation. It will be used for backfilling over the constructed footing with any excess topsoil being evenly spread around the disturbed turbine site. Excavated material can also be used to prepare a level hard stand area for the lay down of the component turbine parts and for the large cranes required for erection of the turbine.

2.5.3 Wind Monitoring Masts

Two temporary wind monitoring masts are currently installed on the project site; an 80 m tower is situated at approximately 925 m ASL to the south-east of the site at -17.175741 °S 145.392811° E; and a 50 m tower in the north-west of the site at -17.166665 °S 145.360292°E (867m ASL). These monitoring masts have recorded wind data which has been utilised for the Proposal's development and planning. Additionally, two mobile sonic wind recorders have been utilised across the site.

Up to four permanent wind monitoring masts will be installed within the development footprint to monitor the performance of the wind turbines against the manufacturer's power-generation guarantees. Each monitoring mast, comprising a lattice structure supported by steel guy cables, will be fitted with equipment such as anemometers, wind vanes, temperature sensors, etc., to measure climatic conditions in the vicinity of the wind turbines. The location and number (max. of 4) of wind monitoring masts is yet to be finalised.

While the monitoring masts provide for the long-term collection of wind data, the key need for the masts is part of performance testing to ensure the wind turbines installed on-site operate in accordance with specifications in respect of noise and power output. The location of monitoring masts in relation to the wind turbines is required to meet a number of obligations to ensure acceptability of test results. These obligations are outlined in *International Standard IEC61400-12*. The final location of masts is determined in conjunction with the owner and supplier of wind turbines. Typical drawings are presented in **Figure 2.4**.

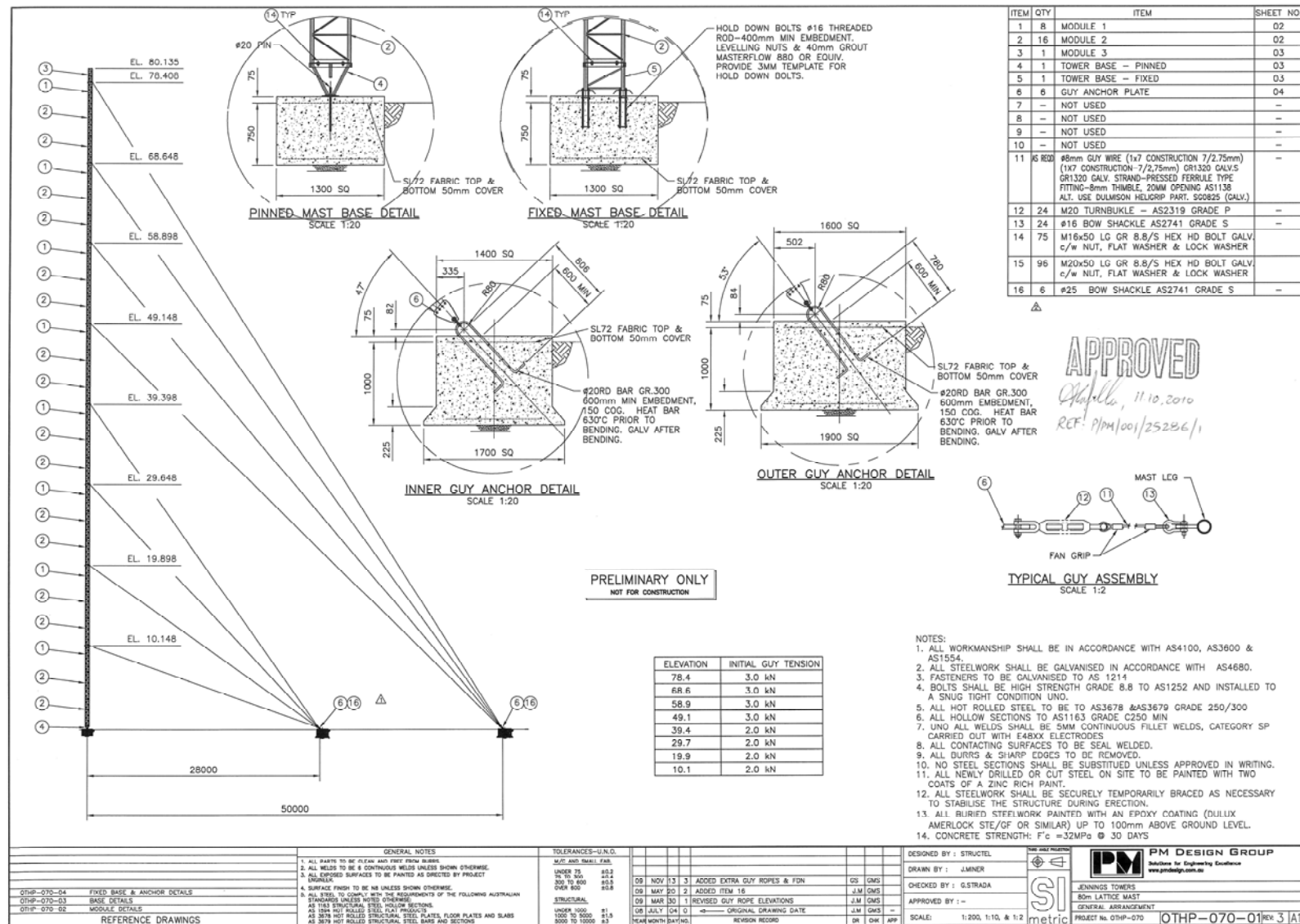


Figure 2.4 80m Wind Monitoring Mast Specifications

2.6 Design Parameters

The design of the wind turbines and the associated infrastructure will be in accordance with appropriate and recognised national and international standards. Wind turbine generators will be required to meet the requirements as defined in *International Standard IEC61400-1:2005* for a Class I site.

Under *IEC61400-1:2005* the key conditions for the wind turbine structural design parameters are:

- V_{ref} (max 10 min average wind speed) – 50 m/s, and
- V_{50} (3 sec gust wind speed) – 70 m/s

2.6.1 Construction and Installation

2.6.1.1 Wind Turbines

Wind turbines are manufactured in separate components and sections and will be assembled on the site according to the following broad stages:

- Turbines will be constructed from a hardstand area located at the base of each turbine location. Refer to **Figure 2.5** for the Crane Hardstand Area Plan.
- Each unit will be installed in a sequential process following the formation of the footing and hardstand areas.
- The installation process will generally take up to one week for each turbine depending on weather conditions.
- Turbine erection commences with the initial tower section bolted to a stub section embedded within the concrete footing. Subsequent sections are raised by crane and bolted to the section below. The nacelle is then lifted to the top of the tower and secured, followed by fixing the rotor and blade assembly.
- Once the turbine is constructed, it is subjected to a detailed checking process as part of its commissioning before it can commence unrestricted operation.

Plates 2.2 and **2.3** below, detail the triangular and rectangular hardstands with specifications that will be required on site. Triangular hardstands are designed for areas with limited access such as ridge top locations, and rectangular hardstands for more uniform areas of the site.

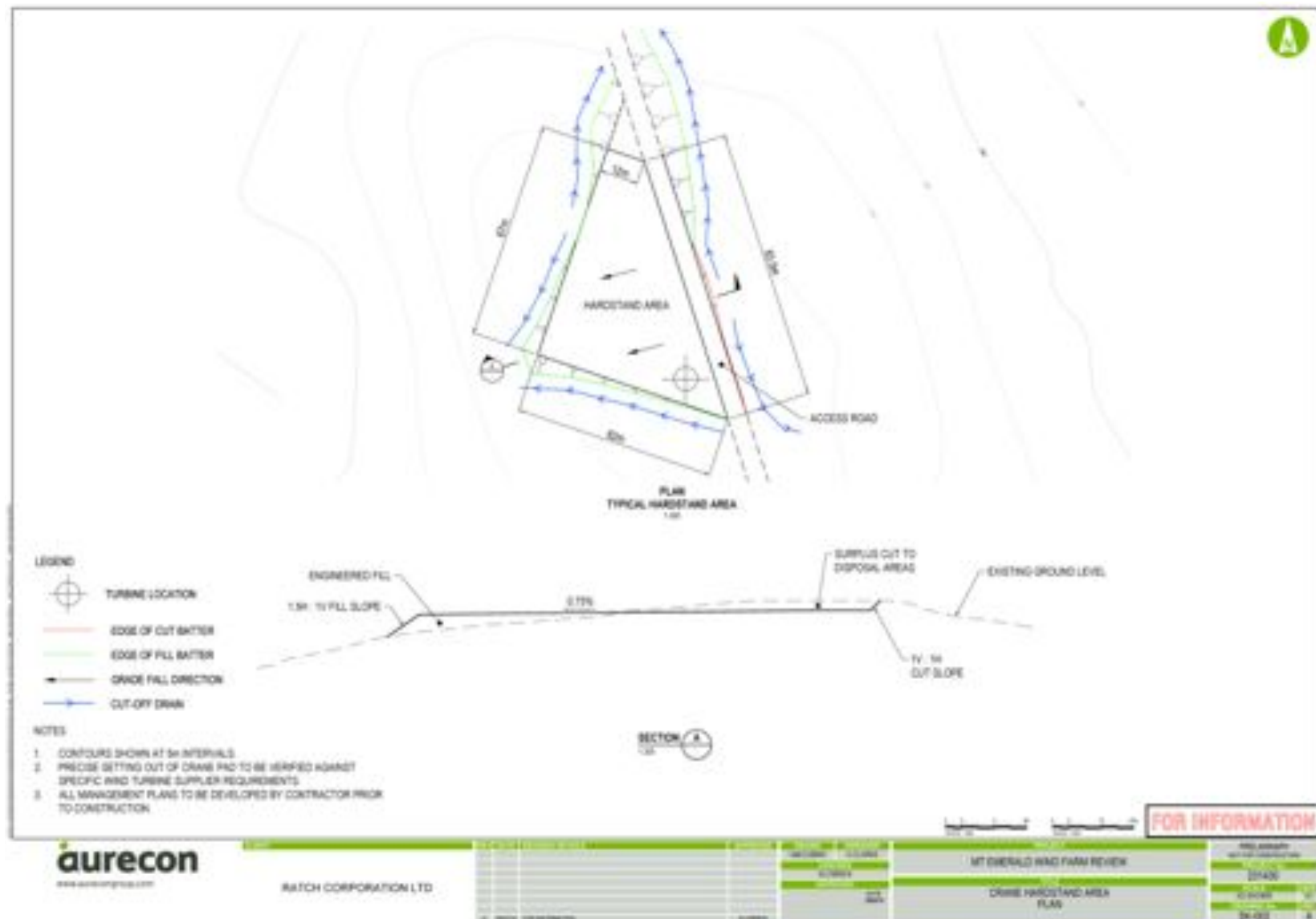
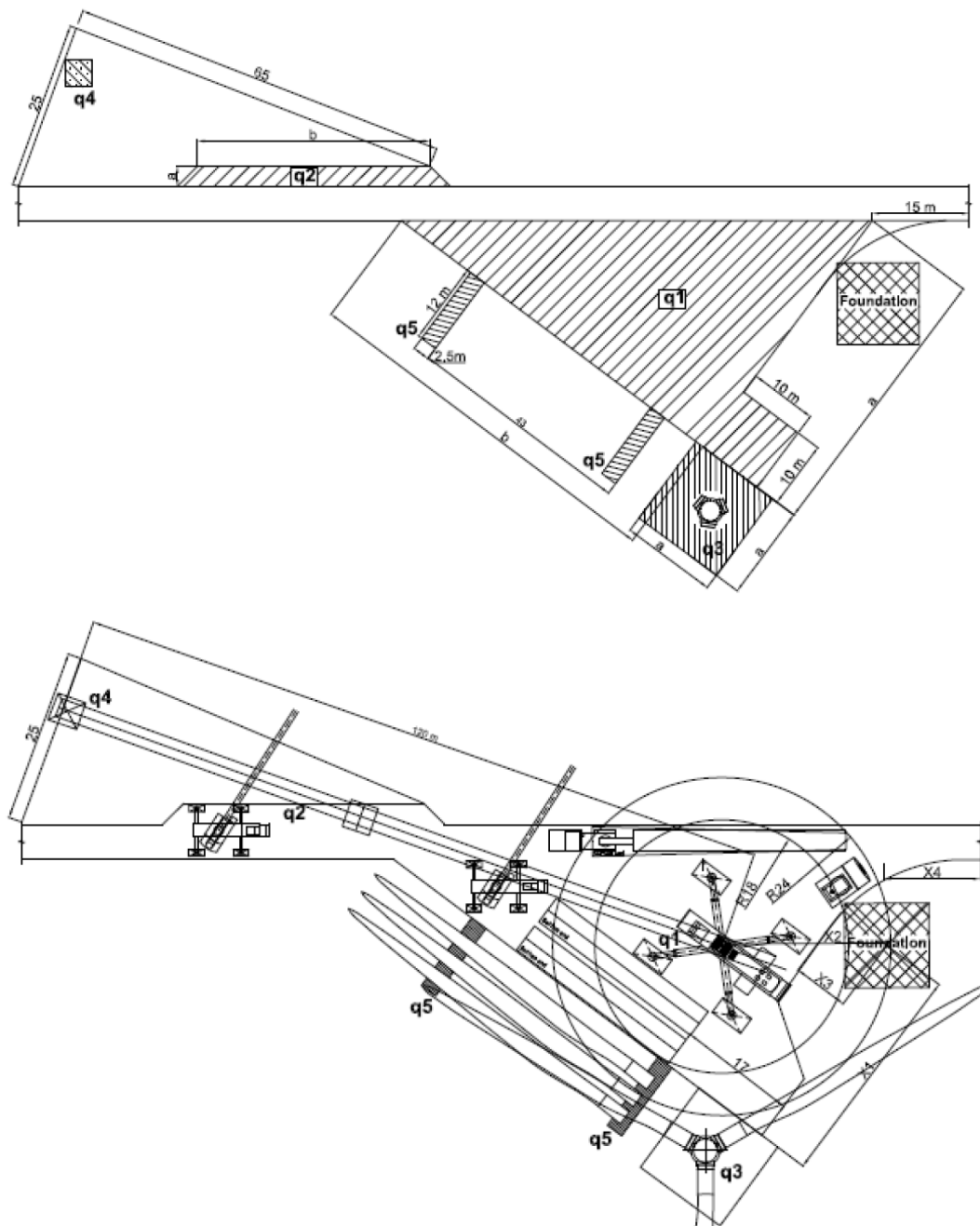


Figure 2.5 MEWF – Crane Hardstand Area Plan

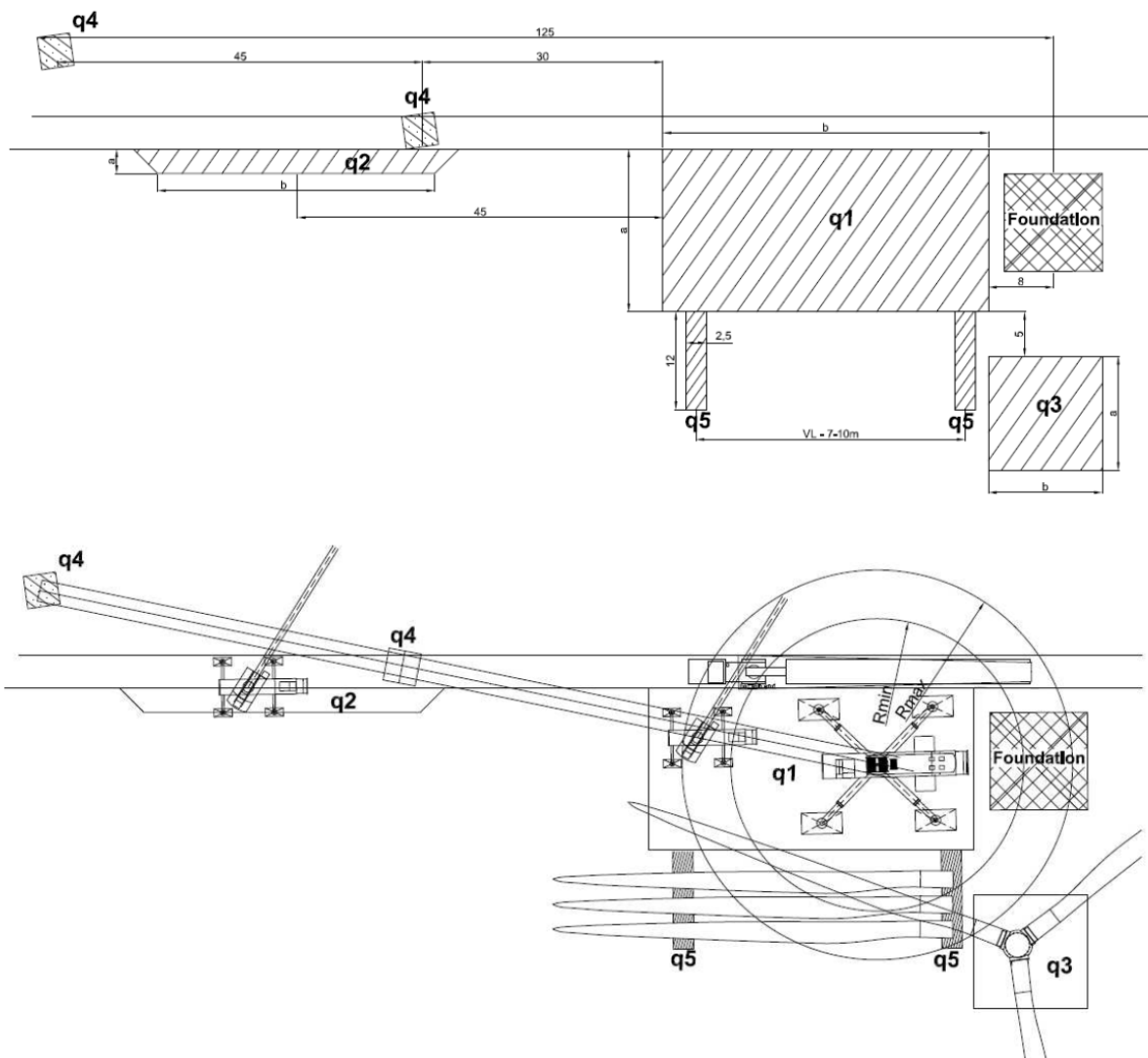


Area	Description	Max. Fall	Area (m2)	Dimension (a x b) (m)	Maintenance
Road	Road section from q1 to q2				Permanent
q1	Hardstand for Main Crane	1 %	1127*	(41 x 55 / 2)	Permanent
q2	Hardstand for Assist Crane	1 %	180*	6 x 30	Permanent
q3**	Hardstand for assembly of rotor	1 %	144*	12 x 12	Temporary
q4	Hardstand for support of the boom	1 %	16*	5 x 5	Temporary
q5	Trestle area for blades	1 %	60*	(12 x 2.5) x 2	Temporary

**** Rotor Assembly** – If the installation method using rotor assembly is chosen, a hardstand (q3) is required, where the hub and three blades can be assembled to one complete rotor without the blades blocking the road prior to mounting. The rotor assembly requires a cleared area for the hub including blades.

Single Blade Installation – if single blade installation is chosen a Hardstand for the rotor (q3) is not required. The hub will be stored on the main Construction Area.

Plate 2.2 Triangular hard stand cross drawings with specifications.



Area	Description	Max. Fall	Area (m ²)	Dimension (a x b) (m)	Maintenance
Road	Road section from q1 to q2				Permanent
q1	Hardstand for Main Crane	1 %	800	20 x 40	Permanent
q2	Hardstand for Assist Crane	1 %	180	6 x 30	Permanent
q3**	Hardstand for assembly of rotor	1 %	144	12 x 12	Temporary
q4	Hardstand for support of the boom	1 %	16	4 x 4	Temporary
q5	Trestle area for blades	1 %	60	(12 x 2.5) x 2	Temporary

**** Rotor Assembly** – If the installation method using rotor assembly is chosen, a hardstand (**q3**) is required, where the hub and three blades can be assembled to one complete rotor without the blades blocking the road prior to mounting. The rotor assembly requires a cleared area for the hub including blades.

Single Blade Installation – if single blade installation is chosen a Hardstand for the rotor (**q3**) is not required. The hub will be stored on the main Construction Area.

Plate 2.3 Rectangular hard stand cross drawings with specifications.

2.6.1.2 Footings

Each wind turbine tower will be erected on a concrete and steel footing. Footings will be of either a gravity or rock-anchor type, depending on the geotechnical conditions at each site. Gravity footings are approximately 450m³ of concrete with 2-2.5m depth at centre to taper to approximately 0.5m at the edge (15m x15m although occasionally octagonal). Anchor footings are approximately 100m³ of concrete and 7mx7m.

Gravity footings are essentially reinforced concrete slabs which support the wind turbine tower by gravitational mass. This type of footing is a “standard” type and requires approximately 450 cubic metres of material to be excavated to a depth of around 2.5 m, which is replaced with concrete and reinforcing steel.

Rock anchor footings utilise a series of tensioned steel cables installed into competent rock to a depth of approximately 20 m below ground. Each cable is secured to a concrete plinth at the surface and tensioned prior to the erection of the tower. Rock anchor footings require approximately 100 m³ of excavation and reinforced concrete.

