Hydro Tasmania

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Flinders Island Hybrid Energy Hub – Wind Turbine

Development Application

29 August 2014

Contents

Hydro Tasmania Standard				
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1. Introduction

1.1 Overview

This section briefly outlines the proposed Flinders Island Hybrid Energy Hub Wind Turbine project, and provides background information on the proponent, the present electricity supply system on Flinders Island, project funding and project benefits.

1.2 The project

As part of its long term strategy to expanding the use of renewable energy the Bass Strait Islands, Hydro Tasmania proposes to establish a single wind turbine (the subject of this Planning Permit Application) on Hayes Hill on Flinders Island (Figure 2-3) along with solar PV and supporting enabling technology at Whitemark power station (the subject of a previously approved Planning Permit Application).

The intended outcomes of the project include:

- Environmentally sustainable energy generation;
- Reduced use of diesel fuel;
- Reduction in the cost of energy generation; and
- Reduction of greenhouse gas emissions.

1.3 The proponent

The Hydro-Electric Corporation ('Hydro Tasmania') is Tasmania's electricity generating utility. It is the largest generator of renewable electricity in Australia, producing over 45 per cent of Australia's renewable output. Hydro Tasmania's generating system has an installed capacity of approximately 2,500 MW, consisting almost entirely of renewable sources and includes:

- a network of 29 small to medium sized hydro-electric power stations;
- a wind farm and solar farm linked with a diesel station on King Island;
- a diesel station on Flinders Island; and
- one thermal (gas) power station at Bell Bay.

Hydro Tasmania opened its first wind farm at Huxley Hill on King Island in 1998 and more recently has undertaken the King Island Renewable Energy Integration Project (KIREIP) on which this Flinders Islands project will be based.

The primary electricity generation and distribution infrastructure on Finders Island is owned and operated by Hydro Tasmania.

1.4 Power supply on Flinders Island

The demand for electricity on Flinders Island is currently met by a diesel power station, located approximately 1.2 km east of Whitemark, and three privately-owned wind turbines located approximately 2.7 km east of Whitemark (Figure 2-3). The power station has four diesel generators (300kW, 2x750kW & 1200kW), giving a total capacity of 3 MW. Electricity is distributed on the island by three 11kV feeders.

The existing privately owned wind turbines are rated at 25 kW, 60 kW and 300kW. The 25 kW machine was installed in 1994, the 60 kW machine was installed in 1988 and more recently a 300kW turbine was installed in 2012 by the Blowing in the Wind Pty Ltd – Joule Logic Pty Ltd joint venture. The power produced by the turbines is sold to Hydro Tasmania. The turbines generally produce up to 25% of the island's electricity requirements, depending on their availability.

1.5 Funding consideration

The Flinders Island Wind turbine should be considered against a background of global warming, Australian Government commitments to cap greenhouse gas emissions and the Australian Renewable Energy Agency's (ARENA) program to support off grid power systems through the Community and Regional Renewable Energy Program (CARRE).

Having made a successful application Hydro Tasmania has recently entered into a funding agreement for partial grant funding for the project under CARRE. Access to these grant funds and progressing with the project remains subject to obtaining Hydro Tasmania Board approval to proceed with the project investment, to which this Planning Permit Application is a precursor.

1.6 Project benefits

The aim of the development is to cost-effectively reduce the use of diesel fuel for electricity generation on Flinders Island and replace it with renewable energy generation. The combination of Hydro Tasmania's experience with renewable energy (RE) integration on King Island and the availability of ARENA funds has provided an opportunity to economically increase in the proportion of Flinders Island's energy demand that is generated from renewable resources from around 25% to around 60%.

Energy modelling for Flinders Island indicates that the total volume of diesel consumed for power generation will be reduced from the present average level of 1.2 million litres per annum to an estimated 0.5 million litres per annum once the wind turbine is installed. This represents around a 60% reduction in annual diesel usage on the Island, and an associated reduction in carbon dioxide emissions from the power station of approximately 34,000 tonnes over a 20 year timeframe.

It is estimated that the wind turbine and associated infrastructure will have a project life of approximately 20 years, however the turbine may remain in operation beyond this period.

1.7 This document

This report has been prepared as supporting documentation for a formal Planning Permit Application to Flinders and include assessment of the project against the provisions of the Flinders Planning Scheme 1994 and an Environmental Impact Assessment and Management Plan.

1.8 Subsequent documentation

Should Flinders Island Council approve the proposal, environmental management plans (EMPs) will be prepared for construction and operation. These plans will incorporate various statutory and planning requirements and any agreements that may have been made with the affected landowners. Such plans are also required under Hydro Tasmania's Health, Safety and Environmental Management System.

Preparation of the plans will be undertaken in consultation with key stakeholders. These plans will ensure implementation of the management measures identified and outlined in this document, and any others required by statutory authorities.

The Construction Environmental Management Plans will incorporate requirements for quality assurance, monitoring and auditing, and will define responsibilities for key personnel. Construction contractors will be required to prepare environmental management plans which will be reviewed and approved by Hydro Tasmania.

An Operation Environmental Management Plan will be developed for the project. The core purpose of this plan is to outline ongoing environmental responsibilities. The plan will be developed by Hydro Tasmania and will include:

- environmental monitoring requirements;
- performance audits;
- review and change control procedure;
- responsibilities;
- ongoing hazardous materials management;
- integration with site quality maintenance and safety plans; and
- documentation and reporting requirements.

2. Proposal

2.1 Overview

This section describes the overall project, aspects of the project that are specific to this application, proposed wind farm, transmission line and ancillary infrastructure. This includes details of site selection, land tenure, plans and details of the proposed infrastructure.

2.2 The site

The predominant land use for the general area is rural properties, some with domestic residences. The wind turbine site itself is cleared agricultural land used mainly for grazing. The turbine is to be located on Hydro Tasmania owned land. Some development has already taken place on the ridge with the two privately owned older wind turbines north of the development site having been installed in 1988 and 1994, and more recently in 2012 a turbine has been installed near the proposed development site by a private developer. The newest of these turbines has a hub 30m high, and blade diameter of 30m. The older turbines have a hub 20m and 15m, with blades approximately eight and ten metres long respectively. There are also communications facilities on Hayes Hill operated by Telstra and the Tasmanian Fire Service at the northern edge of the ridge.

There is a cluster of three houses located approximately 1 km to the south-west of the site, another house located 880m to the north-west, and others further to the north.

The area occupied by the proposed wind turbine is private land on title CT 123215/1 (Lady Barron Road, Whitemark), a portion of the access track and a portion of the 11 kV connection to the grid are located on this title.

During construction and maintenance additional land parcels will need to be accessed, being:

- CT 208390/1 (264 Thule Road, Whitemark) – a portion of the access track is located on this title.
- CT 245575/1 (264 Thule Road, Whitemark) – the proposed access track is located on this title

Titles CT 208390/1 and CT 245575/1 are owned by the Flinders Island Aboriginal Association Inc. (FIAA), while CT123215/1 is owned by Hydro Tasmania. Copies the affected titles are included as Appendix A to this document.