2.6.1.3 Site Access Roads

Construction of new and upgraded access tracks will include:

- Clearing, grading and removal of topsoil as required, and the compaction of a gravel road base to a general formed width of 5 m, (for disturbance area estimates a width of 10m has been applied to all site roads to allow for the formed road, drains and batters);
- Provision of drainage works;
- Excavated topsoil will be stockpiled and later used in the rehabilitation of the site including road verges and disturbed areas.

2.6.1.4 Electrical Infrastructure

The following outlines the main components of electrical infrastructure proposed;

- Power output from each turbine will be directed to 33 kV underground cabling which link each turbine to a new proposed substation located centrally within the site. The cables will generally follow the site access roads within the project area. Trenches will be typically 0.5m wide and 1m deep with cables buried at 0.7m.
- A new substation will provide a connection to the existing 275 kV transmission line which traverses the project area.

2.6.1.5 Site Facilities

The construction and operation of the MEWF will require the installation of a number of temporary and permanent facilities, such as:

- Permanent administration, maintenance and storage building for operations,
- Temporary buildings for construction,
- Laydown and holding areas for equipment and components during construction,
- Car parking.

At the completion of construction all temporary construction facilities will be removed from the site and the areas rehabilitated in accordance with the Rehabilitation Plan.

2.7 Site Access

2.7.1 External Access Roads

Access to the site will be gained from the Kennedy Highway via Hansen Road, then the realigned Springmount Road/Kippen Drive intersection, across a new road within Lot 905, along Kippen Drive and then across Easements A & C to Lot 7, as shown in attached proposed access plan shown in **Figure 2.6** and the typical site access road cross section shown in **Figure 2.7**.

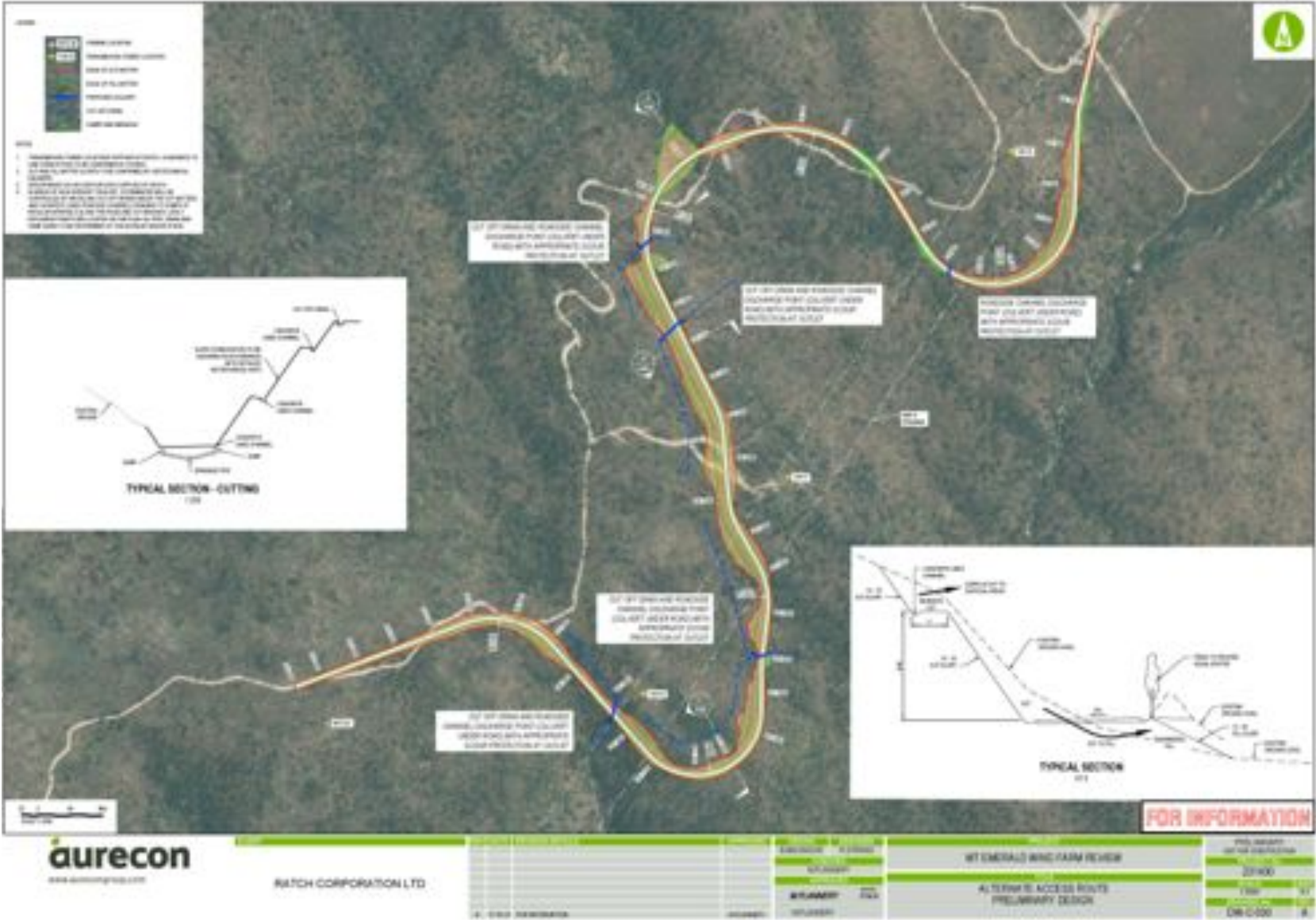


Figure 2.6 Access Plan

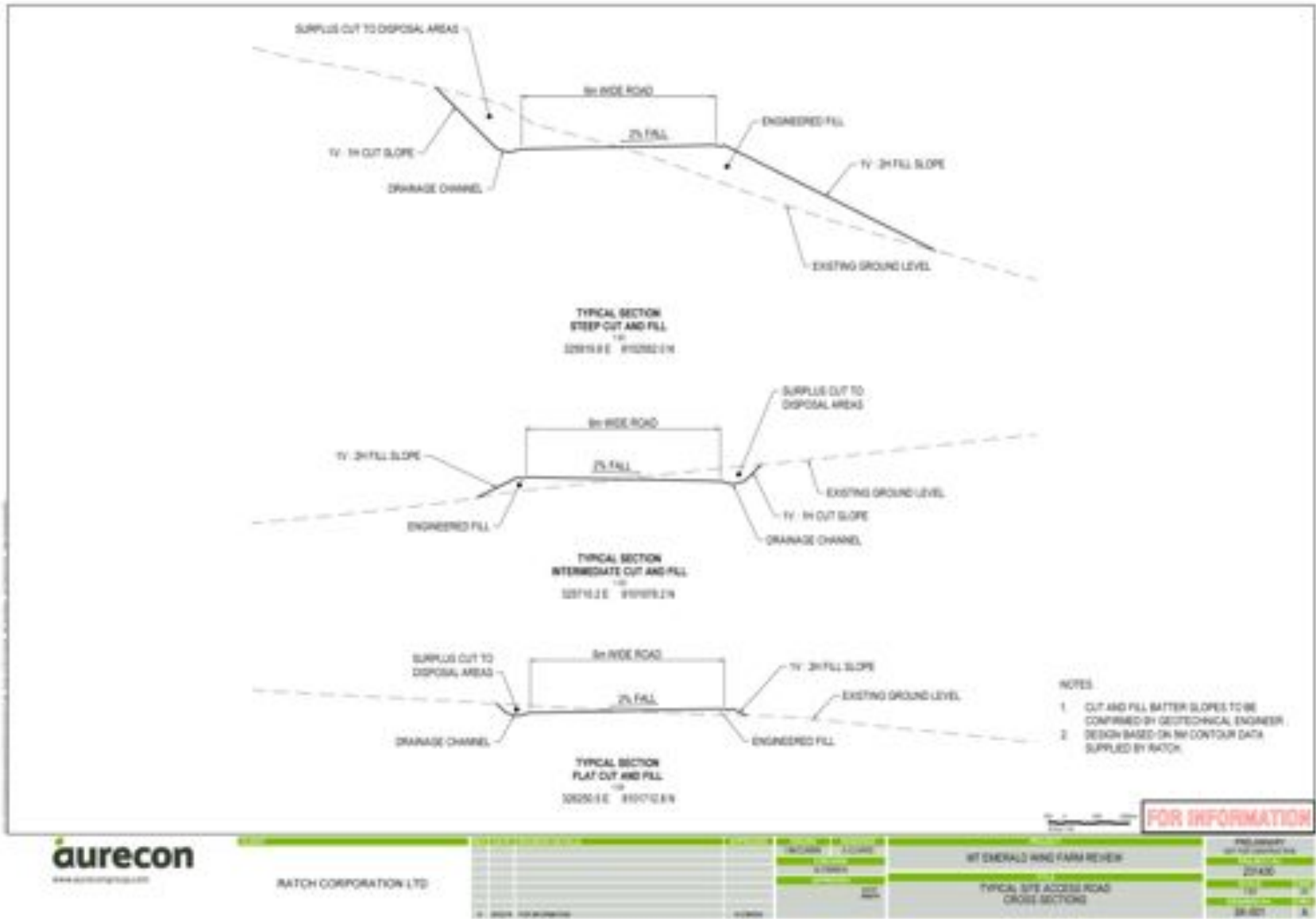


Figure 2.7 Typical Site Access Road Cross Sections for the MEWF

2.7.2 Internal Access Roads

Access to the individual turbine sites will be provided by a series of tracks used for both construction and operation activities. These roads will comprise a formed roadway 5m with additional clearance of 1 m each side for shoulders and drainage. For disturbance area estimates a width of 10m has been applied to all site roads to allow for the formed road, drains and batters. Examples of road cross sections for flat, intermediate and steep terrain are provided (**Figures 2.6** and **2.7**). For the examples shown the overall widths of disturbance are 7.5m, 9m and 15m respectively for varying terrains. Roads have been designed to reduce the amount of steep terrain and as such it is thought reasonable to assume an overall 10m clearance width for all internal roads. The required road gradient for transport and cranes (as per wind turbine supplier specifications) is 11 to 15% without the use of a push/pulling unit. For circumstances where gradients do exceed this requirement, push/pulling units will be used.

An internal road layout has been provisionally determined, and is shown in the proposed site layout shown in **Figure 2.8**. Ultimately the road layout will be dependent upon the final location of the turbines and subject to engineering, environmental and cultural heritage factors.

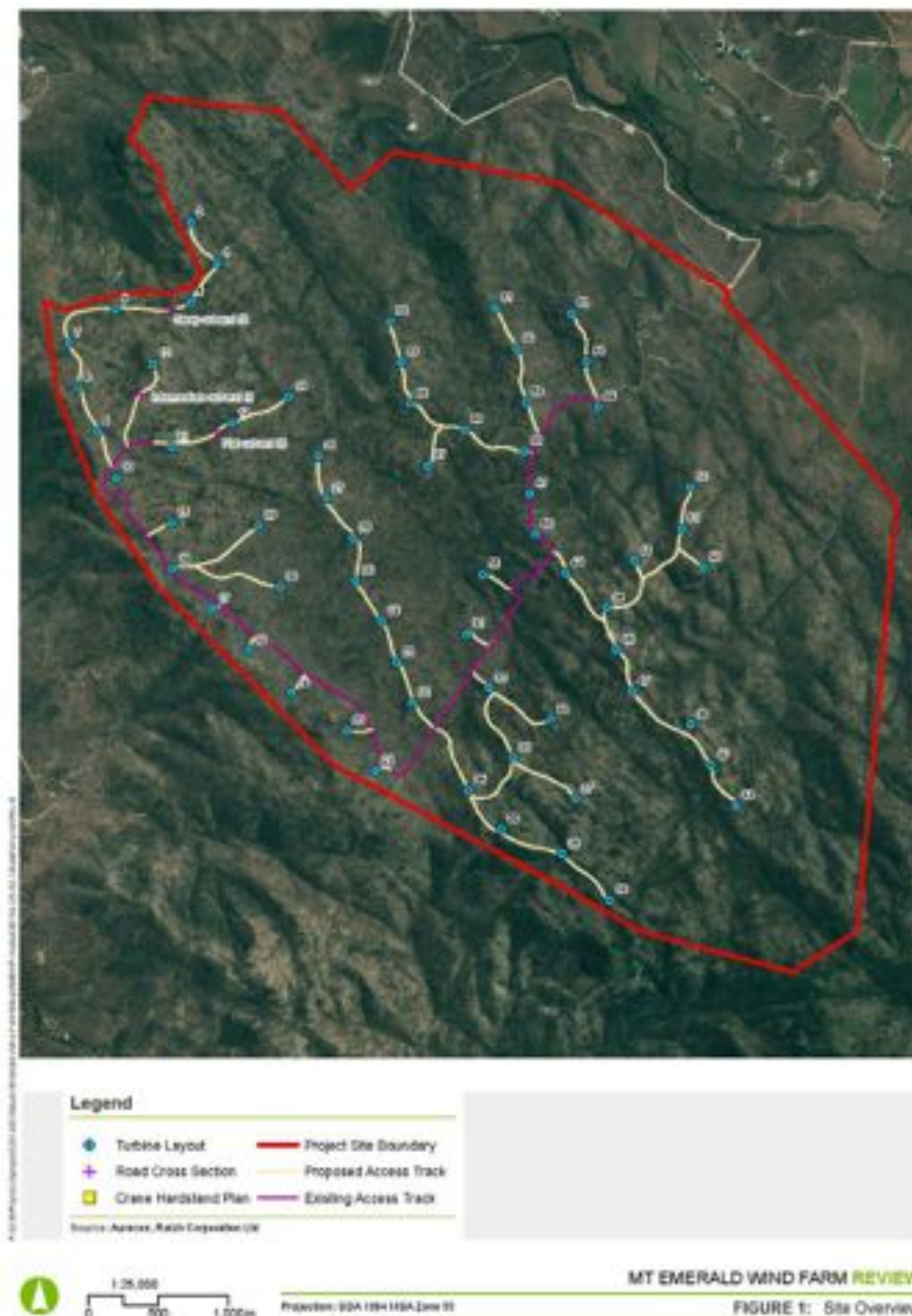


Figure 2.8 MEWF Site Overview Considering Access Roads and Gradients

A number of defined watercourses are present across the site, and the proposed layout is sympathetic to these features and their important environmental values by seeking to minimise the number of waterway crossings and utilising existing crossings where practically possible. It is important to note that all waterways contained within the site are seasonal and generally flow only during the wet season. During the dry season minor pools may remain in the Granite Creek tributary at the lower northern part of the site, depending on the duration and intensity of the season. There are currently approximately 6 km of tracks traversing the site providing access to the Powerlink 275 kV transmission line, which will be used wherever possible to link with the additional turbine access tracks and therefore minimise the area of new disturbance.

In designing the access tracks, particular attention will be given to the management of stormwater drainage to minimise erosion and sediment transport. Excavated topsoil will be stockpiled during the construction of the access tracks and later used in the rehabilitation of the site. The stockpiles will be stabilised to prevent dust generation and loss of material. At the conclusion of the construction phase, any tracks not required for subsequent operation and maintenance of the wind farm will be restored and revegetated according to the Rehabilitation Plan.

2.8 Electrical Infrastructure

The electrical infrastructure at the wind farm will convey electricity generated by the WTGs to the electricity transmission grid. This infrastructure comprises the following elements which are described in detail below:

- WTG transformers at each wind turbine site located within the turbine tower;
- A wind farm substation with two 130 MVA transformers, switch gear and circuit breakers;
- Approximately 40 km of 33 kV underground electrical and control cabling to connect each wind turbine to the substation;
- An overhead transmission connection to the existing 275 kV transmission line; and
- An operations building containing control and communications equipment.

2.8.1 Wind Turbine Generator Transformers

The WTG would produce electricity at approximately 0.7 kV. This output will be transferred via cable to a transformer located within the base of the tower. This transformer would step-up the voltage from 0.7 kV to 33 kV to allow transmission via the underground cable system to the wind farm substation.

2.8.2 Wind Farm Substation

The wind farm substation would be situated in close proximity to the existing power line traversing the central portion of the project site from east to west (see **Figure 1.2**). This would limit the length of the overhead transmission line required to connect to the grid. The substation will be sited in a compound of approximately 200 m x 200 m.

The connections between the incoming 33 kV cabling, the wind farm transformer and the 275 kV transmission line would involve various components including busbars, circuit breakers and isolators. The design specifications will be prepared to meet the requirements of the transmission network owner Powerlink.

Electrical infrastructure within the substation compound will be founded on concrete slabs with gravel surrounds. The compound itself would be enclosed to restrict unauthorised access. The transformers will be placed on concrete pads with protective bunding to contain any leak or spill of transformer oil.

2.8.3 Underground Cabling

Underground 33 kV electrical cables will connect each wind turbine to the wind farm substation. Placement of the cables underground will minimise the visual impact of overhead lines. The proposed underground cable routes would generally follow the access tracks as shown in **Figure 1.2** and would also be included within the already disturbed roadway zone.

Underground cables will be buried in trenches generally about one metre in depth to give a minimum cover of 0.75 m. The width of the trenches for individual cables will be about 0.5 to 0.75 m with power cables and control cables being installed in the same trench. The time that trenches are open will be minimised and they will be backfilled and compacted using sand immediately above the cables and excavated material above the sand.

Control cables would connect each wind turbine to a computerised operation system in the wind farm control room, allowing turbines to be monitored and managed at all times. Individual turbines can be automatically

controlled for start-up and shut-down. In addition, wind speed and direction will be monitored allowing individual turbines to be adjusted to suit the prevailing wind conditions to maximise energy production.

Any surplus natural soil and rock material will be distributed over the surrounding area to blend in with the natural landform and will be revegetated. Excess concrete and other construction materials will be removed from the site. In situations where trenches will need to cross constructed drainage channels, the crossings will either involve under-boring of the channel (horizontal drilling) or stringing conductors above the channels with due consideration given to safety standards and the normal maintenance activities for drainage channels.

2.8.4 Overhead Transmission Connection

As the proposed substation site is located adjacent to the existing Powerlink 275 kV transmission line, the length of some connecting transmission lines will be minimised between the wind farm substation and the connection point along the transmission line.

A separate development approval for the turn-in connection will be sought under Part 5 of Queensland's *Environmental Protection Act 1994* (EP Act) by Powerlink, who will be the proponent for this element of the Proposal. Potential environmental impacts from this development will be addressed by Powerlink in a separate application.

2.8.5 Operations and Maintenance Building

An operations and maintenance building will be constructed adjacent to the substation compound. This building will house the wind farm operational infrastructure, including monitoring and communications equipment. Maintenance facilities would include a store, work area and staff amenities, supported with rainwater tanks and a septic system. Car parking for operations and maintenance staff will also be provided adjacent to the substation compound.

2.9 Operation and Maintenance

Once operational, the wind farm predominantly operates remotely and does not require full-time staff to be in attendance on the site at all times. These staff will be on site during normal working hours unless they are 'called out' under emergency circumstances. Each individual turbine undergoes a regular maintenance regime, which includes maintenance approximately every six months, which requires the turbine to be out of service during this period. Maintenance of the substation and associated facilities will also be required regularly, but relatively infrequently with no heavy machinery generally required once established. Four wheel drive vehicles or vans which carry the required tools and equipment will be used to provide access to the turbines during operation.

Where non-scheduled maintenance is carried out due to irregular equipment failures, the hardstand area beside each turbine is proposed to be maintained to allow access for heavy machinery, as needed to be provided without further disturbance to the environment.

2.10 Decommissioning and Site Restoration

The project economics are based on a wind farm design life of up to 30 years, after which Mt Emerald Wind Farm Pty Ltd (under RACL) will either; continue generating power from the existing turbines, upgrade the turbines or remove the infrastructure and decommission the site.

Decommissioning the site would involve the following:

- Dismantling the turbines;
- Removing towers and replacing soil over foundations;
- Removing all material from site for recycling;
- Where tracks are of no use to the land owner, the land would be actively revegetated;
- Underground cabling would be removed if at risk of impact, but otherwise, this cabling will remain underground to reduce additional impacts caused by ground disturbance. All above ground lines would be removed; and
- The substation and associated buildings would be removed.

Following the decommissioning phase, it is important that any disturbed areas are rehabilitated as soon as possible and the site is restored to a condition that reflects as close as possible, its original condition; and also to prevent the degrading processes such as erosion, and the spread of weeds.

2.10.1 Site Rehabilitation

The requirement to decommission and restore the site according to the Rehabilitation Plan and environmental indicator criteria is a key component of the long-term lease agreement between the wind farm and the landowner, which would be registered against the land title to ensure continuity should the land be sold.

A site Rehabilitation Plan will be prepared to provide strategic guidance and advice, and outline performance criteria for landscape restoration. The Rehabilitation Plan will incorporate the following stages:

- Restore areas where subsurface components have been removed such as underground cabling.
- Cutting off at appropriate depths infrastructure, such as concrete foundations, and grade land to match adjacent contours.
- Sites will be rehabilitated with native and locally endemic plant species. The use of native vegetation will help prevent the spread of invasive and exotic species, and will contribute to providing appropriate habitats for the local fauna. Rehabilitation will also assist in stabilising loose soil and reducing the extent of exposed topsoil, therefore preventing potential erosion and sediment runoff.