2.3 Proposed development

This application is relates to the use of land and development of a single wind turbine, transmission line and ancillary infrastructure on the land to the west of Whitemark on Flinders Island. Further details of the proposed development are included below.

2.3.1 Wind Turbine

The proposed wind turbine will comprise the construction of a single wind turbine generator (WTG) at Lady Barron Road, Whitemark (Title 123215/1). The location for the turbine is (subject to a variable 50m east-west and 100m north –south micrositing requirement, is 589879E 5557047N (MGA9455), this location is shown in Figure 2-3 below.

At this stage the type of turbine to be used on the Flinders Island site has not been finalised, however a turbine within the size ranges outlined in Table 2-1 is considered to be appropriate for the site.

Table 2-1: Turbine size ranges being considered for Flinders Island Wind Turbine

Tower height (m)	Blade diameter (m)	Total height (m)	Number of blades
30 - 55	33 - 52	46.6 - 81	2-3

It should be noted that the Development Application is based on a maximum size of turbine required to allow for some flexibility as to the final turbine model chosen during tendering.

At this stage, precise 'microsited' turbine location has not been finalised. The turbine location will be finalised once micro-siting studies have been completed once the final turbine choice has been made and prior to construction works commencing, however the turbine will be located within the Hydro Tasmania owner land and restricted to the area around the ridge. It is anticipated that the final turbine location will not differ significantly from the nominal locations shown on Figure 2-3, but Hydro Tasmania requires some scope to move the turbine to account for the outcomes of the micro-siting process.

The power rating of the proposed turbine will be in the range of 500-900kW. Turbines in this range under consideration include the Windflow WF500, a 500kW turbine and the Vestas V52 at 850kW. The 500kW Windflow has a 2 bladed arrangement with a blade diameter of 33m and a hub height of 30m, both dimensions similar to the existing privately owned 300kW turbine on Flinders Island. The Vestas V52 850kW turbine has 70% more output compared to the Windflow and a 3 blade diameter of 52m. This turbine has a number of 'standard' hub heights up to 86m, however for Flinders Island this would be limited to a maximum of 55m. By way of comparison the largest of the wind turbines on King Island near the power station are the V52 850kW turbines.

Photographs of both these turbines are shown in Figure 2-1 and Figure 2-2.

The turbine will be mounted on tubular towers and all are horizontal axis turbine and all are 'upwind' machines. This means they face the oncoming wind and rotate as the wind shifts direction.

Typical turbine designs consist of the following main elements:

- concrete foundations finished flush with the ground.
- tubular steel towers up to 55 metres high.
- a fibreglass housing on top of the tower, called a nacelle, which contains the generator. The hub supporting the blades is attached to the nacelle at one end. The nacelle revolves horizontally to allow the blades to face into the wind.
- rotor blades mounted on a shaft connecting to the generator. The blades are usually made of fibreglass and are aerodynamically designed to maximise the extraction of energy from the wind. The turbines under consideration will have two or three blades, ranging from 16.5 to 26 metres long.
- The tower, nacelle and blades will be painted off-white or grey.

Figure 2-1: The Windflow WF500 500kWturbine, an example of a typical two-bladed wind turbine.

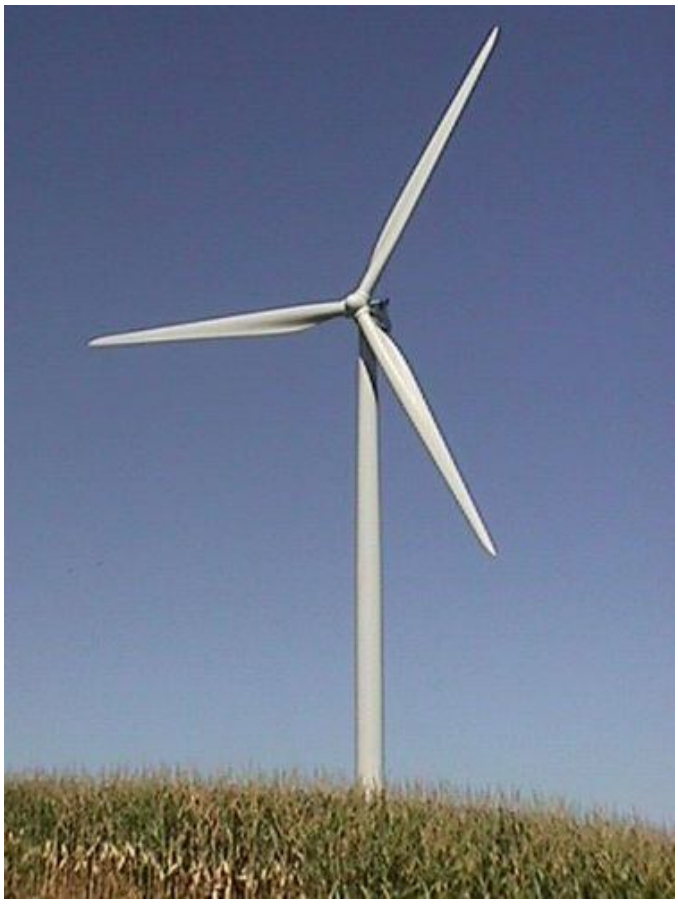


Figure 2-2: The Vestas V52 850kW turbine (as used on King Island), an example of a typical three-bladed wind turbine.

2.3.2 Transmission line and ancillary components

A ground-mounted transformer will be located at the base of the turbine. The transformer unit will be in a sealed metal housing approximately 2m x 2m x 2m. An additional transformer may also be required at the wind turbine/11 kV line interface. This unit will either be ground-mounted near the turbine, or it may be pole-mounted on the 11 kV connection itself. The transformer converts the electrical output from the turbine to a voltage suitable for distribution.

An 11 kV line will be constructed to connect the turbine to the electricity grid easement running along Lady Barron Road, however an additional feeder or upgrade of this line may be required. At this stage, both overhead and underground connections to the electricity grid are being considered.

The remaining section of the line downhill to Lady Barron Road will be mounted on standard distribution poles ten metres high, similar to those used elsewhere on the Island. This will be a single-circuit line, which means that three conductors will be strung on these poles. The wind turbine's distribution line will connect to the existing distribution line running along Lady Barron Road. This existing line is single-circuit. To carry the wind turbine output, an extra circuit will be strung along this line back to the power station at Whitemark.

Other infrastructure associated with the project includes:

- Construction of approximately 1.75 km of access track to provide access to the wind turbine for construction and maintenance.
- Construction of hardstand areas (approximately 30m x 30m) at the base of the turbine for the safe operation of cranes
- The placement of aviation hazard lighting if required by CASA
- Construction of a temporary concrete batch plant if required

Access to the turbine sites would be gained via an existing track running through the Thule property. This track joins with Thule Road to the north of the site. The track is currently about 500m long but will be extended by about 900m down to the turbine sites, and widened and graded if required to allow heavy vehicles to deliver the turbine components. Once the wind turbine is established, the access road will be kept in good repair to allow a crane and other service vehicles to reach the machines for maintenance works.