2.11 Wind Farm Development Program

After planning and approval is finalised, the following proposed project phases will be developed:

- Pre-construction;
- Construction;
- Operation and maintenance and;
- Decommissioning.

The estimated duration of each phase is shown in 0 and the main activities associated with each phase are described in the following sections.

Table 2.5 Project Phase Duration

Project Phase	Duration
Pre-construction	12 months
Construction	24 months
Operation and Maintenance	20-25 years
Decommissioning	12 months

2.11.1 Pre-construction Phase

The pre-construction phase of the development would involve engaging contractors and turbine manufacturers; and carrying out comprehensive site investigations, preparing detailed design and undertaking pre-construction works. This phase would be approximately twelve months in duration.

2.11.1.1 Detailed Design and Contracting

Following the development approval process, a tender would be let for the Proposal's detailed design and construction. The successful tenderer would be responsible for the detailed design of the wind farm which would involve the final micro-siting of the wind turbines and site infrastructure according to the conditions of the project determination.

The detailed design process involves preparation of an Environmental Management Plan (EMP) for the construction phase. The EMP content is determined by the Proponent's commitments, conditions of approval and any licensing requirements. The EMP would likely be subject to the approval of the Department of Planning and Infrastructure prior to works commencing. The EMP would be a component of the contract specifications for the design and construction contractor/s. A draft EMP is provided in Appendix 33 and discussed in detail in Chapter 20.

During this phase the community would be provided with details of the forthcoming construction activities. Community consultation will continue throughout the construction phase at key stages and the community will be advised of any changing circumstances. A dedicated community liaison officer will be employed by the Proponent to consult with the community and resolve issues that may arise.

2.11.1.2 Pre-construction Works

Prior to the main construction commencing, a number of additional works and further site investigations would be undertaken by the selected Contractor, including:

- Geotechnical investigations at each wind turbine site to determine the individual turbine foundation requirements and type;
- Upgrading existing roads and constructing new access roads within the project site, including upgrades at the Springmount Road/Kippen Drive intersection and installation of signage;
- Establishment of a temporary construction compound;
- Preparation works for the location of a mobile concrete batching plant (if required);
- Detailed survey and pegging of infrastructure locations and exclusion areas (e.g. significant vegetation);
- Preparation of a detailed Erosion and Sediment Control Plan (ESCP);
- Conduct preconstruction water quality monitoring to inform construction water quality targets;

- Undertake additional telemetry studies on the project site to determine whether proposed turbine ridge habitats are used preferentially, particularly females with young; and offsite, to collect data on dispersion rates to refine the PVA (to assess the significance of potential impacts);
- Redesign infrastructure layout to avoid high quality foraging or maternal denning habitat and/or inform Quoll Management Plan;
- Continued Habitat Utilisation Surveys for Rare and Threatened Fauna;
- Detailed plant survey of south-west montane heath habitat - GPS mapping of avoidance patches.

The equipment that will be utilised for geotechnical investigations includes a five tonne truck mounted drill rig. The reach all areas of the site, clearance of access track routes will be required, however these will be the access tracks to each turbine area.

The final location for the construction site compound will be subject to discussions and agreement with the host landowner and in respect to environmental constraints. The proposed location is shown in **Figure 1.2**. In selecting the compound site, consideration would be given to logistical requirements, avoidance of important ecological communities and drainage lines, and limiting the visual and noise impact to any nearby receptors. The construction site compound would cover an area of approximately four hectares and would include storage and laydown areas of equipment, materials and machinery; site offices and amenities; and parking areas.

This area will be rehabilitated after construction if finalised and the facility is no longer required.

2.11.2 Construction Phase

The main stages of the wind farm construction program and the associated activities are outlined in **0** and further discussed below. It is anticipated the duration of the construction phase would be up to 24 months.

2.11.2.1 Access Roads, Hardstands and Cabling

Access roads within the project site and crane hardstands will need to be constructed to a standard to support construction traffic and machinery. This will involve excavation of the road and hardstand areas to a suitable depth and the laying of all-weather road base. A proportion of the road base material would be sourced from excavations for turbine foundations, with the remainder sourced by the construction contractor from established facilities off-site in the local area.

Access roads will comprise a general formed width of 5 m, with some additional widening necessary at horizontal curves to allow for movement of large construction plant, including heavy lift cranes and long loads. For the operation phase, widened sections would be reduced to a width of 6 m, with the redundant width from the construction phase rehabilitated. For disturbance area estimates a width of 10m has been applied to all site roads to allow for the formed road, widened sections, drains and batters.

Underground cable installation would initially involve excavation of trenches to a nominal depth of 1 m along the designated cable routes (generally access tracks). A ditch digger, or similar machine, would be used to excavate the trench at a width of approximately 0.5 m to 0.75 m. Excavated material would be stockpiled in windrows adjacent to the trench for subsequent backfilling. Cables would be laid and the trench backfilled and compacted, prior to rehabilitation with vegetation or suitable surface stabilising material. Cable routes would be marked with warning signs at the surface and works-as-executed drawings will be held in the project operations office.

Table 2.6 Main Stages in the Construction Program

Construction Stage	Summary of Works
Access Roads, Hardstands and Cabling	<ul style="list-style-type: none"> Construction of internal access roads to turbine sites Excavation and compaction of crane hardstands Trenching and cable laying
Foundation Construction	<ul style="list-style-type: none"> Excavation and preparation of foundations Footing construction according to geotechnical conditions
Substation Civil and Electrical Works	<ul style="list-style-type: none"> Site survey, clearing and levelling, foundations and fencing Erection and fit-out of control buildings Installation of transformers, busbars, earthing system etc.
Turbine Erection	<ul style="list-style-type: none"> Delivery of tower and turbine components (tower sections, turbine blades, generator/nacelle assembly) Tower erection and nacelle installation Rotor assembly and installation Electrical connections
Wind Farm and Substation Commissioning	<ul style="list-style-type: none"> Turbine testing and commissioning Testing and commissioning transformers, cables, switchgear, SCADA, communications, earthing
Grid Connection	<ul style="list-style-type: none"> High voltage connections and commissioning System energisation and turbine connection

2.11.2.2 Foundation Construction

If gravity foundations are required, the construction of the foundation for each wind turbine would involve the excavation of approximately 450 m³ of ground material to a depth of approximately 2.5 m. Steel reinforcement would then be installed and concrete poured to form the foundation base. For purposes of this environmental assessment, it is assumed that a gravity foundation would require up to 450 m³ of concrete.

Rock anchor foundations would involve the excavation of approximately 100 m³ of ground material to a depth of approximately 2.5 m. Individual rock anchor cores would be drilled into bedrock to a depth of approximately 20 m, with rock anchor tendons grouted into place, stressed and secured at the surface.

2.11.2.3 Substation Civil and Electrical Works

The substation compound area will be approximately 4 ha (i.e. 200 m x 200 m or similar configuration). The compound yard would be surfaced with compacted gravel to form a hardstand. Reinforced concrete pads and footings would be constructed to support electrical infrastructure and buildings. Infrastructure to be installed within the substation yard includes the two units 33/275 kV step-up transformers, switchgear and the operation facilities building.

2.11.2.4 Turbine Erection

The turbine components would be delivered to the project site on semi-trailers. Each tower would be delivered in three parts, and blades would be delivered in single units. Nacelles and turbine substations would also be delivered as individual loads.

The construction method would involve a small mobile crane (up to 100 tonne) for the erection of the bottom two tower sections and the assembly of the rotor unit. A larger 600- 1000 tonne crane would be required to erect the top tower section and install the nacelle and rotor unit. Turbine erection is expected to take approximately 2 to 3 days per turbine.

2.11.2.5 Wind Farm and Substation Commissioning

The wind farm would be commissioned progressively in 'strings' of turbines. Each string would comprise the number of turbines within a cable circuit. There will be six to eight strings of turbines for the Proposal.

The wind farm substation would be commissioned in conjunction with Powerlink to ensure viable connections from the turbines to the substation and the substation to the transmission line. Once the electrical system has been energised, the wind turbines would be put into service.

2.11.3 **Operation and Maintenance**

Once operational, the wind farm would be continuously monitored by staff. Operations staff would be responsible for wind farm operations management, environmental monitoring, routine servicing, malfunction rectification and site visits.

Maintenance would be undertaken on a routine basis, with major servicing undertaken approximately six-monthly on each wind turbine. Each major service visit would involve a number of service vehicles. Maintenance staff would also respond to problems as they arise, with turbine downtime dictated by the complexity of maintenance required. Unscheduled maintenance on equipment such as turbine blades may require the use of large cranes and associated equipment. This can result in a turbine being offline for several weeks whilst the appropriate equipment and materials are sourced.

After approximately 20 to 25 years of operation (or sooner if technology developments allow) the blades, nacelles and towers could be removed and replaced with more efficient component parts. Redundant equipment would be removed from site for recycling and new components installed on existing or new foundations. Refurbishment could extend the life of the Proposal for a further 20 years.

2.11.4 **Decommissioning**

At the end of the operational life of the Proposal, the turbines and all above-ground infrastructures would be dismantled and removed from the site. This includes all the above-ground electrical and substation infrastructure. Foundations would be cut back to below cultivation depth and soil profiles re-established over the footing.

Internal access roads, if not wanted by the landowner, would be removed and the land rehabilitated to as close as possible to the original condition. All decommissioning would be the responsibility of the wind farm owner and would be governed by the conditions of project approval, with decommissioning clauses included in landowner leases. Decommissioning of wind farm infrastructure would take up to 12 months.

2.12 **Resource Requirements**

2.12.1 **Water requirements**

The construction phase of the project will require water for the following uses:

- Moisture conditioning of earth fill;
- Equipment wash down;
- Dust suppression;
- Potable water for site personnel; and
- Fire fighting.

The potential sources of water would depend on the water quality requirement for each application. Water for moisture conditioning of fill and for dust suppression can be sourced from sedimentation basins which may be built to settle silted run-off from construction areas, or from external sources. It is estimated about 20 kilolitres (kL) per day (or two 10 kL water cart loads) would be sufficient for moisture conditioning and dust suppression.

Potable water will be required for the consumption of the construction workforce and site visitors. The estimated potable water requirement during construction is estimated to reach a maximum of 17 kL per day, based on a peak number of approximately 250 personnel, if the average daily consumption is conservatively assumed to be 70 L per person. (On average, per capita household water consumption in Australia is 285 L per day, according to the Australian Water Association <http://www.environment.gov.au/node/22261>. Assume ¼ of this for site requirements).

As there is no supply at the project site, potable water will be delivered by tankers. Potable water requirements during the operational phase will drop dramatically as the number of permanent staff on site is not expected to exceed 15.

Water storage tanks will be provided within the construction compound (during construction) and control building compound (during operation) for bulk potable water storage. Provisions will also be made to allow collection and storage of rainwater from the roof of site buildings. Water will be made available in site storages for fire emergency response (APP, 2012).

2.12.2 Gravel requirements

Gravel and aggregates will be required by the Proposal for the following:

- Concrete for WTG foundations, hardstands and building slabs;
- Pavement material for upgrading of existing or construction of new access roads; and
- Surface overlay for hardstands, and some of the drainage channels and outlet structures.

For a worst case scenario of using all gravity foundations for the maximum 70 WTGs, the concrete requirement is estimated to be 31,500 m³ (based on the conservative estimate of 450 m³ concrete required per foundation), which would require an estimated 20,000 m³ of aggregates. Rock anchor foundations are likely for the majority of WTG locations, therefore the concrete requirement may reduce significantly as this type of foundation requires only about 100 m³ of excavation. If the concrete requirement for the Proposal will be provided by an external supplier, this supplier will source its own aggregate requirement. If the Proponent establishes an on-site batching plant, aggregate will be delivered in bulk to the project site from local sources.

Internal roads will also be built, and the existing site access road upgraded, to take construction loads. This would require an estimated 60,000 m³ of crushed quarry material or natural gravel for the placement of two pavement layers over subgrade on an average 6 m formation width for an estimated combined length of 40 km. Fill for road subgrade construction, if required, will be sourced from suitable materials won from the excavation of foundations.

The above estimates of gravel or crushed quarry material requirements for road construction and upgrade are considered to be conservative. The condition of existing roads will be assessed prior to the commencement of construction to more accurately establish the extent of upgrading required.

It is anticipated the aggregate requirement for concrete batching, and the gravel and/or crushed quarry material for access road pavement construction or upgrade, can be adequately sourced from operating

quarries in the area, with preference given to sources in close proximity to the project site to reduce transport costs and traffic impacts. (APP, 2012)

2.13 References

APP Corporation (2012). *Collector Wind Farm Environmental Assessment*. (RACL), North Sydney.

3.0 Key Legislation and Policies

This chapter addresses the key legislation, policies and regulations that are potentially triggered by the project. **Chapter 4** provides further detail on the approvals and processes which are outside the scope of the EIS that are pertinent to this project.

3.1 Relevant Commonwealth Legislation

The proposed project is considered with respect to the following Commonwealth legislation:

- *Environment Protection and Biodiversity Conservation Act 1999*;
- Commonwealth Heritage Legislation;
- *Aboriginal and Torres Strait Island Heritage Protection Act 1987*;
- *Native Title Act 1993*;
- *Civil Aviation Act 1998*; and
- *Radio Communications Act 1992*.

3.1.1 Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) protects matters of national environmental significance which include:

- A World Heritage property;
- A National Heritage Place;
- A RAMSAR wetland of international importance;
- Nationally listed threatened species and ecological communities;
- Nationally listed migratory species;
- Nuclear actions (including uranium mining); and
- Commonwealth marine areas.

Where a project or action is believed to potentially cause a significant impact on a matter of national environmental significance it is to be referred to Department of the Environment (DoE) for assessment as to whether the action is a 'controlled action' requiring Commonwealth approval for the proposed action. The EPBC Act processes also allow voluntary referral of a Project to seek confirmation that a Project will not have significant impacts on matters of national environmental significance. Where an action requires Commonwealth approval a formal assessment process is undertaken in accordance with provisions of relevant legislation.

Ecological assessments (Flora and Fauna) undertaken for this project concluded in a referral to the DoE. The DoE determined this was a controlled action which resulted in the assessment detailed in this EIS. **Chapter 1** explicitly states the information required under the EIS Guidelines (**Appendix 2**) for this project and the provisions of the controlled action on which the EIS is based.

3.1.2 Commonwealth Heritage Legislation

The Commonwealth heritage regime changed in 2003 with the introduction of three new Commonwealth Acts that repealed the former *Australian Heritage Commission Act 1975*. The three Acts are:

- *Environment and Heritage Legislation Amendment Act (No. 1) 2003* (which amends the EPBC Act);
- *Australian Heritage Council Act 2003*; and
- *Australian Heritage Council (Consequential and Transitional Provisions) Act 2003*.

The Australian Heritage Database contains information about more than 20,000 natural, historic and Indigenous places in Australia. The database contains information listed in the following individual heritage lists and databases:

- World Heritage List;
- National Heritage List;
- Commonwealth Heritage List;
- Register of the National Estate;
- List of Overseas Places of Historic Significance to Australia; and
- Places under consideration, or that may have been considered for, any one of these lists.

Searches of heritage databases and consultation with historical societies and/or other organisations have been undertaken as part of investigations for this EIS.

A review of the heritage register did not identify any items of heritage significance on the site.

3.1.3 Aboriginal and Torres Strait Island Heritage Protection Act 1987

The purpose of the *Aboriginal and Torres Strait Islander Heritage Protection Act 1984* (ATSHPA), as described under Part I, Item 4 of the Act, is to:

'provide for the protection of places, precincts and items of particular cultural significance to indigenous people in accordance with their traditions.'

The ATSHPA enables traditional owners to make an application to the DotE to declare certain areas and objects as protected. RACL is obligated to ensure that areas and objects declared under Part II, Division 1 or Division 2 of the ATSHPA is protected or preserved.

Furthermore, in accordance with Part II, Division 3, Section 20 of the ATSHPA, where RACL or its contractors discover anything that they have 'reasonable grounds to suspect to be Aboriginal remains' they will report the 'discovery to the Minister, giving particulars of the remains and of their location'.

Chapter 11 details the potential impacts of the project on cultural heritage issues.

3.1.4 Native Title Act 1993

The *Native Title Act 1993* recognises native title rights and provides the government with ways in which to validate or legitimise past acts such as the granting of leases.

The Native Title Act provides for the determination of native title claims, the treatment of future acts which may impact on native title rights and the requirement for consultation and/or notification to relevant native title claimants, where future acts are involved.

Chapter 11 details the potential impacts of the project on cultural heritage issues.

3.1.5 Civil Aviation Act 1998

Under the *Civil Aviation Act 1998*, the Civil Aviation Regulations 1998 (CAR) or the Civil Aviation Safety Regulations 1998 (CASR), the proponent of a structure “ *the top of which will be 110m or more above ground level* ” has a duty to notify the Civil Aviation Safety Authority (CASA) of its intention and provide the height and location of the structure. In accordance with CASR Circular #139.370 CASA may determine, after conducting an aeronautical assessment, that an obstacle, building or structure is or will be hazardous to aircraft operations. Should such an obstacle, building or structure be deemed hazardous to aircraft operations CASA may direct the proponent to light or mark the hazard in accordance with the Manual of Standards (MOS) - Part 139 Aerodromes.

Volume 2 Chapter 19.1 provides further information on the potential impacts of the MEWF on aeronautical operations.

3.1.6 Radio Communications Act 1992

Electromagnetic Interference (EMI) can have a substantial impact on telecommunications due to signal degradation. The *Radio Communications Act 1992* states that system such as wind turbines with a potential to interfere with radio transmissions must determine the potential EMI and mitigate against the effects. Section 10.2 provides an assessment of these impacts. **Volume 2 Chapter 19.2** provides further information on the potential impacts of the MEWF on aeronautical operations.

3.2 Relevant Queensland Legislation

The proposed development potentially triggers several State Acts including, but not limited to the following:

- *Aboriginal Cultural Heritage Act 2003*;
- *Electricity Act 1994*;
- *Environmental Protection Act 1994*;
- *Fisheries Act 1994*;
- *Land Protection (Pest and Stock Route Management) Act 2002*;
- *Nature Conservation Act 1992*;
- *Iconic Queensland Places Act 2008*
- *Queensland Heritage Act 1992*;
- *Vegetation Management Act 1999*;
- *Transport and Infrastructure Act 1994*;
- *Water Act 2000*; and
- *Workplace Health & Safety Act 1995*.

3.2.1 Aboriginal Cultural Heritage Act 2003

The *Aboriginal Cultural Heritage Act 2003* (ACH Act) repeals the Cultural Records (Landscapes Queensland and Queensland Estate) Act 1987 and introduces separate (albeit similar) regimes for the protection of significant Aboriginal cultural heritage, including the establishment of a register of Aboriginal cultural heritage and processes for addressing land use impacts.

The major policy objectives of the ACH Act:

- Recognise Aboriginal cultural heritage ownership;
- Establish blanket protection of cultural heritage;
- Recognise the fundamental right of Aboriginal people to assess and manage their cultural heritage;
- Establish a cultural heritage duty of care which requires a person to take all reasonable and practicable measures to ensure the activity does not harm Aboriginal cultural heritage;
- Establish a register and separately, a database of Aboriginal cultural heritage;
- Establish mandatory triggers for the assessment of cultural heritage;
- Facilitate a work area clearance model so that activities undertaken in accordance with an agreement with traditional owners are valid under the new legislation; and
- Create penalties to act as a deterrent.

3.2.1.1 Register and Database

A Cultural Heritage Register (the Register) has been established to keep records on the location and associated information about significant cultural heritage sites and places. There is controlled access to the Cultural Heritage Database (the Database) which contains approximately 18,000 sites. It is a requirement of the ACH Act to search both the Database and the Register prior to the commencement of the Cultural Heritage Management Plan (CHMP) process.

However, neither the Register nor the Database are exhaustive as most of the state has not been systematically investigated. Therefore, it is highly likely that other unknown or unrecorded sites exist in any particular area of interest.

A search of the database was undertaken and the results have been utilised when considering the route alignment.

3.2.1.2 Aboriginal Party

In the legislation, an Aboriginal Party is defined as a Registered Native Title Holder or Claimant. This includes cases where claim to native title fails or where native title is extinguished (unless someone else becomes registered as a Native Title Party).

In the absence of a Native Title Party, the Aboriginal Party is the person recognised in accordance with tradition or law as having responsibility for the area or object.

Alternatively, if the Aboriginal parties agree, they can seek state recognition of an Aboriginal Cultural Heritage Body to act as a 'post box' for identifying the traditional owners in particular areas.

3.2.1.3 Registration of Significance

Aboriginal cultural heritage significance is assessed by the Aboriginal Party. (The results are registered by the state if they are consistent with anthropological, bio-geographical, historical or archaeological information — this is a process registration and is not a reassessment of significance). Significant sites may be registered by completing a Cultural Heritage Study approved under the ACH Act — there is no time limit on completing such a study. Objections to a registration decision are put to the Land and Resources Tribunal, which makes a recommendation to the Minister for Natural Resources and Water.