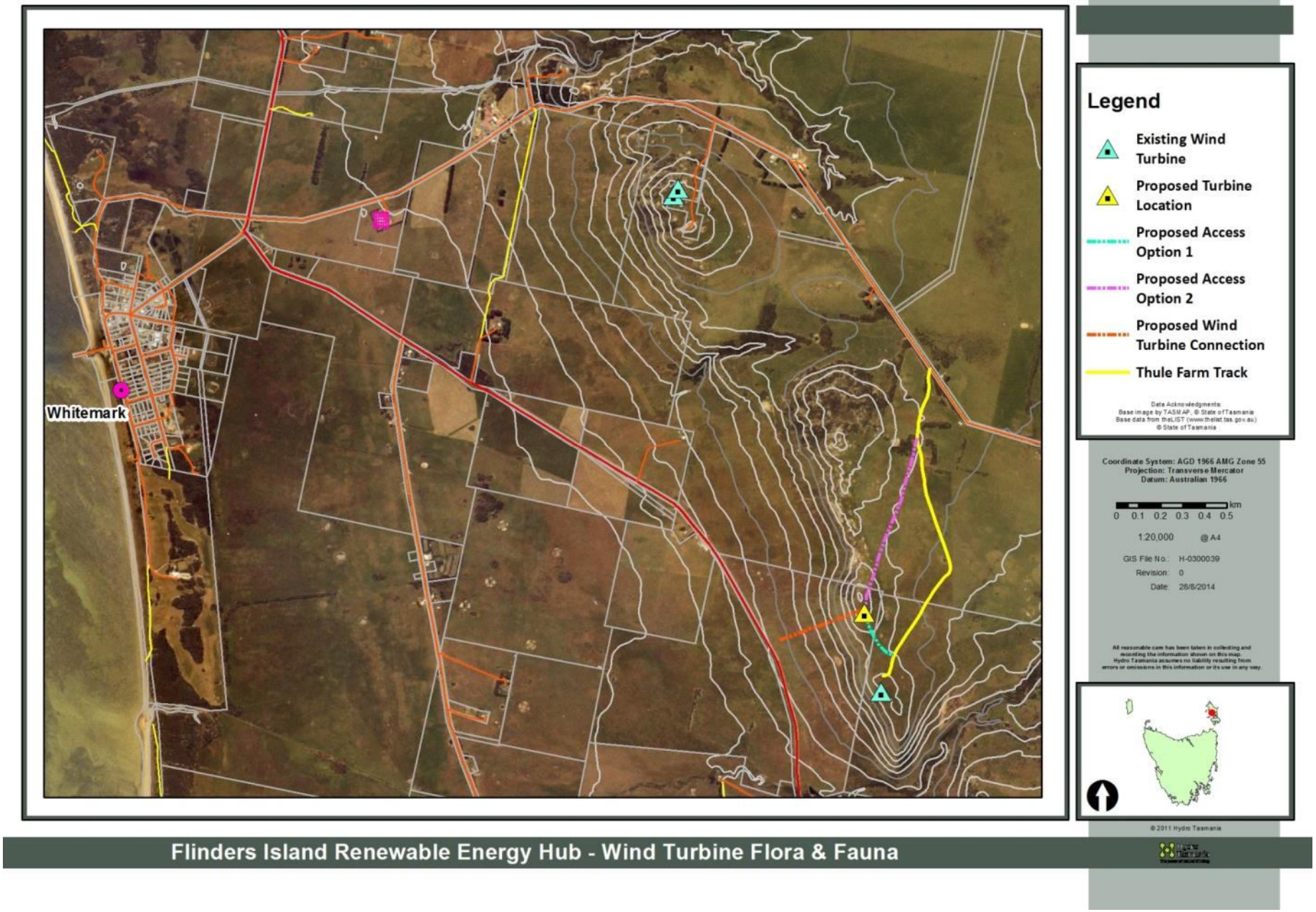


Figure 2-3: Site layout

2.4 Operations and Maintenance

2.4.1 Operations

Once the wind turbine is in service, maintenance patrols will carry out periodic inspections taking note of damage to components. The turbine will be provided with a computer-based control system which will be capable of the following:

- Remote Control
- Condition monitoring;
- Collection and display of operating information;
- Power metering;
- Fault diagnosis; and
- Alarm and protection functions.

This control system will be based at the Whitemark power station. Operators at the power station will be able to monitor operations on a routine basis by checking data displays and accessing condition monitoring data.

2.4.2 Maintenance

Routine scheduled maintenance is usually required every three or four months. Typical maintenance involves the greasing of bearings, checking of hydraulic oil, inspection of the gearbox and generator, and inspection of the braking and yaw control mechanism.

Other minor maintenance would be carried out as required. This includes such activities as the replacement of brake linings, small bearings and other components. A full service will be carried out every 12 months.

Access to the interior of the nacelle is via a set of stairs. Maintenance work will be performed by a team of two people. Routine cleaning of the blades may also be required every 18 months or so to remove a build-up of salt deposits.

Periodic painting of the tower structure, the generator nacelle and the turbine blades may be required. Patch painting is expected to be necessary at regular intervals, and a complete re-paint is likely to be required every ten years.

2.5 Decommissioning

The wind turbine is designed for an operational life of around 20 years. After this time the major mechanical components are approaching their fatigue life and the replacement of major parts is not cost-effective.

Should it be uneconomic to continue operating the wind turbine after 20 years, a decommissioning project will be undertaken. Decommissioning the wind turbine would involve isolating the turbine from the transformer and isolating the 11kV line from its connection point on Lady Barron Road.

The turbine would be lowered to the ground by crane and removed from the site for appropriate disposal or recycling. The steel tower would be cut off at the top of the foundation concrete and the excavation would then be backfilled and the surface re-instated and revegetated. The ground-mounted transformer units would be removed from site, along with their concrete bases.

The overhead conductors on the power line would be lowered onto the ground and cut into manageable lengths and rolled onto reels. These would be removed from the site. The power poles would be cut off at the base and re-used if appropriate or disposed of. It is most likely any

underground cabling would be left in place. However, if it is economically feasible to remove the cable, this work will be done and the area rehabilitated as appropriate.

Access tracks not required for ongoing land use activities would be allowed to revegetate, and light scarifying, fertilising and seeding may be appropriate. Natural regrowth will be encouraged, and planting of local provenance species may be carried out in some areas.

2.6 Transport

All major equipment for the proposed development will need to be shipped to the island and transported by road from Lady Barron. Prior to construction works commencing, Hydro Tasmania will liaise with the Department of Infrastructure Energy and Resources (DIER), the Flinders Council and Tasports to determine the requirements for transport access to the site. The transport of the blades, due to their length, is expected to be the most significant consideration.

3. Planning assessment

3.1 Overview

This Section describes the planning context of the project. The two key pieces of Tasmanian legislation relevant to the development are the *Land Use Planning and Approvals Act 1993* and the *Environmental Management and Pollution Control Act 1994.* At the Commonwealth level, the primary environmental development approval relevant to the project is the *Environment Protection and Biodiversity Conservation Act 1999*.

3.1.1 Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBCA) provides for the protection of matters of national environmental significance and the conservation of Australia's biodiversity. Whilst the States are primarily responsible for environmental impact assessment there are a number of 'matters of national environmental significance' (MNES) that may initiate Commonwealth involvement in a project. These are:

- significant impacts on World Heritage properties;
- significant impacts on National Heritage places;
- significant impacts on Ramsar Wetlands;
- significant impacts on listed threatened species or a listed threatened ecological community;
- significant impacts on listed migratory species;
- nuclear actions; and
- significant impact on the Commonwealth marine environment.

Where an action is likely to result in a 'significant' impact on a MNES the proponent of the action is required to refer the project to the Commonwealth Environment Minister (the Minister). The Minister must make a decision on whether the action is likely to have a significant impact on a MNES and would require further assessment of the potential impacts as a 'controlled action'.

It is considered that the proposed development will not have a significant impact on a MNES and as such does not require referral to the Minister.

3.1.2 Environmental Management and Pollution Control Act 1994

The *Environmental Management and Pollution Control Act 1994* (EMPC Act) is the primary environment protection and pollution control legislation in Tasmania. This is achieved through the imposition of a general environmental duty, the development of policies relating to contaminated land, emissions by noise, air and water, and the regulation of particular land uses and developments as Level 1, 2 or 3 activities. The Tasmanian Environment Protection Authority (EPA) is responsible for implementation and enforcement of the Act and its regulations.

Schedule 2 of EMPC Act prescribes that the generation of energy from through wind with a maximum generating capacity of greater than 30 megawatts is a Level 2 activity that shall be subject to assessment by the EPA.

As the proposed development will comprise a single wind turbine with a maximum generation capacity of 0.9MW, the development is to be considered a Level 1 activity and does **not** require specific referral or assessment by the EPA under this Act.

3.1.3 Land Use Planning and Approvals Act 1993

The *Land Use Planning Approvals Act 1993* (LUPA Act) establishes a framework for the assessment of the use and development of land in Tasmania. The Act allows for the creation and modification Planning Schemes as the primary instrument utilised to regulate the assessment of use and development. The Act also prescribes procedures for the assessment of Level 1 activities (matters dealt with in planning schemes)

The proposed development site is located within the Flinders Island Council municipal area and is falls with the area regulated under Flinders Island Planning Scheme 1994.

3.1.4 Threatened Species Protection Act 1995

The following obligations under the Tasmanian *Threatened Species Protection Act 1995* (TSP Act) are relevant to the Project. In the absence of a permit, no listed species may be killed, injured or collected listed species on land subject to an interim protection order must not be disturbed there must be no disturbance to listed species contrary to a land management agreement Any interim protection order made to conserve the critical habitat of a listed taxon of flora or fauna must be complied with. In the absence of a permit, no activity may be undertaken on land subject to an interim protection order.

As the site is comprised generally of pasture, it does not form and endangered community and is considered to have low risk of threatened species being present on site.

It is unlikely that threatened species will be impacted by the development and a permit will not be required under the *Threatened Species Protection Act 1995*.

3.1.5 Aboriginal Relics Act 1975

The *Aboriginal Relics Act 1975* provides for the protection of Aboriginal relics in Tasmania. Under the Act it is an offence to disturb, damage or destroy any Aboriginal relics without a permit.

An inspection of the Tasmanian Aboriginal Site Index revealed that no sites have been recorded in the development area. A field survey of the area failed to find any sites or artefacts of Aboriginal heritage significance.

Based on the absence of any sites or artefacts of Aboriginal heritage significance during the site survey, it is unlikely that any sites or artefacts of Aboriginal heritage significance would be affected by the proposed development.

3.1.6 Forest Practices Act

The *Forest Practices Act 1985* (FP Act) prescribes the manner in which forest practices are to be conducted which includes the clearance and conversion of native vegetation. The Act and the Code also provide for the protection of the natural and cultural values. A Forest Practices Plan (FPP) is required when clearing trees or clearance and conversion of Threatened Native Vegetation Communities listed on Schedule 3A of the *Nature Conservation Act 2002*.

As the proposed project does not require the clearing of a threatened native vegetation community, an FPP will not be required for the development where a planning permit is granted.

3.1.7 Stakeholder consultation

It is a goal of Hydro Tasmania to engage genuinely with all affected and interested communities and stakeholders about and throughout the life of its projects. “Engagement is respectful. It should be at the starting point of and be an integral component of any program or project development”.

It is critical that engagement processes endeavour to understand the setting, the social fabric of a community, the local key issues and why community and stakeholders might feel the way they do about a project.

Community Engagement Activities

With this in mind Hydro Tasmania prepared an engagement program in order to ensure the following:

- the Flinders Island community and Council had greater context, understanding and clarity about both this specific proposal and the wider Flinders Island Hybrid Energy Hub project,
- to develop greater clarity and engagement with on-island Hydro Tasmania staff to ensure they were informed and engaged
- to ensure where possible community concerns were addressed, minimised and mitigated in relation to the introduction of an additional wind turbine as meeting the wind energy requirements of the wider project.

Hydro Tasmania has conducted a range of community engagement activities since March 2014. They have included media articles, kitchen table meetings with residents and businesses, mail outs of community flyer updates, stalls at the Walkers Supermarket, an evening workshop, presentation and meetings with Flinders Island Council, a visit to King Island Advanced Hybrid Power station for FIC and community, letters, phone calls and emails.

We believe that members of Flinders Island community have been provided with the opportunity to engage with us, become informed and gain understanding about the Flinders Island Hybrid Energy Hub proposal through our engagement program. We have listened to Council and community responding and refining our approach. We have sought out those residents living near the proposed new wind turbine to discuss, inform and consult with them in regards to the Flinders Island Hybrid Energy Hub proposal and its requirements for further wind energy to support the proposal. Details of our engagement activities are provided in the table below.