3.2.1.4 Management Plans

The ACH Act sets out a statutory process to allow CHMPs to be approved. A proponent is deemed to have complied with the cultural heritage duty of care when acting in accordance with a CHMP approved under the ACH Act.

A CHMP may be prepared voluntarily or may be required (for example, as part of a formal Environmental Impact Statement). In both cases, and in order for a CHMP to be approved under the ACH Act, a CHMP process must include a one month notification period and subsequent negotiation period.

It is not essential that cultural heritage be registered as part of the planning process. It may be objected to via the Land and Resources Tribunal, which makes a recommendation to the Minister for Natural Resources and Water – the minister's decision is subject to judicial review. The preparation of a CHMP may include access to culturally appropriate mediation by the Indigenous Issues Referee at the Land and Resources Tribunal.

If a dispute arises between the parties which substantially delays the development of the CHMP, the parties may refer the matter to the Land Court for mediation. If agreement cannot be reached between the parties (regardless of whether mediation has taken place), the proponent may refer the matter to the Land Court, which will then consider the matter and make a recommendation to the chief executive of the Department of Natural Resources and Water (now DERM) as to whether the CHMP should be approved.

Whether or not the matter has been referred to the Land Court, the chief executive must decide whether to approve the CHMP. This decision is subject to judicial review.

Chapter 11 discusses Cultural Heritage and the potential impacts from the proposed MEWF project in detail.

3.2.2 **Electricity Act 1994**

The *Electricity Act 1994* (Electricity Act) sets out the requirements that all electricity industry participants must follow to ensure a safe, efficient and reliable supply of electricity. It also requires that the supply of electricity is undertaken in an environmentally sound manner. Under Section 31(b) of the Electricity Act, a transmission entity is required to properly take into account the environmental effects of its activities under the transmission authority. RACL has met this requirement through preparation of this EIS and the associated Project specific EMP, with the EMP being accordingly implemented through the construction, operation, and decommissioning phases of the Project.

3.2.3 **Electricity Safety Act 2002**

The *Electricity Safety Act 2002* is directed at eliminating the cost to individuals, families and the community of death, injury and destruction that can be caused by electricity. Accordingly, the purpose of this Act is to establish a legislative framework for:

- Preventing persons from being killed or injured by electricity; and
- Preventing property from being destroyed or damaged by electricity.

Prior to energising the line and the operation of the substation site, it will be necessary for RACL and Powerlink to ensure that line clearances and any required setback distances are sufficient to satisfy the requirements of the *Electricity Safety Act 2002* and guarantee public safety.

3.2.4 Environmental Protection Act 1994

The *Environmental Protection Act 1994* (EP Act) provides the key legislative framework for environmental management and protection in Queensland.

The EP Act utilises a number of mechanisms to achieve its objectives. Relevant to this Project is the requirement for the establishment of a general environmental duty, under Section 319 of the EP Act.

Section 319 of the EP Act places a general environmental duty on RACL to ensure that 'it does not carry out any activity that causes, or is likely to cause, environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm'.

By undertaking the preparation of this EIS, RACL demonstrates that it is cognisant of the responsibilities for environmental protection and management in Queensland.

3.2.4.1 Environmental Protection Regulation 2008

Pursuant to the *Environmental Protection Regulation 2008*, activities that will, or have the potential, to release contaminants into the environment and which may cause environmental harm, are defined as environmentally relevant activities (ERAs). ERAs are assessable development under the IPA and require development approval, subject to certain exemptions.

It is not anticipated that there will be any ERAs undertaken in the construction of the Mount Emerald Wind Farm. However, if it were found that as the Project progresses an ERA is required, it would be necessary to prepare and submit a development application to the relevant assessment manager (local authority or the or DERM to obtain approval for the ERA to occur.

3.2.5 Fisheries Act, 1994

The *Fisheries Act 1994* requires assessment of development applications for construction or raising of waterway barrier works. It should be noted that the Fisheries Act applies to temporary waterway barriers as well as permanent barriers. It is recommended that any temporary works in watercourses are undertaken during the dry season so that temporary waterway barriers are not required and the Fisheries Act is not triggered. 'Temporary works' include all works that can be undertaken and completely removed by the time there is any water flow in the creek. The Fisheries Act also prohibits the removal, destruction or damage of a marine plant. Any plans to re-profile watercourses within the study area in order to improve access tracks will need to be considered in light of this Act.

RACL will develop a self assessable code in conjunction with DEEDI in order for waterway barrier works, during the detailed design stage, if required.

3.2.6 Iconic Queensland Places Act 2008

The purpose of this Act is to protect places with characteristics or qualities in their natural or built environment that reflect or contribute in a substantial way to Queensland's character. This is achieved by identifying some of the places, modifying laws and procedures about planning and particular development assessment by local government in the places and imposing additional requirements for making changes to particular local laws relating to the places.

The project is not within any declared Iconic Queensland Places.

3.2.7 Land Protection (Pest and Stock Route Management) Act 2002

The *Land Protection (Pest and Stock Route Management) Act 2002* is intended to provide a framework for developing pest management plans, and protecting and managing stock routes, and the stock route network through the preparation of stock route management plans. Declared pests including weeds are identified under this Act.

Pest Management

The pest management plans are intended to provide guidance to landowners and stakeholders appropriate pest control measures. The current pest management plans that are relevant to the study area are:

- Tablelands Regional Council Land Protection Management Action Plan 2013-2017

RACL or its contractors are obligated under the *Land Protection (Pest and Stock Route Management) Act 2002* to manage declared species within the MEWF property boundaries, during construction, operation and decommissioning activities. The EMP for the Project will address the management of any weeds during construction, operation and decommissioning activities.

Stock Route Management

Stock route management plans are intended to 'improve the management of the stock route network so that the impacts of stock on the resources of the stock route network are minimised'.

Under the Act, the maintenance of stock routes must also be considered. Schedule 4 of the *Land Protection (Pest and Stock Route Management) Regulation 2003* does not identify the study area as being required to prepare a stock route network management plan. Therefore, these requirements of the Act are not applicable in this instance.

3.2.8 Nature Conservation Act 1992

The objective of the *Nature Conservation Act 1992* (NC Act) is to conserve nature through strategies such as dedicating and declaring protected areas for those parts of Queensland with outstanding biological diversity, natural features and wilderness values. The Act provides for the protection of rare, vulnerable and endangered animals and plants.

The proposed MEWF project site does not impact on any identified protected areas.

Nature Conservation (Wildlife) Regulation 2006

In support of the purpose and the provisions of the NC Act, the *Nature Conservation (Wildlife) Regulation 2006* lists all flora and fauna species which are considered to be 'extinct in the wild', 'endangered', 'vulnerable', 'rare', 'near threatened' and 'least concern' wildlife.

A variety of aspects associated with the conservation of nature are regulated under the NC Act. Accordingly, some or all of the following permits may be required for the Project:

- Protected Animals Movement Permits (Section 88);
- Protected Plants Clearing Permits (Section 89); and
- Wildlife Movement Permits (Section 97) [for wildlife not protected under the NC Act but found in certain areas covered by conservation plans created and implemented under the NC Act].

It should also be noted that changes to Section 89 of the NC Act in November 2007 and amendment to the Nature Conservation (Protected Plants) Conservation Plan 2006 (NC Plan) in February 2008 have altered the clearing permit requirements for 'least concern' plants. 'Least concern' plants are all plants indigenous to Australia, except those listed as threatened, rare or near threatened under the NC Act. In accordance with these changes, DERM has expanded its role in regulating clearance of vegetation and now generally requires clearing of all plants indigenous to Australia to be carried out under a clearing permit under the NC Act regardless of whether a development approval for the clearing is in place under the IPA.

However, Section 41 of the NC Plan provides a number of exemptions to the requirement for a clearing permit, namely:

"A clearing permit is not needed for taking a protected plant if:

- (a) the taking happens in the course of an activity under an authority made, granted or given under another Act by –
 - (i) the Governor in Council; or
 - (ii) someone else and the chief executive approves the taking in the course of the activity; or
- (b) for a least concern plant on private land – the person taking the plant is the landowner of the land."

Effectively, these provisions provide exemptions for clearing of native vegetation for the purposes of electrical works for the majority of this project, as easements are typically granted by the Governor in Council. In areas not covered by these provisions – for example, for clearing of plants that are not 'least concern' on land owned by RACL – RACL will obtain any necessary permits.

3.2.9 Queensland Heritage Act 1992

European cultural heritage derives State protection from the *Queensland Heritage Act 1992*. This legislation protects those areas that are considered to be of State significance and are placed on the 'Queensland Heritage Register', which is administered by the Heritage Council. For these registered areas, approval of the Heritage Council is required if any development is proposed.

Unless a registered place, area or relic is of cultural heritage significance to both European and Aboriginal and Torres Strait Islander peoples, the QH Act does not apply to areas of indigenous cultural heritage (Section 3). Indigenous cultural heritage in Queensland is protected under the *Aboriginal Cultural Heritage Act 2003*.

3.2.10 Transport Infrastructure Act 1994

During construction of the Project, temporary closure of roads may be required to permit activities such as the delivery of construction materials on long and/or wide haulage vehicles. In this regard, various permits, licences and approvals may be required to be obtained by RACL and its contractors.

The need for these permits, licenses and approvals will be confirmed following detailed design of the infrastructure and determination of construction methods and materials to be used.

The project may impinge on local road networks during construction and is dealt with in **Chapter 9**.

3.2.11 Vegetation Management Act 1999 (VMA)

Queensland's vegetation management framework regulates the clearing of certain native vegetation remnant communities under the *Vegetation Management Act 1999* (VMA). It protects the State's biodiversity and, by

conserving native vegetation, addresses land degradation issues such as salinity, soil degradation, erosion and declining water quality.

This Act is dealt with in detail in **Volume 2 Chapter 14** and the associated specialist report.

3.2.12 Water Act 2000

The purpose of the *Water Act 2000* is to provide for the sustainable management of water and other resources. Under Section 266 of the *Water Act 2000*, a riverine protection permit is generally required from the DNRW to:

- Destroy vegetation in a watercourse;
- Excavate in a watercourse; and
- Place fill in a watercourse.

Additionally, water supply for construction purposes (e.g. access track construction/ compaction, dust suppression etc) may be required. Where this water supply is proposed to be sourced from nearby watercourses, a permit in accordance with Section 237 of the *Water Act 2000* will be required from DNRW prior to any water being extracted from the watercourse.

Volume 2 Section 12.5 provides information on the potential impacts on water from the project.

3.2.13 Workplace Health & Safety Act 1995

Under the *Workplace Health & Safety Act 1995*, employers are obliged to ensure the health and safety of its workers within the workplace. The Act contains several compliance standards that prescribe ways to prevent and minimise the risk of exposure within the workplace.

This piece of legislation is particularly important during the construction and operation and decommissioning phases of the project but also impacts upon RACL's design obligations.

3.3 References

Tablelands Regional Council (2013). Draft Tablelands Regional Council Local Area Pest Management Plan. Mareeba, Queensland.

4.0 Other Approvals and Conditions

This chapter contains an overview of the planning context of the proposal outside that of the EIS process.

Broadly, the proposal is subject to a Development Application process under the *Sustainable Planning Act 2009* which involves assessment by the relevant Local Government and various State Government 'Referral Agencies'. In the following we provide details of the application in relation to relevant State and Local Government legislation and policies, as well as an overview of the current status of the application within the IDAS (Integrated Development Assessment System) process.

4.1 Legislative Requirements

4.1.1 Sustainable Planning Act 2009

This section provides an overview of the legislative context of the Development Application under the provisions of the *Sustainable Planning Act 2009* (SPA).

4.1.1.1 Confirmation that Development is not Prohibited

The proposed development is not prohibited. This has been established by considering Schedule 1 of the *Sustainable Planning Act 2009*.

4.1.1.2 Assessable Development

The Development Application is for a Material Change of Use for a 'Utility Installation', which is made assessable by the Mareeba Shire Planning Scheme 2004.

4.1.1.3 Assessment Manager

The Assessment Manager for the Development Application is Tablelands Regional Council as determined by Schedule 6 of the *Sustainable Planning Regulations 2009*.

Given the impending de-amalgamation of Tablelands Regional Council and Mareeba Shire Council, it is expected that the re-formed Mareeba Shire Council will ultimately become the Assessment Manager which decides the application.

4.1.1.4 Level of Assessment

Table 4.1 below summarises the assessable development subject of the application and the relevant level of assessment for each aspect of development.

Table 4.1 Assessable Development and Relevant Assessment

Aspect of Development	Planning Instrument that determines Level of Assessment	Level of Assessment
Material Change of Use for 'Utility Installation'	Mareeba Shire Planning Scheme 2004	Code

4.1.1.5 Statutory Considerations for Assessable Development

As the development is subject to 'code assessment', the relevant considerations of the Assessment Manager in making a decision pursuant to Section 313 of the *Sustainable Planning Act 2009* have been assessed at **Section 4.1.1** of this report.

4.1.1.6 Referral Agencies

Referral Agencies triggered by this proposal and their jurisdictions were established with reference to Schedule 7 of the *Sustainable Planning Regulations 2009*, and include the following:

- **Powerlink** was identified as an 'Advice Agency' due to the project area containing an easement for the purpose of electricity transmission, within which works are also proposed;
- **Department of Environment and Resource Management** (now **Department of Environment and Heritage Protection**) was identified as a 'Concurrence Agency' for native vegetation matters;
- **Department of Environment and Resource Management** (now **Department of Natural Resources and Mines**) was identified as a 'Concurrence Agency' for unexploded ordinance matters; and
- **Department of Environment and Resource Management** (now **Department of Environment and Heritage Protection**) was identified as an 'Advice Agency' due to the location of the land within a Wetland Management Area (Trigger Area).

Referral Agency Responses have been obtained as follows:

- Department of Natural Resources and Mines for unexploded ordinance;
- Department of Environment and Heritage Protection for wetlands; and
- Powerlink for electricity transmission.

In all cases, the application has been approved subject to conditions. Copies of these responses are included as **Appendix 2**.

The only outstanding referral matter is that of vegetation, which will be addressed by way of an offset agreement which is currently being coordinated by RACL and is presented in **Volume 2 Chapter 21**.

4.1.1.7 State Resources

In order to legally access this site (Lot 7 on SP235244), some form of tenure permitting access across Lot 905 on CP896501 is required. Mt Emerald Wind Farm Pty Ltd, on behalf of Tablelands Regional Council, made an application to open part of Lot 905 (in strata) as road which will contain the existing constructed access. However, as the relevant Survey Plan has not yet been registered, the area remains leasehold land.

As such, evidence of Resource Entitlement was required to facilitate lodgement of the Development Application. Such evidence was obtained from the Department of Environment and Resource Management (now Department of Natural Resources and Mines).

A General Authority and Chief Executive Consent under the *Water Act 2000*, for taking or interfering with water was included with the application due to the proposed construction works and potential perceived impact on overland flow paths. It is noted that no detention or significant change to overland flow paths are proposed as part of the development, rather, the result of the construction of formed roadways etc., may result in the concentration of stormwater within drainage paths to minimise erosion and ensure all-weather access to the site can be obtained.

4.1.2 **Subsequent Approval Requirements**

The Development Application considered all likely approvals which will be necessary to proceed with construction of the wind farm. It was considered premature however at the Material Change of Use stage to prepare and lodge such applications for components of the wind farm required for construction (such as mobile and temporary ERA's for concrete batching for example).

A summary of likely future approvals include (but are not limited to):

- Operational Works for upgrades to, and construction of intersection upgrades (for Springmount Road/Kippen Drive intersection, road works proposed within Kippen Drive) and new road within Lot 905;
- Riverine Protection Permit under the *Water Act 2000* associated with upgrades to existing creek crossings;
- Building Works under the *Building Act 1975* for any built structures on site (including turbines); and
- Any others as considered necessary as a result of any approval or changes in legislation.

4.2 Statutory Planning Assessment

4.2.1 Overview

This section provides commentary on the Development Application in relation to relevant statutory planning provisions pursuant to Section 313 of the *Sustainable Planning Act 2009*.

4.2.2 Far North Queensland Regional Plan Regulatory Provisions

The project area is included in the 'Regional Landscape and Rural Production Area' designation under the Far North Queensland Regional Plan and, at the time of lodging the Development Application, was subject to Division 2 of the Regulatory Provisions, particularly in relation to a Material Change of Use outside the Urban Footprint.

As the development constitutes 'electricity infrastructure', being the generation of electricity through harnessing energy from the wind, and includes ancillary facilities to ensure its distribution (such as switch yards and transmission lines), it is not considered to constitute an 'urban activity'. The proposal was therefore not regulated by the Far North Queensland Regional Plan Regulatory Provisions. In addition to this, we note that the Far North Queensland Regional Plan Regulatory Provisions have since been repealed.

4.2.3 Far North Queensland Regional Plan 2009-2031

While the Far North Queensland Regional Plan Regulatory Provisions have been repealed, the Regional Plan has not, so an assessment of the proposal against the Regional Plan is relevant to aspects which are not appropriately included within the current Planning Scheme, pursuant to Section 313(2) of the *Sustainable Planning Act 2009*.

The Planning Scheme does not identify that the Regional Plan has been appropriately addressed; therefore the application must be assessed against all relevant provisions of the Regional Plan, which include:

Policy 1.1 Biodiversity Conservation

The entire project area contains Terrestrial Areas of High Ecological Significance which is based on current designations of the site under the *Vegetation Management Act 1999* as containing both *Of Concern* and *Least Concern* Regional Ecosystems, and the relatively undisturbed nature of the site.

Policies relating to these areas restrict 'urban development' in these areas. Despite the Regulatory Provisions excluding 'electricity infrastructure' from the definition of 'urban activity', the Regional Plan uses the term 'urban development' and does not exclude infrastructure items. However, page 40 of the Regional Plan states:

'Essential community infrastructure, such as power lines and telecommunications towers may be permitted in areas of high ecological significance, subject to adverse impacts being avoided or mitigated, including the use of offsets.'

An ecological assessment report prepared by RPS accompanied the Development Application, however this was general in nature and assessing authorities have requested further information. The ecological assessment undertaken in relation to the EIS includes significantly more detail so will be used to address this matter.

Policy 1.3 Air and Acoustic Environment Protection

An acoustic assessment report prepared by Noise Mapping Australia accompanied the Development Application which confirmed that the proposal would be able to comply with *Environmental Protection Policy (Noise) 2008*. Assessing authorities have requested further information and the applicant intends to submit the further report prepared by Noise Mapping Australia which is presented in **Chapter 8** to address this matter.

Policy 2.1 Regional Landscape Values

The project area includes areas identified as being Terrestrial Areas of High Ecological Significance. All 63 turbines sites, currently being considered, are proposed to be located in remnant vegetation habitats, as defined under the *Vegetation Management Act 1999*. The regional landscape value of the site, which forms the vegetated hill slope background of this part of the Tablelands, is recognised.

Given the site topography, and geological characteristics, the land is not considered Good Quality Agricultural Land (GQAL) under the Mareeba Shire Planning Scheme. No cultivation activities are undertaken on site and only limited stock grazing would be possible. Importantly, the establishment of the turbines will not prejudice the ongoing operation of the existing farmlands in proximity to the site due to their relatively benign physical impacts upon agricultural landscapes and their location generally along ridgelines.

Additionally, the subject site is not located within or adjacent to any areas of World Heritage significance (such as Wet Tropics Area), which forms the majority of the landscape values referred to, nor does it impact upon cultural heritage values (European or Indigenous) with no significant sites being recorded. Notwithstanding this, a Cultural Heritage Management Plan will be prepared prior to construction to ensure appropriate management strategies are employed to preserve any areas of cultural significance. Preliminary advice regarding Indigenous Cultural Heritage prepared by Converge was included with the Development Application.

The Regional Plan also recognises the value of the landscape for renewable energy projects (as per land use policy 2.1.1) and dictates that such projects should be given '*appropriate recognition in land use planning and development assessment*'. This is an important aspect to consider in providing a balanced assessment of the expected impacts upon the environment through vegetation clearing. This policy essentially recognises that, inevitably, such uses are required to be located in areas of forested hill slopes, which form part of the regional landscape of the area, and that provided these impacts can be minimised and managed through construction techniques etc., and the sustainability of fauna populations and important ecosystems are not adversely affected, wind farms are a legitimate land use in these areas.

Policy 2.3 Scenic Amenities, Outdoor Recreation and Inter-urban Breaks

Land use policies relating to scenic amenity within the Regional Plan recognise that the rural landscape and natural areas are a major economic asset of the region, containing culturally significant landscapes, and importantly, contributes to the way of life. Having regard to land use policy 2.1.1, which recognises the value of the landscape for renewable energy, **Section 2.3** also recognises that public utilities and infrastructure should be appropriately managed to protect the natural values of the region.