Table 3-1- Flinders Island Stakeholder & Community Engagements

Engagement activity	Timing	Details and comments
Open Letter and Flyer to the community.	24th March 2014	Distributed via unaddressed mail out to all residents and business on Flinders Island. Distributed to Executive Assistant for distribution to Councillors and staff. Announcing proposal and opportunity to speak to Hydro Tasmania staff on island 26-28 March, via email, 1300 number and also website information.
Stall at Walker Supermarket foyer	26th March 2014 20th August 2014	Available to public at the Walker Supermarket foyer throughout the day (a sign was created and updated if we need to attend a meeting and when we would return) Spoke to 50(+) people (50 signed up to a mailing list) Available to public at the Walker Supermarket- spoke to approx. 30 people. Awareness of proposal much higher.
Stall at CWA Room	27th March	Available to public at the CWA Room 6-7.30pm No one came through in the evening.
Presentation/Workshop at Interstate Hotel	21st August	13 FI community members attended
Media – Articles to Island News	14th March 2014 9th May 23rd May 6th June 4th July 15th August	Introducing proposal, contacts etc Update and announcing competition to KI Update and announcing winners of competition Community reporting back on KI trip Community update Update and announcing HT visit
Community Update – unaddressed mail out.	6th May 12th August	Community Update 1 Community Update 2
'Kitchen Table" meetings with residents (face to face) Meeting with Council Meeting at Lady Barron Store (attended by 5 residents)	26-28th March 20-23rd August	5 1 1 2 (resident meetings requested) 1 (Council update meeting)
Community Competition to win trip to King Island	April /May	Awareness raising about the proposal and opportunity for representative from community to visit king Island and independently report back to FI community.
Trip to King Island May 23rd - Flinders Island Council - Two FI residents	23rd May	Visit to King Island to see Advanced Hybrid Power station for FI Council and community members. Also meet and liaise with King Island Council and community.
HT presentation to FI Council on FI	3rd July	Ray Massie presentation to FIC
Follow up with residents and Council via emails, phone calls	March-current	Multiple correspondence

3.2 Planning provisions

3.2.1 Zone & land use

The proposed development site is zoned Rural under the Flinders Island Planning Scheme. The use of land for a wind turbine and ancillary development including electricity transmission infrastructure is defined as a 'Public Utility (major)', which is a discretionary development within this zone.

3.2.2 Development standards

Section 3.1.2 of the planning scheme requires that an application for use and development must demonstrate compliance with relevant provisions of Parts 5, 6 and 7, and the relevant Schedules of Part 8. Furthermore, Section 3.5.1 of the planning scheme provides that, if a use is listed in the Table of Use as discretionary, it is discretion and to be dealt with under Section 57 of LUPAA.

Table 3-2: Rural zone development standards

Planning scheme provision	Comment
5.8.1 ZONE INTENT	
(a) The Rural Zone on Flinders Island is intended to maintain the existing rural character of the island which is typified by a pattern of areas of open farmland, typically with shelter belts of remnant vegetation, interspersed with irregular areas of native vegetation and substantial unspoiled landform. On other islands within the Planning Area the zone is intended to preserve the existing character which displays minimal signs of European occupation.	The proposed development will complement the existing character of the location by reinforcing the use of the site for renewable energy generation.
(b) Use and development in the Rural Zone is intended to accommodate agricultural uses and development predominantly, with some compatible non-agricultural uses and development in appropriate circumstances, including tourist operation and rural industries. Forest plantations may be appropriate where they do not adversely affect the character of an area or detract from important views.	The proposed development is considered to be a compatible non-agricultural use as it serves an important utility function whilst not constraining adjacent agricultural uses.
5.8.2 DESIRED ZONE CHARACTER AND ZONE GUIDELINES	
(a) The use or development of small existing rural lots for the purpose of residential living shall only be approved where such use or development is compatible with any existing or potential agricultural use of that land or surrounding lands.	The proposed development is not for a residential land use and as such is not applicable to this application.
(b) Use or development should enhance the rural character of the zone. Buildings should be substantial distances from the road frontage and apart, unless inappropriate for operational or topographical reasons. Where land clearance is undertaken it should be visually sympathetic; important trees (or stands of trees) should be retained, important hilltop locations should not be cleared and location of trees and shrubs along fence lines, property boundaries, watercourses and at property entrances is encouraged. Buildings and structures for aquaculture should be sited with regard to the protection of coastal scenery and compatibility with recreational use of the coastline.	The proposed development will enhance the rural character of the surrounding area by maintaining appropriate setbacks to all boundaries, and minimising the clearance of vegetation. Doing so will minimise the visual impact of the development whilst facilitating a compatible non-agricultural use.

Planning scheme provision	Comment
(c) Land use or development and management practices shall be environmentally appropriate and shall avoid contamination or despoliation of the land, ground water, water courses, shorelines, lagoons and marshes. Sand-dunes and coastal vegetation and ecologically important areas shall be protected from degradation.	The proposed development has been designed to avoid impacts on protected natural values by avoiding the development on already disturbed and degraded land. In addition the project shall be undertaken in accordance with Hydro Tasmania's accredited ISO14001 Health, Safety and Environmental Management System.
(d) Forestry activities in the zone shall be in accordance with the Forest Practices Code	The proposed development does not include Forestry activities and is therefore not applicable to this application.
5.8.4 DEVELOPMENT STANDARDS	
(a) The maximum height of buildings is 8.0 metres unless it can be satisfactorily demonstrated that a higher structure is required for operational, topographic or other justified purposes.	The proposed development will comprise a single wind turbine with a maximum height of 81m. While greater than the 8m height standard prescribed under this clause, the development is considered to comply with the alternative measure as the very nature of wind turbine developments typically requires that they be of sufficient size and scale to operate at a commercial scale. In addition, a wind turbine is generally located at or very near to high points in the landscape as they need to take advantage of the best and most reliable wind resources, taking into account distances to electricity transmission infrastructure and the availability of land for development. Transmission infrastructure from the site will comprise an 11kV line mounted on poles up to 10m high. While greater than the 8m height standard prescribed under this clause, the design of the infrastructure is based upon standards for transmission infrastructure and function requirements of the project.
(b) Habitable buildings should be sited and designed to achieve the best solar gain or orientation that the site can provide. Where such design or orientation is not feasible other energy efficient practices, such as insulation, heat pumps or double glazing, should be considered.	The proposed development is not for a residential land use and as such is not applicable to this application.
(c) Buildings shall be setback a minimum distance of 20 metres from all boundaries.	Complies. The proposed wind turbine shall be sited more that 20m from all property boundaries.
(d) Regardless of the foregoing minimum setbacks, buildings shall be set back not less than a horizontal distance of 100m from high water mark and 40 m from a perennial watercourse.	Complies. The proposed development is not located within 100m from a high water mark or 40 m from a perennial water course.
(e) Council may relax the setback requirement of the above clause pursuant to the provisions of Clause 3.5 of this	N/A