Inevitably, the turbines will have a strong visual presence within and external to the site, given the structures will be situated along a series of ridgelines, which form part of the Great Dividing Range between the natural landmarks of Walsh Bluff and Mount Emerald, at a range of elevations between

700 m to 1000 m ASL. Impacts associated with the juxtaposition of such structures within the soft natural landscape remains relatively subjective and based on individual perceptions. By locating the turbines along existing ridgelines and separation of the turbines over large areas, adverse impacts are somewhat minimised by being uniform and repetitive. It can even be suggested the establishment of the turbines will add to the scenic amenity of the landscape at this location, and provide a 'landmark' within the existing landscape.

A visual assessment report prepared by RPS accompanied the Development Application. Assessing authorities have requested further information and the applicant intends to submit the further report prepared by Green Bean Design (**Appendix 6**) which accompanies this EIS to address this matter.

Policy 6.1 Infrastructure Planning and Coordination

Overall, the project represents a collaborative partnership between Mt Emerald Wind Farm Pty Ltd, landowners and Powerlink to produce additional energy in a renewable form and is consistent with the aligned policy 6.1C which encourages collaboration in the design and provision of infrastructure within a chosen corridor.

Policy 6.3 Energy

Land use policy 6.3.1 encourages the establishment of viable renewable energy sources such as wind farms, which are '*recognised as a legitimate land use and supported for their contribution to reducing greenhouse emissions*'.

The Mount Emerald Wind Farm is intended to complement the existing Windy Hill Wind Farm and proposed High Road Wind Farm, to create a wind farm node within the Tablelands which will enhance the security of renewable energy supply for residents of the region. Cumulatively, these wind farms will contribute to meeting Queensland's renewable energy targets and ultimately, assist in reducing greenhouse gas emissions, which will have a positive impact upon sustainability of ecosystems.

4.2.4 State Planning Policies

State Planning Policies are relevant to the assessment of the Development Application where they are not appropriately reflected in either a Regional Plan or Planning Scheme relevant to the site. The applicability of relevant State Planning Policies is discussed in **Table 4.2** below. Compliance with relevant provisions from State Planning Policies is also addressed in the table below.

Table 4.2 Applicability of State Planning Policy to the Application

State Planning Policy	Applicability to Application
SPP1/92 Development and the Conservation of Agricultural Land	Applicable, however this policy has been adequately reflected in the Mareeba Shire Planning Scheme and therefore does not require separate assessment. This policy has also been repealed since lodgement of the Development Application.
SPP2/02 Planning and Managing Development Involving Acid Sulphate Soils	Not applicable as the project area is not subject to Acid Sulphate Soils.
SPP1/02 Development in the Vicinity of Certain Airports and Aviation Facilities	Applicable, however this policy has been adequately reflected in the Mareeba Shire Planning Scheme and therefore does not require separate assessment. This policy has also been repealed since lodgement of the Development Application.
SPP1/03 Mitigating the Adverse Impacts of Flood, Bushfire and Landslide	Applicable, however this policy has been adequately reflected in the Mareeba Shire Planning Scheme and therefore does not require separate assessment. This policy has also been repealed since lodgement of the Development Application.
SPP1/07 Housing and Residential Development	Not applicable as this policy applies to Local governments when preparing planning schemes.
SPP2/07 Protection of Extractive Resources	Not applicable as no identified KRA's are in the project area.
SPP2/10 South East Queensland Koala Conservation	Not applicable as the project area is not located in SEQ.
SPP3/10 Acceleration of Compliance Assessment	Not applicable as the proposal does not require compliance assessment.
SPP4/10 Healthy Waterways	Not applicable as the proposal does not involve 'urban development' or a subdivision.
SPP5/10: Air, Noise and Hazardous Substances 2009	Not applicable as the proposal does not include a 'sensitive use' or subdivision within or adjacent to an identified Management Area or Industrial Planning Area.
SPP 2/11 (Temporary) Planning for stronger, more resilient floodplains	Not applicable as the site is not affected by flooding, include residential development nor increasing number of lots. This policy has also expired since lodgement of the Development Application.
SPP3/11 Coastal Protection	Not applicable as the site is not located in coastal area. This policy has also been suspended since lodgement of the Development Application.
SPP4/11 Protecting Wetlands of High Ecological Significance in Great Barrier Reef Catchments	Not applicable as the site is not located within a Great Barrier Reef catchment.
SPP1/12 Protection of Queensland's Strategic Cropping Land	Not applicable as while part of Lot 7 and Lot 905 contain mapped 'potential strategic cropping land', the proposed access to the site has been designed to ensure that it does not traverse this area.

In addition to the above, it is noted that the State Government is currently preparing a Single State Planning Policy which will replace all of the above policies. In accordance with Section 317 of the *Sustainable Planning Act 2009*, the Assessment Manager may give weight to later laws and policies which are introduced after the lodgement of a Development Application, but before it enters the decision stage.

In light of the above, it is likely that Council will consider the new Single State Planning Policy in its assessment of the Development Application.

4.2.5 Mareeba Shire Planning Scheme

The proposed development is identified as a 'Utility Installation' under the Mareeba Shire Planning Scheme and is subject to 'code assessment'.

Code-assessable development is generally considered to be consistent with the broad intent of the land and is therefore usually subject to a less rigorous assessment process to that of impact-assessable development, which is generally considered less consistent and more likely to result in significant adverse impacts. This less rigorous process generally involves an assessment against the technical 'codes' of the planning scheme, and not the higher-order intent statements, and precludes third party objection and appeal rights which are only afforded to impact-assessable development.

Despite the code-assessable nature of the proposal, it is acknowledged that the Mareeba Shire Planning Scheme was perhaps inconsiderate of such large-scale infrastructure projects such as wind farms at the time the Development Application was lodged. This is evident by the fact that shortly after the application was lodged, Tablelands Regional Council introduced Temporary Local Planning Instrument 01/11 (Wind Farms), and subsequently, Temporary Local Planning Instrument 01/12 (Wind Farms). These temporary instruments introduced more specific assessment criteria for wind farm developments than the existing planning scheme provided for. In any case however, both instruments have expired and are currently of no effect.

Given the general lack of specific assessment criteria for wind farms, the Development Application included an assessment of the proposal against all aspects of the planning scheme, including the higher-order 'Desired Environmental Outcomes', as outlined below.

4.2.5.1 Desired Environmental Outcomes

An assessment of the proposal in respect to the relevant Desired Environmental Outcomes sought by the scheme is provided below:

- (a) Significant natural features such as the dense tropical rainforest adjoining the Wet Tropics area, the savannas, the major river systems, wetlands and wildlife corridors, areas identified in the Areas of Regional Significance for the Conservation of Biodiversity under the FNQ Regional Plan are protected.

Given the natural state of the project area, the majority of the site has been identified as containing significant vegetation, regrowth corridors and watercourses under the *Vegetation Management Act 1999* and *Vegetation Management (Regrowth) Act 2009* which is reflected in the designation of the site as containing areas of High Ecological Significance under the *Far North Queensland Regional Plan 2009-2031*. The site does not contain or border areas of dense tropical rainforest adjoining Wet Tropics areas or major river systems. Refer to Chapter 14 for further details.

- (b) The values of significant cultural heritage features and heritage conservation, the components of which include aesthetic, architectural, historic, social or spiritual significance are conserved and protected.

Converge Heritage + Community were commissioned to undertake an assessment of Indigenous Cultural Heritage values of the project area. A search of the relevant heritage databases and registers for former Lot 7 on SP181543 from which the subject land has been excised identified two sites of heritage significance, although these are not physically located within the current area identified as Lot 7 on SP235244, but given proximity, may be located close to the project area.

Given the location of known Aboriginal cultural heritage sites adjacent the project area, it was advised that potential for Aboriginal cultural heritage being present within the study area is moderate. The report therefore recommended adoption of a process whereby consultation with appropriate Aboriginal parties

for the area is initiated. It is expected that this consultation would result in the preparation and negotiation of a cultural heritage management plan to manage any areas of significance that may be found to exist.

- (c) Adverse effects from development on the natural environment are minimised with respect to the loss of natural vegetation, soil degradation, air and water pollution due to erosion, dust and chemical contamination, dispersal of pollutants, effluent disposal and the like.

The Mount Emerald Wind Farm has been designed, as far as practical, to ensure that existing landscape values and significant natural features are not compromised by the establishment of the wind turbines. This is proposed to be achieved by designing a layout which respects existing features, ensuring that operational impacts are managed appropriately, and ensuring that the facility can be operated with minimal input from natural resources such as water and extractive materials.

In order to minimise and offset impacts, micro-site locating of wind turbines is the primary preferred option being adopted. Specific construction footprints are being chosen according to the presence or otherwise of a range of biophysical and landscape factors and final selection of sites for wind turbines will be based on the findings of detailed field investigations.

The results of the detailed surveys will inform strategically appropriate measures required to ameliorate and mitigate the effects of impacts caused during and after the construction phase. This information will also direct the necessary requirements for the compilation of the Environmental Management Plan (a draft is discussed further in **Volume 2 Chapter 20** and is provided in **Volume 3 Appendix 32**), which will contain environmental management elements dealing with:

- Erosion and Sediment Control;
- Rehabilitation;
- Storm and Waste Water Management;
- Weed and pest management;
- Fauna management; and
- Vegetation and flora management (including the management of plants of conservation interest).

- (d) Good quality agricultural land is conserved and protected from fragmentation and alienation.

A review of Council's Agricultural Land Quality mapping confirms the eastern portion of the site is included within the 'Not Good Quality Agricultural Land' designation, while no data is available for the balance of the site. Inclusion of the land within these designations is assumed to be due to site topography and other characteristics. It has been submitted that the proposed development will not result in the loss of, including fragmentation or alienation of, good quality agricultural land.

- (e) Agricultural and forestry resources, mining, extractive activity in the rural sector are encouraged, facilitated and protected.

While not directly applicable to the subject site or development proposal, as no such uses are proposed, it is noted for comparison that the physical change to the landscape as a result of a wind farm would be minimal when compared with mining and extractive activities, which are encouraged in the rural area. This is an important consideration given the long term impacts upon vegetation and displacement of fauna generally associated with mining and extractive activities and agriculture and forestry.

- (f) The amenity and safety of land uses adjoining industrial estates and agricultural areas adjoining urban centres are protected from potential noise and air pollution.

Again, while not specifically relevant to the proposal as the wind farm is neither an industrial estate nor an agricultural area, by extension, the impacts associated with potential noise impacts upon adjoining areas is considered relevant to the wind farm.

An acoustic assessment report prepared by Noise Mapping Australia and Marshall Day Acoustics accompanied the Development Application which confirmed that the proposal would be able to comply with *Environmental Protection Policy (Noise) 2008*. Assessing authorities have requested further information and the applicant intends to submit the further report prepared by Noise Mapping Australia and Marshall Day Acoustics which accompanies this EIS (**Chapter 8**) to address this matter.

- (g) The standard and location of the built environment, particularly in Mareeba and Kuranda, minimise the use of non-renewable resources, having regard to associated wastewater and effluent disposal infrastructure.

Not applicable to the subject site or development proposal.

- (h) All members of the community have appropriate access to relevant services and facilities that meet their needs and create a sense of community satisfaction

Not applicable to the subject site or development proposal.

- (i) The efficient use, extension and safe operation of infrastructure are maximised, including roads, rail, aerodromes, water and sewerage systems.

The proposal facilitates the achievement of this outcome by efficiently using existing transmission line infrastructure to distribute clean energy and utilising existing road networks for site access. Further, the proposal does not impact upon aerodrome operations (confirmed by Rehbein Aeronautical assessment included with Development Application and Volume 3), nor does it impact upon water and sewerage systems.

- (j) Threats to public safety and health associated with the natural and built environments, including flooding in the catchments of the Barron River and Mitchell River are minimised.

Risks to public safety and health are limited to noise and shadow flicker impacts. Specialist assessments of the anticipated impacts have been undertaken by appropriately qualified individuals with experience in wind farms and reports were submitted with the Development Application.

Assessing authorities have requested further information and the applicant intends to submit the further report acoustic report prepared by Noise Mapping Australia and Marshall Day Acoustics and further shadow flicker report prepared by Parsons Brinkerhoff Australia Pty Limited which accompanies this EIS (**Volume 2 Chapter 19.5.3**) to address this matter.

In addition, it is anticipated that conditions of any approval attaching to the development would include limits relating to noise and blade flicker, based on scientific guidelines that have been established with reference to appropriate limits that are intended to maintain human health and amenity.

- (k) Communities of Bibbohra, Chillagoe, Dimbulah, Irvinebank, and Julatten, Mount Molloy, and Watsonville will continue to be maintained and provided with appropriate levels of services and facilities, as secondary to the primary residential settlements of Mareeba and Kuranda.

Not applicable to the subject site or development proposal.

- (l) Residential uses are consolidated in identified urban nodes, including the existing townships and settlements and the rural landscape is protected from encroachment of urban uses.

Not applicable to the subject site or development proposal, as no urban land or land uses are proposed by the development. Further, we note that the site is not bordered by any future residential or rural residential settlements so will not impact upon the preferred settlement pattern of the area.

- (m) Integrated Open Space networks comprising of national parks, botanical gardens river esplanades, pedestrian and bicycle pathways and wetlands provide a pleasant and safe public environment for aesthetic enjoyment, cultural, recreational and social interaction. Natural public open space areas are integrated into a network with conservation and natural resources areas such as State Forests to

maximise habitat and corridor protection.

The land over which development is proposed will remain under freehold tenure, with the land to be leased to Mt Emerald Wind Farm Pty Ltd. Public access to the site will be restricted due to safety issues.

- (n) Mareeba's role and identity as the main business, economic centre and regional service centre and gateway to the Cape is consolidated.

Development of the site does not detract from Mareeba as the main business / economic centre. It is expected that the proposed wind farm will bring positive benefits (direct and indirect) to the local and regional economies throughout the life-cycle of the project. The phases that will typically see such benefits can be broadly described as the design & development, construction and commissioning, operation and decommissioning phases of the project.

The project will provide opportunities for local employment and will rely on various local inputs which will directly improve economic wellbeing of those involved in the construction phase of the project. Indirectly, the increased expenditure during construction will aid in increasing the social wellbeing of the local community. For the full economic report refer to **Appendix 4**.

Post construction, there is opportunity for continued injection of jobs throughout the region through the increase in tourism generated by the wind farm. Previous experience with Windy Hill Wind Farm and from other wind farms established throughout Australia and New Zealand indicate genuine interest in such proposals, given that they are not as common in other international cities.

- (o) The Mareeba township and the Myola district, as identified by the Myola Feasibility Study, are the primary residential nodes to accommodate future urban growth in accordance with the FNQ Regional Plan.

This is not applicable to the subject site or development proposal.

- (p) The Kuranda Village's role and identity not only as an international tourist destination but as a residential centre and a functional service location for the wider district is protected and enhanced whilst ensuring the community's harmony and a sense of place is maximised through ensuring that the mix between tourists and residents meets the needs of both groups.

This is not applicable to the subject site or development proposal.

- (q) The establishment of new industries such as value adding agricultural industries as well as ecotourism and tradeable services beyond agriculture.

The proposal serves an essential community need by aiding the delivery of cleaner electricity to the local and regional community and will provide significant direct and indirect economic and social benefits to the local area.

- (r) The identification and protection of the amenity of noise sensitive development and liveability of residential areas.

An acoustic assessment report prepared by Noise Mapping Australia accompanied the Development Application which confirmed that the proposal would be able to comply with *Environmental Protection Policy (Noise) 2008*. Assessing authorities have requested further information and the applicant intends to submit the further report prepared by Noise Mapping Australia which accompanies this EIS (**Chapter 8**) to address this matter.

- (s) The provision of pedestrian and bicycle facilities in urban areas.

This is not applicable to the subject site or development proposal.

- (t) The protection of exiting heavy vehicle routes as shown on Maps R1 and R2 and existing and proposed extraction haulage routes from incompatible land use.

A traffic assessment report prepared by Sinclair Knight Merz accompanied the Development Application which provided recommendations to ensure the continued safe and efficient functioning of the surrounding road network. Assessing authorities have requested further information and the applicant intends to submit the further report prepared by SKM which accompanies this EIS (**Chapter 9**) to address this matter.

4.2.5.2 Zoning

The project area is included within the Rural Zone under the Mareeba Shire Planning Scheme 2004.

The overall outcomes sought for the Rural Zone Code are to achieve an area:

- (a) That caters for a range of primary industries including forestry and aquaculture to contribute to the economic wellbeing of the Mareeba Shire;
- (b) Where agricultural production and the raising of animals are protected from incompatible land uses;
- (c) Where Good Quality Agricultural Land (GQAL) is protected from fragmentation and alienation, not developed for purposes other than agricultural and support uses, and is protected from incompatible land uses in accordance with SPP1/92;
- (d) In which agricultural uses and works are located, designed and managed to maximise the efficient use and operation of infrastructure including the MDIA channel infrastructure;
- (e) That allows tourist uses that are ecologically sustainable and dependent on the values of the cultural heritage and natural resource or features located in the rural zone;
- (f) That excludes residential uses unless these uses are primarily ancillary and necessary to agricultural uses;
- (g) Where a distinct boundary between the towns of Mareeba, Kuranda and Dimbulah is clear so that those towns do not extend beyond identified boundaries;
- (h) Where provides adequate services to cater for the needs of industry are provided whilst ensuring likely environmental and social impacts of industrial developments and activities (e.g. Both construction and operational impacts) and the cumulative impacts of trucks/transportation to and from industrial sites are minimised;
- (i) Impacts on development on the natural values and water quality are minimised;
- (j) That allows for rural value adding industries where appropriately located;
- (k) Where GQAL is conserved for agricultural uses that are dependent on the quality of agricultural land;
- (l) Where the scenic values of the Shire are maintained;
- (m) Where, in the Southedge Potential Tourist Area (as shown on Strategic Framework Maps SP1 & SP2) allows for tourist facilities directly associated with the natural attributes of the Southedge site, provided there is a demonstrable need for the facilities and adequate support systems are in place;
- (n) Where, in Preferred area No 3 (as shown on Maps Z8, Z9 and Z10) the Clohesy River Area is protected for future long term urban development as identified by the FNQ Regional Plan;
- (o) Where uses and works are located, designed and managed to avoid significant effect on the environment;
- (p) Where, in Preferred Area No 2 (as shown on Map Z10) the Mona Mona Reserve is planned for its continued development in accordance with an approved Plan of Development and Land Management and the Supplementary Table of zones;
- (q) Makes effective use of the land and of the services provided to enable the functioning of the zone.

It is considered that the Rural Zone is the most appropriate designation to locate development of the type proposed given the general inconsistency of the proposal with other 'urban' style development. Further, establishing a wind farm at this location will not prejudice the continuation of rural pursuits surrounding the site nor fragment or alienate agricultural land.

It is also anticipated that the broader community has a certain level of acceptance of such proposals, given the established Windy Hill Wind Farm, greater public knowledge of the need for renewable energy sources generally and policy direction of the State and Federal government which encourage development of renewable energy.

Notwithstanding the above, it is acknowledged that the proposal, even in a rural locality, will have a range of impacts including noise, electromagnetic interference, shadow flicker, aeronautical impacts, traffic, visual, environmental and cultural heritage which need to be addressed. Accordingly, significant effort is being made to mitigate and minimise such impacts to achieve an acceptable level of consistency with the objectives sought to be achieved in the Rural Zone of the Mareeba Shire Planning Scheme.

4.2.6 Draft Tablelands Regional Council Planning Scheme

Following amalgamation of the four (4) former Tablelands Shires (Atherton, Eacham, Herberton and Mareeba) the Tablelands Regional Council commenced the development of a single Planning Scheme relating to the Tablelands Regional Council Local Government Area.

As mentioned previously, Section 317 of the *Sustainable Planning Act 2009* states that the Assessment Manager may give weight to later laws and policies which are introduced after the lodgement of a Development Application, but before it enters the decision stage. It is therefore possible that the Draft Planning Scheme prepared by the Tablelands Regional Council will factor in the assessment of the Development Application.

However, the Tablelands Regional Council has undergone a process of de-amalgamation where the former Mareeba Shire Local Government Area has been excised from the Tablelands Regional Council Local Government Area and a new Mareeba Shire Council has been formed which officially commenced operation on 1 January 2014. Given that the Mareeba Shire Council was not party to the preparation of the Draft Planning Scheme, it is expected that the Council will seek to review and amend the Draft Scheme prior to its adoption by the new Council. It is understood that work on the Draft Scheme by the new Mareeba Shire Council may not commence for approximately 6 months therefore it is unclear at this stage what role the current Draft Scheme will play in the assessment of the Development Application. For this reason, it is not considered appropriate to provide any technical commentary against the Draft Scheme at this stage.

4.3 Status of Development Application

The Development Application is currently in the 'Information Response' stage of the IDAS (Integrated Development Assessment System) process under the *Sustainable Planning Act 2009*. During this stage, the Assessment Manager and relevant State Referral Agencies can seek further information and the applicant has the option to provide all, some or none of the requested information.

As mentioned in **Section 4.1**, conditional approval has been obtained from most of the State Referral Agencies, with only DNRM approval for vegetation matters outstanding. Also as mentioned, an offset agreement is currently being arranged to address State vegetation requirements.

A relatively detailed Information Request was received from the Assessment Manager (Tablelands Regional Council) and a comprehensive response is currently being prepared. This response will include a range of specialist reports, including the EIS.