Planning scheme provision	Comment
Scheme and after giving consideration to: i. The particular size, shape, contours or slope of the land and the adjoining land; ii. The adjoining land and uses and zones iii. The position of existing buildings and setbacks in the immediate area; iv. Consideration of any representations received as a result of the notification under Section 57 of the Act.	
(f) The external walls, roof, paving and other large surface areas of buildings shall be finished with non-reflective materials and colours that harmonise with the natural landscape or shall be substantially screened by landscaping.	The proposed wind turbine shall be painted with non-reflective colours to harmonise with the natural landscape.
(g) A house on any lot which contains only class 4, 5, 6 or 7 land is discretionary and may only be approved if any existing or potential development and use of agricultural land in the vicinity is likely to receive no impact, or only minor impact from the establishment of the residence taking into account: (a) The topography of the land; (b) The location of water catchments; (c) The location of neighbouring agricultural pursuits; (d) Buffers created by natural features; (e) Resource sustainability given the objective of the State Protection of Agricultural Land Policy.	The proposed development is not for a residential land use and as such is not applicable to this application.
Part 6 Use and Development Principals	
6.1 Use (a) Use or development shall not unreasonably impact on any existing or intended use of development of neighbouring land. (b) Subdivision of land shall be carried out in accordance with the subdivision provisions for the zone within which the land is located or where that is not appropriate in accordance with: (i) the requirements of the intended use, and (ii) the Zone Intent, or alternatively by (iii) an approved Development Plan that has been adopted by Council and inserted as a provision in the Scheme. (c) Residential Zones shall be protected from encroachment by incompatible use or development. (d) Rural Industrial operations shall be appropriately located and designed to avoid any detrimental effects on neighbouring land use or development, particularly in respect of atmospheric emissions, solid waste disposal and water pollution, soil erosion, noise or visual quality. (e) Mining and quarrying operations shall be located and carried out in a form which does not conflict with	The proposed development will not unreasonably impact on the use or development of neighbouring land as proposed development site is located at least 250m from the boundary non-stakeholder land. In addition, the siting of the proposed development on this ridgeline will not adversely impact the potential agricultural land uses of the site as it will use less productive land and have minimal footprint. In doing so the proposed development will have no impact on any future adjacent land uses by way of emissions to air, land or water.

Planning scheme provision	Comment
surrounding land use or development, scenic values and the environment.	
6.2 Character (a) Use and development shall adequately respect the character of, and future intentions for the area in which it is to be located. (b) Subdivision layout, particularly roads, shall take adequate account of land contours and the need to avoid visual scarring. (c) Use or development (including public facilities and services) should adequately respect the surrounding streetscape and neighbouring use or development, particularly in relation to scale, setbacks, form (including roof shape), landscaping, materials, colours and fencing. (d) Landscaping of use or development shall be of a type, form, variety(s) and character which is suited to the intention of the zone, the area and the nature of the use or development. (e) Where trees are an important element in the character of an area they should be retained. (f) Signs shall be consistent in type, scale and location, with the intention of the zone, the streetscape and the building or structure on which they are positioned or to which they otherwise relate. (g) Forestry use or development, particularly plantations, shall be appropriately sited and planned to protect the visual quality and character of the countryside generally, and from important viewing locations in particular.	The proposed development will reinforce the use of the existing site for renewable energy generation by consolidating the current use of the site for wind energy generation. The proposed use and development will respect the surrounding landscape values by consolidating the development site as the location of wind energy generation, in a site that is located a considerable distance from the nearest town (Whitemark), and maintaining significant setbacks to adjacent properties and dwellings. Where possible, vegetation over the site will be retained to maintain the character and street landscape values of the site.
6.3 Amenity (a) Adequate public open space shall be provided in areas of new subdivision, to meet the recreational and open space requirements of the community generally and particularly the new owners of the lots created by subdivision. (b) Use or development shall accord all existing and/or future occupiers with adequate and reasonable levels of amenity, especially in relation to privacy, sunlight, aspect, views and noise disturbance. (c) Dwellings shall provide an adequate amount and appropriate type of private open space, to meet the expected lifestyle requirements of occupants. Such private open space shall provide adequate privacy, be exposed to reasonable levels of sunshine and directly accessible from the dwelling to which it belongs.	The proposed development is located more than 850m from the nearest residential dwelling. As such any impacts on the neighbouring dwellings will be minimal. While the potential exists for operational noise impacts to affect nearby residences, an assessment of potential impacts from the wind turbine likely to be used in the project has identified that any noise impacts would be within acceptable limits. Further details of this assessment are included in section 4.3.4 of this report.
6.4 Environment (a) Use or development shall not be allowed to detrimentally affect the environment. All areas, and sensitive ecological and/or visual areas in particular, shall be developed in a manner and to an extent which is	The proposed development is considered to comply with this part as it will not have a detrimental impact on the environment. This is achieved by ensuring that the development is not located on:

Planning scheme provision	Comment
consistent with the protection of the values of the area. (b) Use or Development and land management practices shall be directed towards achieving environmental sustainability, biodiversity and ecological balance, and avoiding environmental damage such as soil erosion, coastal dune erosion, loss of important animal and plant species and increases in vermin populations. (c) Use or Development shall not be located in areas of unacceptable risk (eg. from fire, flood or landslip). In situations where risk may exist, use and development shall be appropriately sited and designed to provide an acceptable level of protection and safety for future users. In particular. i. Lands subject to flood risk are those subject to a greater than one in a 100 year flood interval (1% probability), and land, the natural surface level of which is below 3 metres Australian Height Datum (AHD); and ii. Land which comprises soils of known or suspected instability, has a slope greater than 1 in 4, or is filled or reclaimed land, are deemed to constitute an unstable land hazard; and iii. Use and development in bushfire prone areas will comply with the provisions of Schedule 7 Development in Bushfire Prone Areas or some other provisions acceptable to Council and the Tasmania Fire Service. (d) Potentially incompatible Uses or Developments shall be adequately and appropriately located, sited and designed to avoid conflict. Level 2 activities or sources of pollution shall be sited in accordance with the following: i. Use or Development for a use of land that is a Level 2 activity under the provisions of the *Environment Management and Pollution Control Act 1994* shall not be allowed within the lesser distance from a residential zone than that recommended by the Director of Environmental Management. ii. Use or Development of land that is not a Level 2 activity, but which Council nonetheless considers will or has the potential for environmental harm, shall not be allowed within a lesser distance from a residential zone than that determined by Council after taking into account the advice from the Director of Environmental Management. iii. A dwelling unit shall not be erected within a lesser distance of any established Level 2 activity or other use of land which Council considers a source of pollution, than that determined by Council taking into account the advice from the Director of Environmental Management. (e) Activities involving extensive site works, such as quarrying, shall be suitably sited, screened, and	• Land that is ecologically sensitive; • soils that are suspected of instability; • land that is considered to be a bushfire prone area; In addition, the project is not a Level 2 activity and will not be impacted by the operation of an existing Level 2 activity. While the proposed development may involve site works and ground disturbance, any potential impacts from erosion and sedimentation are considered low and can be managed through the development and implementation of a construction environmental management plan. The details of risks and potential management and mitigations are detailed in section 4 of this report. Complete details of the environmental impact assessment for this project are included in section 4 of this report.

Planning scheme provision	Comment
rehabilitated where appropriate, to protect the ecological and visual qualities of the area. (f) Use or development shall be of a suitable form and siting to avoid any adverse impact on any watercourse and vice versa. Use or development (including the siting of effluent disposal systems) shall be setback a minimum of 40 metres, or such distance as is required, from a watercourse to avoid degradation of water quality. (g) Use of land in the vicinity of those watercourses identified in Schedule 3 shall provide Riparian Reserves in an appropriate location and form.	
6.5 Heritage (a) Use or Development shall be undertaken in areas and in a manner which conserves items, sites, areas and customs of historic and cultural value. (b) Any Use or Development carried out on or in the vicinity of an item, site, area, feature or customary activity (including Aboriginal sites and shipwrecks) or conservation value, shall adequately respect its historic and cultural integrity. (c) The protection and conservation of items, sites, areas, features and customary activities of historic and cultural importance applies to those previously identified and listed in the Scheme, and those which subsequently become known to Council. (d) Where an item, site, area, feature or customary activity has or may have historic or cultural importance, Council may require a Statement of Cultural Significance to be prepared. (e) Use or development shall be carried out in accordance with the principles and practices of the *Burra Charter*. (f) Use or Development involving any historic building or group of buildings shall adequately respect the design and construction elements of the building(s) and particularly the relationship of spaces, orientation, form, mass, scale, fenestration, detailing, style, materials and colour. (g) Areas of identified conservation value, including National Parks and Nature Reserves, shall be protected from inappropriate use or development and detrimental land management practices including land clearance, within such areas and adjacent areas outside them.	The proposed development is considered to comply with this part as it will not impact on any area, items, site or cultural values identified in the Planning Scheme. In addition, an inspection of the Tasmanian Aboriginal Site Index revealed that no sites have been recorded in the development area. A field survey of the area failed to find any sites or artefacts of Aboriginal heritage significance. Based on the absence of any sites or artefacts of Aboriginal heritage significance during the site survey, it is unlikely that any sites or artefacts of Aboriginal heritage significant would be affected by the proposed development. In addition, impacts regarding unanticipated discoveries will be managed in accordance with the prescriptions in section 4 of this report.
6.6 Access and Parking (a) All new lots must be provided with satisfactory pedestrian and vehicular access to a public street. (b) All Use or Development shall provide satisfactory pedestrian and vehicular access which is suited to the volume and needs of future users. (c) Buildings and spaces intended for public access shall	The proposed development is considered to comply with the provisions of this part as it does not require the alteration to the existing access arrangements. Rather the proposal will require extension to an existing farm track, use of the existing access of Thule Road.

Planning scheme provision	Comment
provide for satisfactory use and access by the disabled; the requirements of the Building Regulations in relation to AS1428.1-1988 shall be met. (d) Road widths shall be appropriate to the road function, expected traffic type and volume, and future subdivision potential of the subject and surrounding land. (e) Footpaths shall normally be required in areas of new subdivision except where low vehicle traffic volumes are anticipated, in which case a footpath one side only or no footpath may be appropriate. (f) Road intersections shall be kept to a minimum with the use of existing roads, service roads and/or shared driveways being encouraged where appropriate. (g) Intersections of roads, footpaths and foot crossings and driveways shall provide adequate safety for all users and shall satisfy the relevant requirements of Schedule 4. (h) New Use or Development shall provide a suitably constructed driveway of a width to provide for the safe ingress and egress of the anticipated volume of traffic associated with the Use or Development. (i) New Use or Development shall provide adequate car parking to provide for the demand it generates and shall be capable of being safely accessed. (j) On site turning shall be provided for development involving significant traffic volumes, heavy vehicle types and/or on roads which carry significant amounts of traffic. (k) New Use or Development in Bushfire Prone Areas will require access that complies with the provisions of Schedule 7, Development in Bushfire Prone Areas.	
6.7 Services (a) Use or Development shall be provided with adequate and appropriate services which are suited to the lifestyle requirements of people, the nature of the location, and the ability of the community to provide. (b) Lot size and arrangement shall be adequate and appropriate to ensure an acceptable level of servicing, particularly in relation to waste disposal. (c) In areas not serviced with water use or development shall provide adequate water supply and effluent disposal systems. Each dwelling shall provide a potable water storage facility (minimum capacity of 40kl) to provide for the anticipated number of occupants, and a wastewater disposal system approved by the Council's Environmental Health Officer (d) Use or Development in the bushfire prone areas will provide fire protection features and water supplies which comply with Schedule 7. (e) Use or Development shall be appropriately sited, designed and constructed to avoid conflict with service mains (including telephone, power, sewer, water and	The proposed development is considered to comply with the provisions of this part as use and development will not increase demand on any public services. In addition the very nature of the use and development is to optimise the use of energy resources by consolidating the generation of wind energy on Flinders Island.

Planning scheme provision	Comment
irrigation channels/pipelines). Buildings shall not be erected over any service main or within any easement providing for same whether utilised or not. (f) Servicing systems shall use adequate and appropriate design methods and materials to ensure an acceptable life span and allow for adequate maintenance requirements. (g) Use or Development shall optimise efficiency in the use of energy and resources. In particular, land should be subdivided on a generally sequential basis (ie. one area is substantially should be used for different services where appropriate, and solar access maximised.	
6.8 Social Interest 1. Use or Development should demonstrate how it suits the community interest. 2. Use or Development shall have adequate and appropriate types and levels of access to social facilities and services (eg. shops, government agencies, telecommunication, health services and educational facilities).	The proposed development is considered to comply with the provision of this part as the project is intended to improve the efficiency of the electricity supply to the Flinders Island community.
Part 7 Special Area Provisions	The proposed development does occur within an area subject to the provisions of this part.
Schedule 2 Buildings and Works or Historic Interest	N/A
Schedule 3 Riverside, Wetlands and Shoreline Areas	N/A
Schedule 4 Roads	N/A
Schedule 5 Signs	N/A
Schedule 6 Telecommunications Infrastructure Schedule	N/A
Schedule 7 Development in Bushfire Prone Areas	N/A
Schedule 8 North East River Development Plan	N/A

3.2.3 Objective of the RMPS

Schedule 1 of LUPAA includes a number of objectives to be achieved through Tasmania's Resource Management and Planning Approval system and furthered by planning schemes and planning scheme amendments. These are provided in Table 3-3 with a comment in relation to the proposed development.

Table 3-3 Objectives of Schedule 1 of LUPAA

Objective	Comment
Part 1	
(a) to promote the sustainable development of natural and physical resources and the maintenance of ecological processes and genetic diversity	The development will facilitate a reduction in the use of fossil fuels as the primary source of electricity generation on Flinders Island without any significant impact on ecological processes and genetic diversity.