The response to Council's Information Request was due 28 October 2013; however a request for an extension of time was submitted, and subsequently approved, by Council with the Information Response Period now due to expire on 28 April 2014.

Over the last 12 months, the Tablelands Regional Council has undergone a process of de-amalgamation where the former Mareeba Shire Local Government Area has been excised from the Tablelands Regional Council Local Government Area and a new Mareeba Shire Council has been formed. Given that the subject land on which the wind farm is proposed is now located in the Mareeba Shire Local Government Area, the Development Application will now be decided by the new Mareeba Shire Council once responses to the requests for further information has been lodged.

5.0 Strategic Justification of the Proposal

5.1 Wind Resource

The site has been selected as it displays an excellent wind resource and is well placed in terms of access to existing electricity transmission infrastructure. Monitoring of the wind resource at this location has been undertaken at two sites within the project area. Each monitoring tower measures wind speed and direction at various heights above ground, as well as recording other standard weather observations.

Two monitoring towers (ID 9530 & 9531) were approved by Council in November 2009 and subsequently established on site in May 2010 and are located approximately 3.6 km apart, at heights of 80 m and 50 m respectively. Each monitoring tower includes instruments, at varying heights, to obtain representative wind data across the site.

Tower 9530 recorded an average wind speed of 10.03 m/s and tower 9531 recorded 8.1 m/s (correlated) and long term adjusted average of 9.7 m/s and 7.9 m/s respectively. These records and long-term assessments suggest an excellent wind resource is available at this location.

An assessment of the expected energy yields of the proposed MEWF are included in the Assessment Report prepared by Parsons Brinckerhoff and included for reference in **Appendix 5**.

5.2 Economic Benefits

It is expected the proposed MEWF will bring positive benefits (direct and indirect) to the local, regional and national economies throughout the life-cycle of the project. The phases will typically see such benefits that can be broadly described as the design and development, construction and commissioning, operation and decommissioning phases of the project.

At a direct level, wind farm development generates employment opportunities within the local area during construction and maintenance phases of the project. It is anticipated workers and contractors required for the project will include plant operators, truck drivers, mechanics, welders, fencers, electricians, labourers and other individuals typically used in a civil construction context.

The economic impact assessment undertaken of the proposed MEWF by Cummings Economics (2013) **Appendix 4**, determined that the local benefits to the Tablelands' economy would be in the order of \$30 million from a \$382 million project with a projected 300 jobs to be created directly and indirectly (flow on effects) from the construction. The 'Review of the Australian Wind Industry 2011 Report, estimates the total direct employment generated by wind farm construction (based on recent study for Hallett wind farms) is 0.7 jobs per MW locally. The Mount Emerald Wind Farm has been designed to generate approximately 225 MW, which equates to a total of 158 local jobs directly, for the construction period, which is expected to last 24 months from project commencement.

Cummings Economics also estimates that during the operating phase, annual benefits will be of the order of 57 additional jobs (including flow-on effects) and about \$5.6 million per annum addition to the Tablelands' Gross Regional Product (i.e. an approximate 0.3% increase in economic activity and employees). Net Present Value of an annual flow of benefits of \$5.6 million per annum would be of the order of \$100 million (over a 30-year period at discount rate 4% real [approximately 7% nominal]).

While issues of potential negative 'secondary' impacts have been raised in relation to agricultural aviation, adjacent farm operations and on visual amenity and tourism, the likelihood of any significant impacts seems small.

At an indirect level, it is expected economic benefit will arise through the provision of short to medium term accommodation, entertainment and goods and services primarily felt during the construction and operational phases of the project. It is expected this expenditure will occur in the local community as a proportion of wages paid to employees associated with the construction and operation of the wind farm. In terms of indirect employment opportunities, a number of recent studies suggest that for every job generated directly during the construction of the wind farm, a further two full time equivalent positions are created, which may occur locally or nationally. For the Mount Emerald Wind Farm, this would equate to further 300 jobs throughout Australia, and perhaps overseas.

In addition, there are various community benefits created as a result of the proposed MEWF through community benefit funds, which can be used for various local community groups, sponsorships and the like, as well as improved infrastructure. In the case of the Mount Emerald Wind Farm, the community will indirectly benefit by the upgrade of intersections likely to be required in the immediate vicinity of the project site, as well as upgrade and opening of Kippen Drive to the public, which has potentially saved the Council (and community) significant time and cost.

Direct job creation in geographically diverse areas, such as Mareeba, contributes to the development of skills and expertise in a growing industry and thereby stimulates rural economies generally.

There will be economic efficiency gains in meeting government objectives, by replacing fossil fuel electricity supply in areas where long transmission distances from generation sources lead to extra costs due to transmission loss and susceptibility to power disruptions.

There are also intangible benefits associated with wind farms, and renewable energy generally such as:

- Avoidance of greenhouse gas emissions associated with conventional fossil fuel generation;
- Insulates electricity market from fluctuations in fuel prices by increasing the diversity of the energy system (that is, wind can assist in times of peak demand); and
- Wind farm electricity generation requires comparatively minimal natural inputs such as water consumption.

It is acknowledged there are greenhouse gas emissions associated with the manufacture, construction, operation and decommissioning of a wind farm. The carbon abatement period, or time it takes to generate sufficient electricity (without any greenhouse gas emissions) to offset the emissions created in the creation and installation of the facility has been the focus of many studies over the past 15 years.

The payback period and carbon abatement for the proposed MEWF has been estimated at just over 7 months, based on data and methodology provided in 'Review of the Australian Wind Industry 2011' prepared by Garrad Hassan (2011) for the Clean Energy Council and shown in **Table 5.1** below:

Table 5.1 Payback Period and Carbon Abatement for Mount Emerald Wind Farm

Activity	Output
Wind Farm Capacity	189 MW (using 63 x 3MW wind turbines)
Capacity factor	35% (using specific site wind modelling)
Annual electricity generation	189 MW x 35% x 8766 hrs/year = 579,870 MWh/year = 580 GWh/year
Life of the wind farm	25 years
Life cycle wind farm CO ₂ emissions per unit of energy production	20 t CO₂ / GWh (average of literature review conducted in Review of Australian Wind Industry 2011)
Lifetime CO ₂ emissions	20 t CO ₂ / GWh x 25 years x 580 GWh/yr = 289,900 t CO₂
Greenhouse gas abatement factor	0.86 t CO₂ / MWh (from Dept Climate Change and Energy Efficiency National Greenhouse Accounts Factors – July 2012 for Queensland)
Total generation required to abate wind farm life cycle emissions	289,900 t CO ₂ ÷ 0.86 t CO ₂ / MWh = 337,000 MWh
Payback period	337,000 MWh ÷ 579,870 MWh / year = 0.58 years = 7 months

5.3 Economic Efficiency

There are a number of aspects that make the location of a wind farm on the Tablelands more economically efficient. Government policy, through the carbon tax and through the mandated non fossil fuel supply requirements, means that a proportion of generated electricity supply will be from non fossil fuel sources regardless of location. It is more efficient if the non-fossil fuel sources replace more expensive fossil fuel sources.

Fossil fuel sources are most expensive in real terms in those remote areas not in a grid and those areas furthest removed from fossil fuel generation sources that experience transmission losses. The electricity grid in the Far North Queensland region is among those areas furthest removed from fossil fuel generation sources. The closest coal fired base load generation at Collinsville is comparatively inefficient with high carbon emissions and has been subject to negotiations to close it down. The base load power stations from which most of the region's power is derived, are located in Central Queensland over 1000 km away. Substantial transmission losses are involved and the economic cost of replacing this power with a non fossil source, are lower.

The second economic efficiency is related. Long transmission lines are more prone to being affected by disruptions. The whole area from Central Queensland to the Far North is cyclone prone with the area of highest cyclone frequency along the coast from Bowen to Townsville being in the centre of transmission routes.

Local sources of generation enhance power security in the Far North Queensland region. In relation to various forms of non-fossil fuel power generation, the indications from the information available are that wind power in suitable locations is generally cheaper than solar power.

Existing hydro electricity generated in the region at the long established Barron Falls and Kareeya Power Stations can be expected to be cheaper. Expansion of hydro electricity through the proposed Tully Millstream scheme could bring a large block of additional power on stream but the capital investment needed to develop the scheme is very large. There were also substantial environmental issues involved and potential impacts on white water rafting tourism operations.

Biomass generation from sugar mills is also likely to produce relatively cheap non fossil fuel power, but apart from limited amounts of source fuel from bagasse by-product, there is little available resource that would not have environmental implications. Additionally, Pongamia plantings are likely to be the cheapest alternative for liquid biofuel production and could be used for electricity production however there are currently very limited plantings.

Appendix 4 provides the full report to the summary of economic impacts provided in this chapter.

5.4 References

Hassan, G. Report for the Clean Energy Council (2011). *Review of the Australian Wind Industry 2011*

6.0 Alternatives to the Proposal

6.1 Site Location

The most critical aspects in the development of any energy generation project are access to both a fuel source and an electricity network. The amount of available energy in the wind increases cubically with an increase in wind speed, thus selecting a site with as good a wind resource as possible is highly preferential. While a site may have an extremely good wind resource and can produce a very high amount of electricity it is useless unless the power can be transmitted and used. To this end, proximity to an electricity network capable of accepting and being able to transport the electricity generated to a customer base is of the utmost importance.

A review of the wind speeds through the country (**Figure 6.1**) show the better wind resources to be available in some of the more remote and less populated parts of the country. This contrasts with the majority of the population being located along the eastern seaboard and hence this is where the strongest parts of the electricity network are located.

The region of the Atherton Tablelands in Far Northern Queensland is one area where wind speeds are comparable with some of the best wind resources in the country. For this reason the Tablelands is home to one of the earliest commercial wind farms built in Australia, being Windy Hill, which commenced operating in 2000.

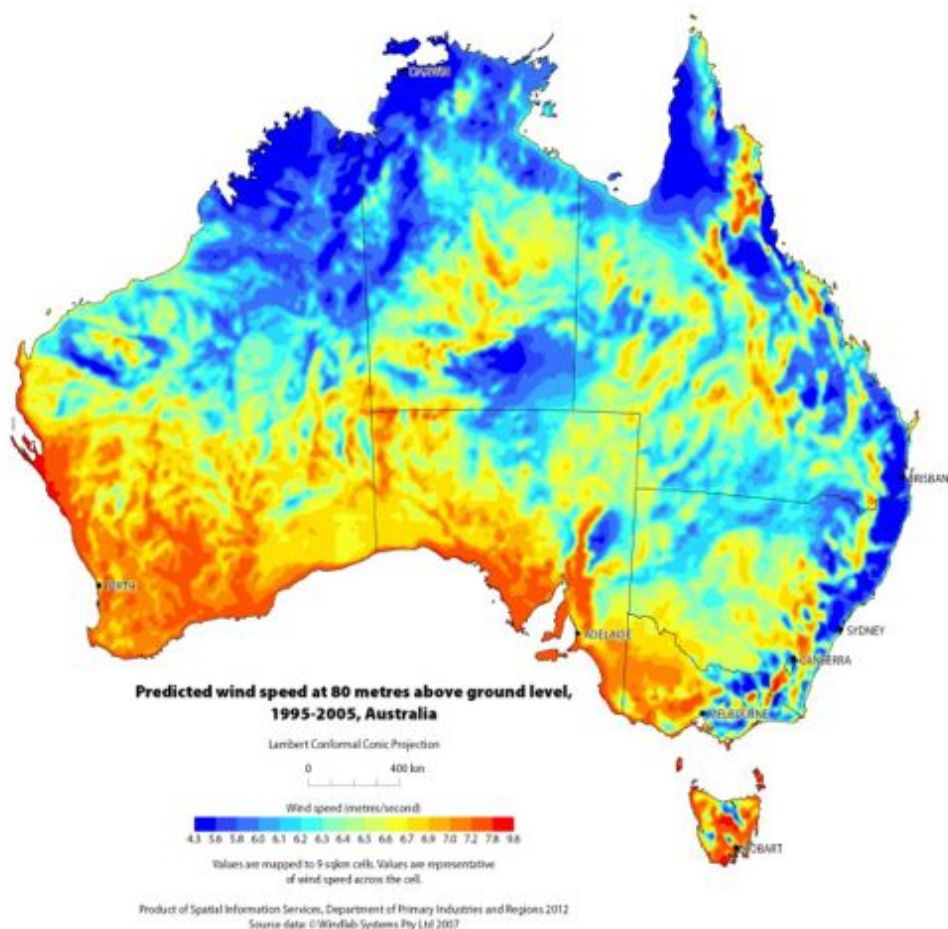


Figure 6.1 Mean Wind Speed at 80 m Above Ground Level (1995-2005)
(source: Spatial Information Services, Department of Primary Industries and Regions 2012. Source data Windlab Systems Pty Ltd 2007)

In 2009, Transfield Services was approached by land owners in the Tablelands region to investigate the potential for a wind farm to be located on their land. Subsequent preliminary investigations of the subject land indicated the site to possess a quality wind resource and with a high voltage powerline crossing the site, providing a high likelihood of quality electricity network access.

A review of the region using available information from the Queensland Government Department of Mines and Energy confirms the area to have a high quality wind resource suitable for further investigation.

Further investigation was conducted into other locations within the region with particular attention to the southwest of the subject land (red area in **Figure 6.2** below).

The subject land was considered to be a more favourable option for development due to:

- Transmission - access to the 275 kV electricity transmission line which traverses through the centre of the property.
- Constructability – the high wind resource area to the southwest of the subject land would seem to be more rugged and require additional civil costs to construct and have a larger disturbed area.
- Site access – closer proximity to Kennedy Highway council sealed roads. Additional road upgrades would be required to access areas to the southwest.

Negotiations were undertaken to secure an appropriate lease agreement with the owner to enable further planning studies to be conducted and to seek approval for the installation of onsite wind monitoring masts to validate the expected wind resource.

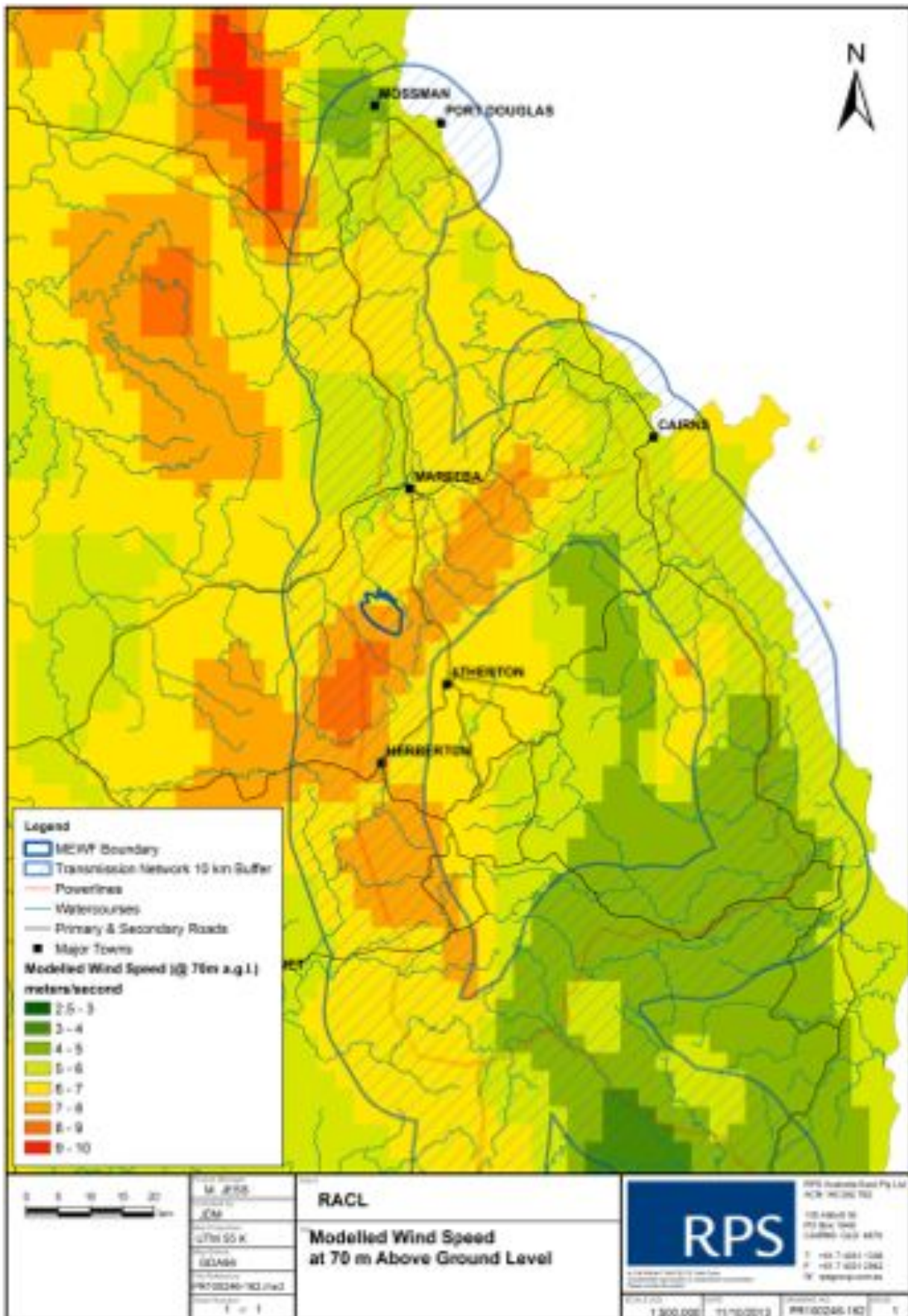


Figure 6.2 Wind Speed at 70 m Above Ground Surface

6.2 Wind Farm Design – Reduction of Impacts

A variety of design options were considered during the conceptual stage of the wind farm development. The overall objective at this time was to identify the layout of the project to maximise electricity generation and deliver significant savings in greenhouse gas emissions whilst being commercially viable and socially and environmentally responsible.

An initial turbine layout was produced allowing for the orientation of the prevailing winds and turbine spacing relative to the size of the turbines chosen at the time, to maximise the generation of the land available. The turbine used for this concept shared common characteristics of a 90 m rotor and a 2 MW capacity as generally available to the market at the time.

This concept layout provided for 100 wind turbines located across the site.

Adjustments to the layout and the number of turbines was then performed, with consideration given to constructability, environmental constraints and issues relevant to the local community especially noise and visual.

Following consultation with surrounding residents, amendments were made to the turbine layout to reduce both the noise and the visual impact at the respective homes. Most notably this included:

- Moving the turbines off the top of the western ridgeline to further within the property to screen a significant portion of the turbine from views to landowners to the west of the site;
- Removal of turbines in the northeast of the site at the request of owners within this view shed; and
- Removal of turbines in the southeast corner to significantly reduce the size of turbines visible to the residents of Rangeview.

The result of these modifications provided for a preferred project layout incorporating 75 wind turbines in 2012.

Consistent with the commercial market for wind turbines in Australia and internationally, larger 3 MW class wind turbines are now the most common being installed. These turbines have rotor diameters above 100 m and as such require additional spacing between turbines, thus reducing the overall number of turbines on site. While the overall tip height of turbines would increase by 5 m to 10 m the reduction in number and increased spacing is thought to reduce the visual aspect of the wind farm.

The use of larger turbines reduced the preferred layout to a total of 70 wind turbines. Following detailed environmental investigations the wind turbine layout design has been further modified to a currently preferred total of 63 turbines (**Figure 6.3**).

These further reductions were in respect to:

- WTG 1 and 2 – remove to reduce fauna impacts due to avian species' utilisation of the Walsh Bluff area – 500 m buffer zone allowed for around Walsh Bluff;
- WTG 62 – residential impacts (noise, visual) to neighbouring residences; and
- WTG 40, 41, 42 and 43 – Reduction of impacts to montane heathland zone greater than 900 m ASL in Wet Tropics bioregion (Volume 2 Chapter 18).

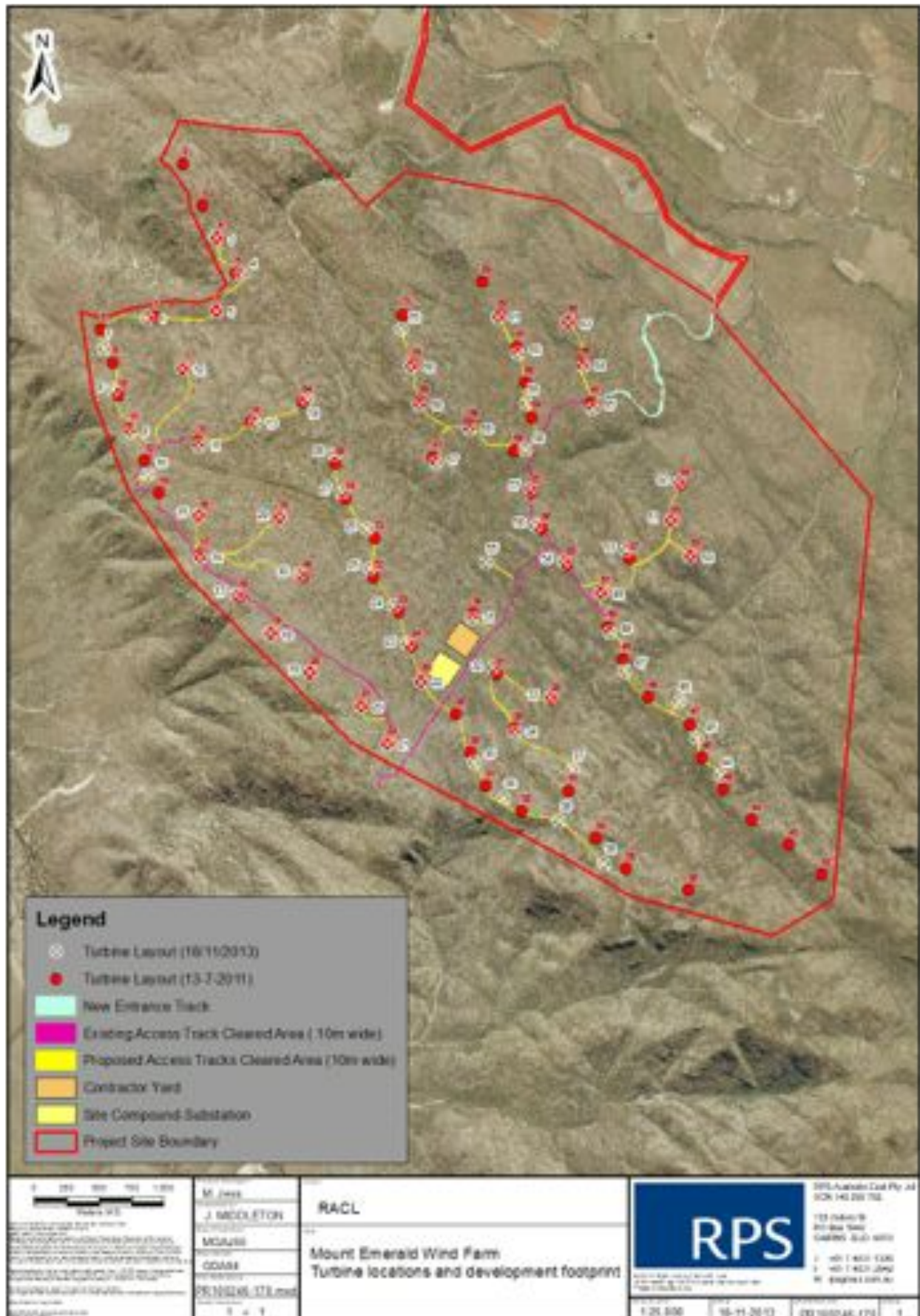


Figure 6.3 Current Wind Turbine Layout

6.3 Construction Alternatives

The Traffic and Transport Assessment discussed in **Chapter 9** provides an assessment of the viable alternatives for delivery of components to site.

As discussed in **Section 2.5** the supply of concrete will most likely be provided by concrete batching plants already approved or established in the area, however the viability of installing an on-site temporary facility would be investigated by a suitably qualified supply contractor who would also be responsible for the approval of such a facility.

Subject to its suitability, the material made available from site excavations would be utilised for access track and hardstand area construction thus reducing or eliminating the amount of material required from outside sources. If any additional material is required, it would be sourced from existing facilities in the immediate region.

The type of crane used for the installation of the wind turbines may be either a track based crawler able to access all turbine sites including steep access, or a conventional rubber wheel mounted crane which would necessitate a higher standard of access track to reach all sites. Depending on the nature of the individual turbine site it may be necessary to vary the construction procedures particularly where the site is constrained by vegetation or slope.

Minor clearing of vegetation may be required for the installation of turbines, including selective pruning or removal of identified trees to allow for laydown and assembly of turbines blades and rotors. Alternatively, components can be delivered to the turbine site as required for erection with blades installed individually. This would reduce the clearing required with the objective to minimise or avoid removal of mature trees or particular species of significance.

7.0 Landscape and Visual Impact

7.1 Methodology

A detailed Landscape and Visual Impact Assessment (LVIA) undertaken by Green Bean Design (GBD) involved a comprehensive evaluation of the landscape character in which the proposed Mount Emerald Wind Farm and ancillary structures would be located, and an assessment of the potential landscape and visual impacts that could result from the construction and operation of the wind farm, taking into account appropriate mitigation measures (**Appendix 6**). The assessment was based on 70 turbines with a maximum blade tip height of 130.5m from ground level to tip of blade and a maximum rotor diameter of up to 110m. Whilst the final turbine model has not yet been determined from a visual impact assessment perspective the minor differences between the candidate models is unlikely to materially affect the outcome of the LVIA. A summary of this assessment is provided below.

The LVIA was prepared with regard to a number of existing planning and industry guidelines that relate to the assessment and determination of potential landscape and visual impacts with specific regard to wind farm developments. These guidelines include the:

- Draft National Wind Farm Development Guidelines;
- Wind Farms and Landscape Values National Assessment Framework; and
- Auswind Best Practice Guidelines.

Whilst none of these guidelines are mandatory the LVIA adopted their key elements including the following methodologies:

- Desktop study addressing visual character and identification of view locations within the surrounding area;
- Fieldwork and photography;
- Preparation of ZVI (zone of visual influence) diagrams;
- Assessment and determination of landscape sensitivity;
- Assessment of significance of visual impact; and
- Preparation of photomontages and illustrative figures.

7.2 Impact Assessment

The LVIA concluded that the Mount Emerald Wind Farm project would have an overall low to medium visual significance on the majority of uninvolved residential view locations within the viewshed as well as public view locations (from sections of local roads and amenity areas within urban localities). **Plate 7.1** is an example. More specifically the LVIA determined that:

- The project will have a medium to high visual significance for five uninvolved residential view locations within 2 km of the proposed Mount Emerald Wind Farm turbines. The LVIA also determined that the project will have a medium significance for two residential dwellings within 2 km of the proposed turbines.
- The overall landscape character sensitivity is considered to be medium to high. Some recognisable characteristics of the Landscape Character Area (LCA) will be altered by the proposed project, and result in the introduction of visually prominent elements that will alter the perceived characteristics of the LCA but may be partially mitigated by existing landscape elements and features within the LCA.



Plate 7.1 Photo montage location M30-Single frame photo detail, proposed view (Appendix 5)

- The main characteristics of the LCA's, patterns and combinations of landform and land cover will still be visually evident from within and beyond the project site boundary.
- The LCA's identified and described in the LVIA are generally well represented throughout the surrounding Local Government Areas and more generally within other regions across the Atherton Tablelands. The landscape surrounding the project will have some ability to accommodate the physical changes associated with the wind farm and its associated structures.
- Many of the residential dwellings surrounding the wind farm have been positioned within the landscape to mitigate exposure to inclement weather, or have adopted measures to reduce these impacts by planting and maintaining windbreaks around residential dwellings. The extent of windbreak planting reduces the potential visibility of the wind farm from a number of residential view locations in the surrounding landscape.
- Views toward the Mount Emerald wind turbines would generally result in a low impact for the majority of motorists travelling through the area due to the short duration and transitory nature of effects. This low level of impact would include tourist traffic travelling along the Kennedy Highway (**Plate 7.2**).
- Construction of the project would not result in any significant 'direct', 'indirect' or 'sequential' cumulative impacts when considered against any existing or proposed wind farm developments within the planning system located in the Atherton Tablelands.



Plate 7.2 Photo montage Location M3 – Single frame photo detail, proposed view (Appendix 5)

- The potential substation location and associated electrical infrastructure works are unlikely to result in any visual impact for surrounding residential or public view locations.
- Both pre-construction and construction activities are unlikely to result in an unacceptable level of visual impact due to the temporary nature of these activities together with proposed restoration and rehabilitation strategies. The preferred location for some of the construction activities, including the on-site concrete batch plant and rock crushing equipment, would be located away from publicly accessible areas, with the closest residential view locations generally comprising involved landowners.
- The proposed MEWF turbines do not exceed the 150 m tip height threshold and, in accordance with current CASA guidelines, will not require night time obstacle lighting.

7.3 Mitigation Measures

Although some mitigation measures are considered appropriate to minimise the visual effects for a number of the elements associated with the MEWF, it is acknowledged that the degree to which the wind turbines would be visually mitigated is limited by their scale and position within the landscape relative to surrounding view locations. Notwithstanding that predicted noise levels experienced at surrounding residences are expected to be below nuisance standards, potential mitigation measures could include landscaping of residences and access tracks and acoustic shielding of residences to reduce internal noise levels.

RACL has engaged in ongoing consultation with local residents and made adjustments to the location of individual turbines and associated infrastructure to minimise visual impacts where possible.

8.0 Noise Assessment

8.1 Scope

Detailed noise assessments have been carried out during the MEWF concept design phase by Noise Mapping Australia (NMA) and more recently Marshall Day Acoustics (MDA), with the aim of producing a site layout that minimises operation phase impacts on nearby properties (refer **Appendix 7**). The current conceptual layout referred to in this document reflects earlier consideration of offsite noise impacts through repositioning and reduction in number of turbines. Assessment of noise impact from the current layout has included detailed background noise investigations and initial modelling by NMA which has been further refined including an assessment of noise characteristics of a viable candidate list of turbine models, including RePower 3XM104, Siemens SWT-3.0-101 and Siemens SWT-3.0-108 models. The final turbine model will be confirmed during the detailed design phase.

The key to assessment of noise impacts is the selection of acceptable compliance limits. The MDA noise assessment recognises the requirements of applicable regional and state noise guidance, including the *Tablelands Regional Council Planning Scheme Amendment PSA 01/11 – Wind Farms - Mareeba Shire Planning Scheme 2004* and provides a detailed rationale for the chosen assessment guidelines.

Once noise limits were established, further wind farm predictions were carried out and compliance assessed by comparing the predicted wind farm noise levels with the noise limits over a range of wind speeds.

Additionally, an assessment of low frequency noise levels and a qualitative review of infrasound are included in this assessment to address the requirements of the Queensland EPA EcoAccess draft document Guideline: Assessment of low frequency noise (LFN Guideline).

8.2 Noise Guidelines

The PSA 01/11 amendment requires that a proposed wind farm be designed, constructed and operated in accordance with recognised standards for the assessment of environmental noise. In relation to recognised standards, New Zealand Standard 6808:2010 Acoustics – Wind farm noise (NZS6808:2010) and the Queensland Government's Environment Protection (Noise) Policy 2008 (EPP 2008) are specifically noted in the planning scheme. As the state government's noise guidance documents, including EPP 2008, apply to general noise sources, they do not offer guidance for sources with sound levels that vary with wind speed, as is typical of wind turbines. To address this issue directly, NZS 6808:2010 serves as the primary guidance document referenced for this noise assessment.

Section 5.2 Noise limit of NZS6808:2010 defines acceptable noise limits as follows:

As a guide to the limits of acceptability at a noise sensitive location, at any wind speed wind farm sound levels (L_{A90}) should not exceed the background sound level by more than 5 dB, or a level of 40 dB L_{A90} , whichever is the greater.

L_{A90} : The A-weighted statistical noise level exceeded for 90% over the measurement period (normally 10min), measured in dBA (decibels). L_{Aeq} : The A-weighted constant noise level over the time period, equivalent to the actual fluctuating noise level, measure in dBA.

This arrangement of noise limits requires the noise associated with wind farms to be restricted to a permissible level above background noise, except in instances when both the background and source noise levels are low. In this respect, the criteria indicate that it is not necessary to continue to adhere to a margin above background when the background values are below the range of 30-35 dB.

The definition of a high amenity area provided in NZS6808:2010 is specific to New Zealand planning legislation and guidelines. A degree of interpretation is therefore required when determining how to apply the concept of high amenity in Queensland. Section 5.3 of NZS6808:2010 provides details of high amenity noise limits, requiring that where a residential property is deemed to be located within a high amenity area as defined in Sections 5.3.1 and 5.3.2 of NZS6808:2010, wind farm noise levels (L_{A90}) during evening and night-time periods should not exceed the background noise level (L_{A90}) by more than 5 dB or 35 dB L_{A90} , whichever is the greater, for wind speeds below 6 m/s at hub height. High amenity noise limits are not applicable during the daytime period.

Section 6.4 S5(b) of PSA 01/11 requires that a wind farm not result in unacceptable levels of nuisance, risk to human health or ability to sleep and relax. In relation to this the forwarding comments of the Standard note: *Wind farm sound may be audible at times at noise sensitive locations, and this Standard does not set limits that provide absolute protection for residents from audible wind farm sound. Guidance is provided on noise limits that are considered reasonable for protecting sleep and amenity from wind farm sound received at noise sensitive locations.*

The assessment adopted a manufacturers tonality factor in accordance with IEC61400-11 Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques (IEC61400-11) for the REPower model and a default figure of no greater than -3 dB at all assessed wind speeds for the Siemens models, which is to be confirmed during the detailed design phase.

8.3 Existing Noise Environment

In choosing the assessment limits, whilst the project will be located within Mareeba Shire, assessment considered land use zonings in the adjacent Atherton Shire and also considered zonings in the Tablelands Regional Council scheme. These schemes identified the land surrounding the MEWF site is zoned as predominantly primary or rural production.

Section 7.1.4 of NZS6808:2010 recommends that background noise monitoring be carried out at noise sensitive locations around a proposed wind farm where predicted wind farm noise levels exceed 35dB L_{A90} . The noise assessment considered one hundred and twenty-three (123) receiver locations around the site of the proposed wind farm site identified by RACL (refer **Appendix 7**). Background noise assessment was conducted by NMA in March 2012 at six representative locations over two weeks.

The high amenity noise limit has not been applied because of a considered absence of such receptors and a 40 dB L_{Aeq} base noise level limit was used for this noise assessment. Notwithstanding this approach, MDA recommended that further background noise monitoring at a later stage, in order to quantify the existing baseline noise environment in the area, which could inform and be integrated into any required post-construction noise monitoring.

8.4 Impact Assessment – Construction and Decommissioning

Typical construction and decommissioning phase noise generating activities include:

- Internal and site access road construction;
- Crane pad construction;
- Turbine tower foundation excavation and construction;
- Underground cabling trench excavation; and
- Assembly/disassembly and erection of turbine tower, nacelle and rotor blades.

Chemical and mechanical rock breaking is to be preferred over low energy blasting where mechanical ripping and excavation are not feasible for track and turbine footing construction. All construction will be undertaken in daylight hours in accordance with approval conditions.

Construction noise modelling has not been undertaken, however the closest construction activity with a minimum separation distance of one kilometre to the closest receptor is the new site access road. This distance is considered unlikely to result in noise nuisance, particularly given the dominant local E/SE wind directions. Once construction activity moves beyond the fringing ranges potential for impact is considered to greatly reduce. Similarly given the separation distances, vibration is also considered not likely to impact surrounding residences.

Decommissioning is likely to include turbine removal and decommissioning and rehabilitation of the majority of the track network. Turbine foundations and cabling would be left in place. Decommissioning noise impacts are difficult to predict because of the unknowable distances to future receptors, work patterns and methods, however it is reasonable to assume that noise emissions should be less than the construction phase given the likely absence of higher noise emitting activities of track and turbine foundation construction.

8.5 Impact Assessment – Operation

The MDA assessment of operating impact has been predicted using the implementation of ISO9613-2:19964 with Sound PLAN version 7.2 noise modelling software. Predictions have been carried out using the sound power level data presented in Section 3.1.2. The ISO 9613-2:1996 method has been used with input parameters specifically chosen for the purpose of modelling wind farm noise, taking account of a range of national and international research publications. These publications include a comprehensive 1998 study (commonly cited as the Joule Report) part funded by the European Commission which found the ISO 9613 model provides a robust representation of upper noise levels which may occur in practice.

With the exception of the Siemens SWT-3.0-108 model at two receptor locations, predicted noise levels from the proposed wind farm for all the three chosen turbine models comply with the 40 dB L_{Aeq} base criterion within the range of assessed wind speeds at each of the listed receiver locations. Wind farm noise at all other identified receiver locations in the vicinity of the MEWF are predicted to be 5 dB or more below the 40 dB L_{Aeq} base criterion and therefore also demonstrate compliance with NZS6808:2010 across the range of assessed wind speeds. However it was found that after removal of three turbines and operation of three other turbines in “Noise Restricted Operation mode” compliance could be achieved with that model.

Similarly, compliance with the adopted internal low frequency noise limit (Danish EPA 1284 method) was demonstrated for all three turbine models assuming removal of the same three turbines for the Siemens model SWT-3.0-108.

The proposed substation in the flat “central bowl” area of the site is approximately 2.7 km from the nearest residence and therefore considered to be inaudible at all receptors.

8.6 Mitigation Measures – Construction and Decommissioning

Construction and decommissioning activities will be temporary and will occur intermittently over an approximate period of two years. The majority of the bulk earthmoving activities are likely to occur within the first nine months of commencement, with the first activity being construction of the new site access road.

Key noise mitigation measures during construction and decommissioning would include:

- Compliance with approved working hours expected to be daylight only 7.00 am to 6.00 pm Monday to Friday; and 8.00 am to 1.00 pm on Saturdays, with no work or deliveries on Sundays or public holidays.

Special permits would be required for exceptional activities which may need to occur outside standard working hours (e.g. delivery of oversize loads and other low noise activities);

- In accordance with Queensland EPP(Noise) and best practice, all feasible and reasonable work practices would be employed to minimise construction noise impacts;
- Continuing consultation and notification with potentially affected residents in the vicinity of the project site to be maintained, particularly in advance of potentially noisy works.
- Selection of construction plant on the basis of low inherent potential to generate noise and vibration;
- Fitting equipment with noise control equipment (such as mufflers) and low-noise reversing alarms; and
- Regular inspection and maintenance of equipment to ensure noise emissions do not exceed typical levels.

In addition to detailed traffic management impact mitigation measures provided in Section 9 below, other noise mitigation measures would include:

- Regulating the timing of deliveries; and
- Notification to residents when deliveries of large loads are scheduled.

8.7 Mitigation Measures - Operation

The primary noise management tool available to minimise potential operational noise impacts is through iterative design of the final layout once the turbine model is decided; modelling of the three candidate models indicates that compliance with noise limits is achievable. It is recommended that noise modelling is rerun if significant modification to the tested models is proposed.

During the operation phase noise mitigation measures would include:

Within the first four months of operation noise monitoring would be undertaken to validate compliance with adopted limits;

Should limits be exceeded the following mitigation measures would be initiated:

- Using active noise control functions of turbines;
- Rectify any manufacturing defects or control settings so that noise can be reduced to the in accordance with the contracted specifications; or
- If excesses still occur, acoustic treatment of receiver dwellings as agreed with residents followed by noise monitoring to ensure compliance.

9.0 Traffic and Transport

Sinclair Knight Merz (SKM) was commissioned by RACL (**Appendix 8**) to undertake a traffic impact assessment for the proposed Mount Emerald Wind Farm (MEWF) project at Walkamin.

The purpose of this report was to review the impact that the proposed MEWF development, will have on the surrounding road network, including requirements for access to the project site during construction and operation.

An additional *Technical Note* (**Appendix 8a**) was issued to provide engineering input to Council's queries regarding the impact the proposed MEWF development will have on the surrounding road network, including vertical alignment checks for Hansen and Springmount Roads and various traffic generation figures during construction and operation.

9.1 Existing Environment

The major road adjacent to the proposed site is the Kennedy Highway running generally in a north south direction and forms part of the planned route for the transport of the wind tower components from their delivery location. This State-Controlled road is a two lane, two-way, sealed road with sealed shoulders, unsealed verges and is a gazetted 23-25 m B-double route.

From the main highway at Walkamin, the recommended (and most viable) route to the proposed MEWF site is via Hansen Road and Springmount Road, while direct access to the site is off Kippen Drive. All of these roads are locally controlled by the Tablelands Regional Council and are generally two lane, two-way, sealed roads with unsealed shoulders and verges, except for Kippen Drive which is largely an unbound gravel road/track.

For modelling purposes a maximum of 75 wind turbines are expected to be constructed on the site and a tourist viewing facility is likely to be built but its location is currently unknown. A plan showing the locality of the planned site is shown in **Figure 9.1** below.

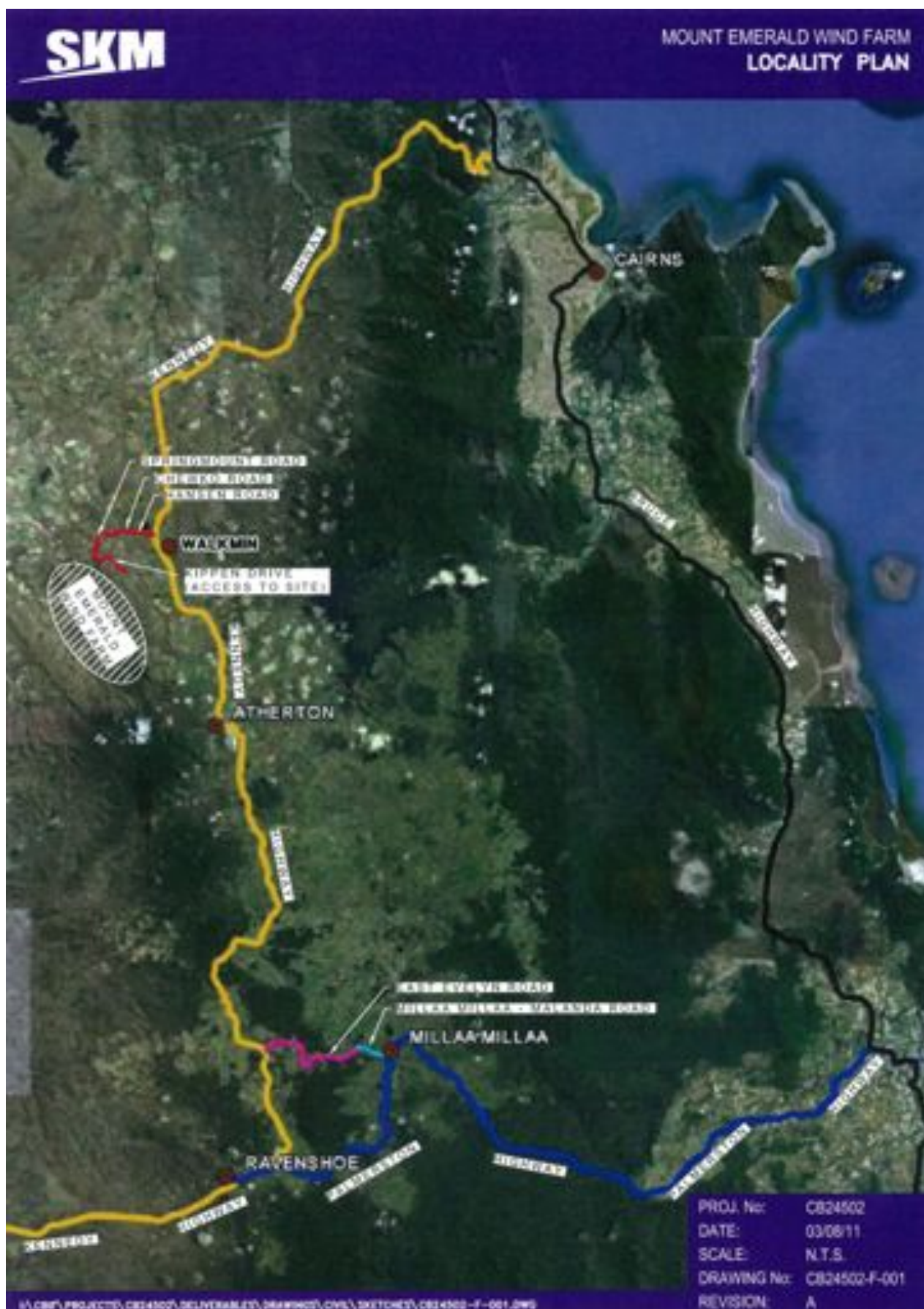


Figure 9.1 Mount Emerald Wind Farm Road Network Plan

9.1.2 Transport Routes

There were two identified possible routes for the transport of the wind tower components from their eventual delivery point to the Kennedy Highway at Walkamin. The following identified routes comprise roads that have been gazetted for 23-25 m B-double vehicles.

The first of these options (identified as the coastal route) assumes the wind tower components will be delivered at a coastal port and is via the Palmerston Highway which commences at the intersection of the Bruce Highway, approximately 5 km north of Innisfail. This road traverses the Great Dividing Range for approximately 58 km through mountainous terrain before following Millaa Millaa - Malanda Road north through the Malanda township. Continuing in a north-west direction along Malanda - Atherton Road, the route bypasses Atherton by following Tinaroo Falls Dam Road and Kairi Road before eventually intersecting the Kennedy Highway approximately 5 km north of Atherton.

The second option (identified as the inland route) assumes the wind tower components will be delivered at an inland location and is via Kennedy Developmental Road and the Kennedy Highway passing through Mt Garnet. This route continues in a north-east direction past Ravenshoe and joins onto East Evelyn Road towards the township of Millaa Millaa. Not dissimilar to the coastal option, this route then follows the same roads to bypass Atherton and intersects the Kennedy Highway approximately 5 km north of Atherton.

The finalised route will be determined by the equipment supplier, who will ultimately be responsible for performing a detailed investigation of transportation requirements to the proposed MEWF site.

9.2 Impact Assessment – Construction and Decommissioning

9.2.1 Construction

The transport of materials and equipment to the site during the construction phase would involve a temporary increase in the local traffic volume and the transport of oversize loads.

The turbine components would include the tower sections, nacelles, blades, turbines, transformers, steel reinforcing (for the foundations), and substation components.

The towers will be delivered in three sections (each approximately 30 m in length) transported on extended articulated trucks. A heavy-duty articulated truck could deliver the generators and nacelle assemblies. A-double trucks (total length 36.2 m) may be suitable. Depending on the model selected, the turbine blades can reach around 50 m in length and would be transported on an oversize vehicle. The blades will be unloaded at the individual turbine sites.

Current road design should be considered as preliminary in nature, with a final detailed design undertaken by the contracted turbine supplier. All designs have been produced to allow for full accessibility of vehicles based on the general road design requirements. A calculation of the generated traffic details various vehicle types and calculates the trips generated by those various types of vehicles during different activities and phases of the construction period. For calculation purposes it is assumed pavement rehabilitation of entire length of Hansen Road will be required due to the heavy loading. It is assumed that 150 mm gravel overlay will be required for Hansen Road.

A detailed pavement impact assessment should be carried out before construction activities. **Table 9.1** shows a summary of vehicles movements during the 2 year construction and wind towers installation period. Details of these calculations are provided in the *SKM – Technical Note (Appendix 8a)*.

It should be noted the external sourcing of materials for the road base and the tower foundation will be done in the first 6 months, so there will be increased activities in the first six months during the construction period.

This leads to a figure of Annual Average Daily Traffic (AADT) of 79 (arriving loaded and leaving the site empty) during different phases of the project. It was assumed for calculation purpose that there will be 300 days of working days per year, which may vary in reality depending on other circumstances and weather condition.

Traffic consultants have assumed the use of a 30 seat bus/coach to be used to transport workers to site from construction camp or nearby towns. The value of 4580 is determined by the number of trips to and from site over the 2 year construction period of (6 days/week x 50 weeks/year x 2 years = 600 days) – average of 3.8 return trips/day. It was also assumed that there was 12 working hours per day and peak hour traffic generation during construction and operation is 12% of the AADT which equates to approximately 10 vehicles per hour in the peak hour.

Table 9.1 Vehicle Movements expected during 2 year construction and wind tower installation period

Vehicle Type		Vehicle Movements
A	Trucks	
	10 yd Dump Trucks/Trailers	14,261
	Agitators	5
	Flat Tray Trucks (10 t)	577
	Elevated Platform Trucks	2
		14,845
B	Trucks	
	Semi/Low Loaders	513
	Water Tankers	90
		603
C	Trucks	
	Overlength/Oversize Vehicles	78
		78
D	Light Vehicles	
	4WD Vehicles	3,607
	Bus/Coach 30 seaters	4,580
		8,187
E	Earth Moving Equipment (transported on low-loader)	
	Bulldozers	6
	Graders	3
	Vibrating Rollers	5
	Excavators	7
		21
F	Cranes	
	50 t plus capacity	4
	400 t plus capacity (Main Crane)	20
		24
TOTAL		23,758
Total Trucks per day		40
Average trips per day		79

Existing traffic has been recorded on a section of the Kennedy Highway that includes the intersection with Hansen road by Department of Transport and Main Roads in 2008. Similarly, another applicable traffic count has been conducted on Hansen Road near the intersection of Chewko Road by TRC in 2010.

The results of these traffic counts are shown below in **Table 9.2** and display as an Annual Average Daily Traffic (AADT) value expressed as vehicles per day (vpd) and a corresponding percentage of heavy vehicles where applicable. A 10 year design life for Hansen Road was assumed making the design traffic year 2022 and a traffic growth of 3% per annum.

Table 9.2 Existing AADT

Road	Location	Count Year	AADT	Peak Hour	Heavy Vehicles	Design Year AADT	Design Year peak Hour
			(vpd)	(vph)	(%)	(vpd)	(vph)
Kennedy Highway	Hansen Road Intersection	2008	4,891	587	5.9	7,398	888
Hansen Road	Chewko Road Intersection	2010	1,318	159	-	1,879	225

The daily traffic movements estimated during construction is shown in **Table 9.3** detailing the anticipated traffic increase of Hansen Road. The AADT for 2012 is calculated from **Table 9.2** with a growth rate of 3% per annum, and the AADT increase for the construction period is taken from the calculated truck trips per day in **Table 9.1**.

Table 9.3 Construction Period AADT

Road	Location	Count Year	AADT	Peak Hour	Heavy Vehicles	Avg. Wind farm trips	Increased AADT	Increase
			(vpd)	(vph)	(%)	(vpd)	(vpd)	(%)
Kennedy Highway	Hansen Road Intersection	2012	5,670	680	5.9	79	5,749	1.4
Hansen Road	Chewko Road Intersection	2012	1,440	173	-	79	1,519	5.5

9.2.2 Decommissioning

The nature of site traffic generated during the decommissioning phase and its potential traffic and transport impacts will be similar to the construction phase of the Proposal. It is expected that traffic volumes will comprise floats to and from site of construction plant and haulage of decommissioned WTG equipment and demolition materials for offsite disposal or storage.

9.3 Impact Assessment – Operation

The operation phase of the Proposal is not expected to generate significant volumes of traffic. The number of permanent staff on site is not expected to exceed 15 people, with approximately 8 trips assumed for residential purposes.

The concept of tourist generated traffic should also be considered, with Kippen Drive likely to provide access to a viewing area after construction is complete, as it may well be a requirement of the Mareeba Shire Council (Approval authority) for tourist traffic to be controlled in the vicinity.

Based on anecdotal evidence and local knowledge of the existing viewing area at the Windy Hill wind farm, a conservative assumption has been made that 100 vpd will be utilising the proposed viewing area. The daily

traffic movements estimated during operation is shown in **Table 9.4**. Again the AADT for 2012 is calculated from **Table 9.2** with a growth rate of 3% per annum.

Table 9.4 Operation Period AADT

Road	Location	Count Year	AADT	Peak Hour	Heavy Vehicles	Avg. Wind farm trips	Increased AADT	Increase
			(vpd)	(vph)	(%)	(vpd)	(vpd)	(%)
Kennedy Highway	Hansen Road Intersection	2012	5,670	680	5.9	108	5,778	2
Hansen Road	Chewko Road Intersection	2012	1,440	173	-	108	1,548	7

9.4 Mitigation Measures – Construction and Decommissioning

The following management and mitigation measures will be implemented to reduce the impact of traffic generation during the construction and decommissioning phases of the Proposal on the local and wider road network:

- The route along Hansen Road and Springmount Road is gazetted for large vehicles accessing the Arriga Mill, it is recommended that special warning signage be installed to denote that B-doubles are present along these local roads. As a minimum, Trucks Crossing or Entering signs should be provided to warn motorists of the large articulated vehicles regularly using the route.
- Kennedy Highway and Hansen Road Intersection - this intersection was appropriately signed and makes adequate provision to cater for the current and expected future turning traffic. No further recommendations to upgrade this junction have been warranted.
- Hansen Road and Chewko Road Intersection - the extra vehicles generated by the proposed MEWF development should not directly affect the operation of this intersection however some safety concerns regarding achievable sight distances around this junction and location of signage were identified. It is recommended that the large tree adjacent to the intersection be removed to improve sight distance from Chewko Road and also that the Give Way sign on the minor road be relocated next to the corresponding line marking. In addition, it is advised to install a Give Way Ahead sign on Chewko Road to provide additional prior warning to motorists of the upcoming intersection with Hansen Road.
- Hansen Road and Channel Road Intersection - not dissimilar to the intersection with Chewko Road, the extra vehicles generated by the proposed MEWF development should not directly affect the operation of this intersection, however some safety concerns regarding achievable sight distances around this junction and types of signage used were also identified. Improving sight distances around this intersection to achieve minimum values would require considerable earthworks to cut back batters. Instead, it is recommended that some signage be altered (namely the Side Road Junction signs) to provide advance warning to motorists of the road environment ahead. Some vegetation clearing on both approaches to Channel Road will also assist in improving visibility at this intersection.
- Springmount Road and Kippen Drive Intersection - based on the recommended route configuration from the Kennedy Highway (via Hansen Road and Springmount Road), transportation of all tower components will utilise Kippen Drive by turning left in and right out.
- Given the expected traffic increase during the construction of the proposed MEWF development on Springmount Road, it is warranted to upgrade the Kippen Drive and Springmount Road intersection with Basic Right Turn (BAR) and Basic Left Turn (BAL) treatments that cater specifically for articulated vehicles. However, due to the safety issues concerning the substandard sight distances available at this junction, it is recommended that an Auxiliary Left Turn (AUL) treatment be provided in substitute of the BAL. Some minor pavement and seal widening will be required for the BAR/AUL intersection treatments to accommodate the swept path of the turning movement for the typical design vehicles. Subsequently,

to improve achievable sight distances at this intersection, it is recommended to undertake vegetation clearing for both approaches to Kippen Drive. To provide additional warning to motorists that trucks will be turning out of Kippen Drive onto Springmount Road it is recommended to install 'Trucks Entering' supplementary sign plates underneath the new Side Road Junction on 'Curve' signs for both intersection approaches.

- No oversize or large trucks associated with the construction would operate on the Kennedy Highway during the school bus hours of 7:30 am and 9:00 am, and between 3:00 pm and 4:30 pm on school days;
- Once more detail is known about the exact type of transport vehicles and routing, more detailed swept path analysis would be undertaken along the truck route;
- Assessment of the condition of existing pavements to ascertain the need and extent of pavement upgrade or construction works required;
- The road and intersection conditions would be established by the use of field surveys and regular site inspections. When required, rehabilitation of the pavement and/or edges of seal, shoulders and verges would be carried out. At the completion of the works the access roads would be in the same or superior condition than at the commencement of the works;
- Establishing procedures to monitor traffic impacts on public and internal access tracks during construction, including noise, dust and travel times, and to implement modified work methods to reduce such impacts where possible;
- Regular road dilapidation surveys during construction;
- Retention and handover of internal access roads to be used for agricultural production and fire fighting purposes after the decommissioning of the Proposal.

9.5 Mitigation Measures – Operation

The mitigation measures incorporated for the construction phase of the development should adequately cover any future operations requirements. A procedure will be established to ensure the ongoing maintenance of access roads during the operation phase

10.0 Community Consultation

Successful community engagement is an integral component of any project which RACL are involved in. Given the level of community interest in the proposed Mount Emerald Wind Farm shown to date and sensitivities of community with respect to wind farm developments in the area, it is important that community engagement is undertaken both before and throughout the entire project process.

There has been some concern raised in relation to the location of the wind farm within close proximity to established residences and uncertainty regarding potential impacts from noise, impact on aircraft movements (and thus potential light impacts), blade flicker and visual amenity. Specialist reports have been prepared to address these concerns where possible.

This chapter summarises the Community Consultation Report prepared by RACL (**Appendix 9**).

10.1 Consultation Methodology

The objectives of the community engagement program were to ensure that the community and stakeholders were:

- Informed about the Proposal, through an ongoing commitment by the Proponent to provide information, allowing a good understanding of the proposed development and the likely impacts;
- Actively engaged on issues of concern to them, to identify and consider options for eliminating or reducing impacts; and
- Given ample opportunity to provide views on the proposal.

10.2 Stakeholder Consultation

The following organisations have been identified as having a vested interest in the outcome of the proposed MEWF:

- Tablelands Regional Council
- Mareeba Shire Council
- Landholders
- Communities in Atherton Tablelands area, most notably Mareeba, Atherton and Tolga
- Bar Barrum and Muluridji People
- North Queensland Land Council
- Near neighbours
- Department of Employment, Economic Development and Innovation (DEEDI) includes Mines and Energy
- Department of Environment and Resource Management (DERM) includes Environment Protection Authority (EPA)
- Local Rural Fire Brigade
- Civil Aviation Safety Authority, Mareeba Airport and Aerial Agriculture companies
- Tourism Queensland
- Department of Transport and Main Roads
- Network Service Provider ("NSP") operating in the region of the proposed project area - Powerlink

- Electricity Off-taker
- SunWater
- Springmount Waste Disposal Facility

10.3 Consultation Activities

A summary of key stakeholder engagement and consultation activities undertaken throughout the course of the development is outlined in the sections below, with a list of the consultation activities is included in **Appendix 9 – Stakeholder Consultation Program**.

A summary of some of the key activities is shown in **Table 10.1** below.

Table 10.1 Key Consultation Activities

Date	Stakeholder	Description
May 2009	Various neighbouring landowners	Introductory meeting with discussion on general project concept
July 2009	TRC mayor and planning staff	Introductory meeting with discussion on general project concept
September 2009	TRC planning staff	Wind monitoring tower application
January 2011	Landowners meeting Oaky Valley residents	Project information and questions
March 2011	Public Open Day	Public meeting with approx. 60 attendees; also involved media release and advertisement, newsletter #1, information booklet
March 2011	Traditional Owners	Preliminary meeting and discussion with group representatives
July 2011	TRC councillors, planners and media	Site inspection
July 2012	TRC (Mayor, CEO, Planners)	Submissions received on project Key issues – noise, crop dusting, shadow
September 2012	Public Open Day	Public meeting with approx. 150 attendees; also involved media release and advertisement, newsletter #5
September 2012	Public Site Inspection	Guided trips of the actual wind farm site
Sep/Oct 2012	Media releases	Addressing issues and questions raised at the September 2012 Open Day
November 2012	Website	Launch of dedicated website www.mtemeraldwindfarm.com.au
February 2013	Traditional owners	Initial meeting in respect of cultural heritage management plan

An additional consultation session will be held post-lodgement of the development application to seek further feedback on the overall, amended project. Regular updates, in the form of newsletters have been, and will continue to be disseminated throughout the community and on relevant websites to ensure up to date information is available to all members of the community.

Frequent discussion and information continues to occur directly between project proponents and interested residents within the area.

10.4 Conclusions

RACL have proposed a Community Consultative Committee for the Mount Emerald Wind Farm similar to that developed and implemented at other wind farms around the country.

The structure of this committee has been developed in conjunction with other companies and the Clean Energy Council's Engagement Officer to ensure the committee charter and proposed operating regime provide the best possible outcomes.

A possible Chair has been approached and potential members identified, along with a timeline for commencement initiated.

11.0 Cultural Heritage

The project area remains largely within a natural state and ground disturbance within the area appears to be confined to various tracks associated with Powerlink's existing transmission line, which traverses east west across the southern end of the site. This history of land use reduces the likelihood any features of non-aboriginal cultural significance remaining on the site, although it is noted that this area was used extensively for military training during World War II. A due diligence assessment of likely Indigenous cultural heritage significance has been undertaken, including assessment of the preliminary corridor layouts. Given the location of known Aboriginal cultural heritage sites adjacent the project area, it is advised that potential for Aboriginal cultural heritage being present within the study area is moderate.

11.1 Assessment

A full Cultural Heritage Assessment was undertaken by Converge, and is included for reference in **Appendix 10**. It is noted that further detailed assessment of the updated layout is currently being finalised and expected to form the basis for future negotiations.

A Cultural Heritage inspection report was provided by Converge in November 2013. This correspondence details the findings of searches and an inspection of the site 31 May 2010. The inspection was carried out in accordance with the *Aboriginal Cultural Heritage Act 2003* to determine the category of the works according to Queensland's Cultural Heritage Duty of Care Guidelines.

The category that was determined to best describe the conditions of the project area and nature of the works was Category 5 Duty of Care Guidelines. Category 5 Guidelines encompasses any activity that does not fall into any of the preceding categories (1-4). This category makes the assumption that there is a high risk of the activity damaging or disturbing Aboriginal Cultural Heritage which will need to be addressed before commencement of activities through a Cultural Heritage Management Plan (CHMP), Cultural Heritage Study or by Agreement.

The findings of the study identified the site as being largely untouched despite access tracks being present. A summary of studies and assessments were presented that identified an number of Cultural Heritage items of significance in the region and although limited sites or artefacts were identified (6 sites in close proximity to the site within 500m) for the site specific records indicate the potential presence of cultural heritage values on the site. A lack of records is expected to be a result of a lack of cultural heritage surveys. The category 5 classification of the site was deemed appropriate due to these records in close proximity and given that there is little previous disturbance over the majority of the area. The potential for Aboriginal Cultural Heritage over the area is moderate.

The appropriate people are the Barburrum and Muluridji people which should be contacted to determine the correct Aboriginal Party for the area. The correspondence recommends a process of consultation with the appropriate Aboriginal Party(ies). An agreement pursuant to section 23(3)(a)(iii) of the Act is recommended to be entered into involving those people advocated by the North Queensland Aboriginal Land Council (NQLC), the native title representative for this area, to simplify the agreement process.

The report therefore recommends adoption of a process whereby consultation with the appropriate Aboriginal parties for the area is initiated. It is expected that the consultation would result in the preparation and implementation of a Cultural Heritage Management Plan to manage areas of significance.

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