(b)	to provide for the fair, orderly and sustainable use and development of air, land and water	A reduction in fossil fuel electricity generation will improve sustainability outcomes for the whole community.
(c)	to encourage public involvement in resource management and planning	The public can be involved in the development process, through making representations.
(d)	to facilitate economic development in accordance with the objectives set out in paragraphs (a), (b) and (c)	The proposal will facilitate economic development for the area by increasing sustainability outcomes and reducing longer term reliance on the importation of diesel.
(e)	to promote the sharing of responsibility for resource management and planning between the different spheres of Government, the community and industry in the State	The development will require local government approval.
Part 2		
(a)	to require sound strategic planning and co-ordinated action by State and local government	The proposed development accords with local and state policies.
(b)	to establish a system of planning instruments to be the principal way of setting objectives, policies and controls for the use, development and protection of land	This objective is not directly applicable.
(c)	to ensure that the effects on the environment are considered and provide for explicit consideration of social and economic effects when decisions are made about the use and development of land	The design of the development primarily seeks to avoid adverse impacts upon any significant values of the site.
(d)	to require land use and development planning and policy to be easily integrated with environmental, social, economic, conservation and resource management policies at State, regional and municipal levels	The proposed development furthers this objective and takes into account state, regional and local planning policies and strategies.
(e)	to provide for the consolidation of approvals for land use or development and related matters, and to co-ordinate planning approvals with related approvals	This objective can only be met through legislative change. This development will gain all necessary permits and approvals for its use and development.
(f)	to secure a pleasant, efficient and safe working, living and recreational environment for all Tasmanians and visitors to Tasmania	The proposed development will meet this objective through avoidance of significant impacts.
(g)	to conserve those buildings, areas or other places which are of scientific, aesthetic, architectural or historical interest, or otherwise of special cultural value	The proposed development will not adversely impact any significant buildings or places of scientific, aesthetic, architectural or historical interest, or otherwise of special cultural value.
(h)	to protect public infrastructure and other assets and enable the orderly provision and co-ordination of public utilities and other facilities for the benefit of the community	Existing infrastructure will be protected through appropriate construction management.
(i)	to provide a planning framework which fully considers land capability.	This objective is not directly applicable.

3.2.4 State Policies

Tasmania has a number of State Policies which guide the decision making of development applications.

The Tasmanian Coastal Policy

It is considered that the State Coastal Policy 1996 is not applicable to this application as the proposed development site is more than 1 km from the coast (as defined).

The State Policy on the Protection of Agricultural Land

The development does not impact on any designated Prime Agricultural Land and the proposed site does not have any agricultural potential.

The State Policy on Water Quality Management

The development will not conflict with the objectives of the State Policy on Water Quality Management 1997 (SPWQM).

3.2.5 National Environment Protection Measures (NEPMs)

National Environment Protection Measures (NEPMs) are treated in a similar manner to State Policies. Table 3-4 below lists the NEPMs and provides a response in relation to the proposal development.

Table 3-4: National Environment Protection Measures

National Environment Protection Measure	Relevance to Proposal
Used packaging materials	The proposal cannot influence this NEPM.
Ambient air quality	Substantive Greenhouse gas emissions are not expected from the development, and it will result in an overall reduction in greenhouse gas emissions from the existing power station.
Movement of controlled waste	The proposal does not involve controlled waste.
National pollutant inventory	Not relevant.
Assessment of site contamination	While no site investigation of contamination has occurred, the history of usage and occupation of the development area, as well as a surface inspection suggests that contamination of the development area is unlikely.
Diesel vehicle emissions	The minor level of construction will not significantly increase CO_2 emissions during construction.
Air toxics	The proposal will not produce air toxics

4. Environmental impact assessment and management

4.1 Overview

This Section describes the environmental management aspects of the project. For each component of the environment a description is given of:

- the existing environment;
- the potential effects of the project on the environment; and
- the strategies and safeguards proposed for managing these potential effects within acceptable limits.

The structure of this Section corresponds with the aspects of the environment as follows:

- the biophysical environment – that is, topography, geology, soils and water quality, flora and fauna; and
- the human environment – that is, land use and land tenure, Aboriginal heritage, visual amenity, noise and social impacts.

Information was drawn from a range of sources including specialist studies and reports carried out for the project.

The management prescriptions identified in this part shall be included in a Construction Environmental Management Plan that is to be prepared prior to the commencement of construction and approved by Hydro Tasmania.

4.2 Biophysical environment

4.2.1 Topography, geology, soils and water quality

The Existing Environment

The turbine will be situated at the southern end of the Hayes Hill ridge (Figure 2-3). This ridgeline runs roughly north-south and is bounded by Lady Barron Road to the west and Nalinga Creek to the south. The turbine site is approximately 124 metres AHD. The land to the west of the turbine site slopes steeply, while the land to the north and north-east of the turbine is undulating.

The superficial geology of the Hayes Hill ridge is Quaternary deposits comprising talus, coastal sand, gravel and limestone. A preliminary geotechnical investigation was carried out at the turbine sites by Hydro Tasmania in March 2002 for the purpose of verifying the local ground conditions. Four test pits were excavated and logged. Weathered limestone bedrock was noted, and soils at the turbine sites comprise a mixture of weathered clayey silts and dense silty sands. Road access to the site passes through an area of loose, sandy soils.

The closest waterway to the site is Nalinga Creek, located approximately 350 metres from the site. Construction and operation of the turbine is not expected to impact on this waterway. Small drainage lines are present across the site.

Groundwater was not encountered in any of the test pits, as would be expected at such an elevated site.

Potential Effects

There is minor potential for increased soil erosion arising from any activity that involves the removal of vegetation cover or the disturbance of soil. In addition to the loss of soil, this can result in

increased sediment pollution of waterways and generation of dust. Other related effects include soil structural damage, soil compaction and erosion from stockpiled material.

There is some potential for minor dusting and erosion to occur along the access to the site.

Management of Environmental Issues

The following measures will be adopted at the site.

- If required a stormwater management plan will be prepared as part of the Construction Environmental Management Plan for the project.
- Soil and vegetation disturbance will be kept to the minimum area necessary for the practical and economical completion of the project.
- Movement of vehicles and equipment will be restricted to designated areas.
- Drainage works will be installed to divert upslope runoff around disturbed areas and stockpile sites via stable pathways. Runoff from disturbed areas will be directed through sediment control devices such as sediment fences and will be discharged to stable, well-vegetated areas.
- Cleared vegetation and excavated topsoil will be stockpiled and used in rehabilitation works.
- Rehabilitation of disturbed areas will be carried out as soon as practicable.
- The access will be spread with gravel to minimise dust.

Regular monitoring for erosion will be carried out during construction and operation, and rehabilitation will be carried out as necessary. Rehabilitated areas will be monitored and re-treated if necessary.

4.2.2 Flora and fauna

The Existing Environment

A natural values assessment was carried at the power station site by Entura in November 2013. The assessment has included both a desktop assessment and field investigation involving a flora survey of the development site by a suitably qualified ecologist.

The Hayes Hill south turbine proposed development area is also located in pastureland with a similar mix of pasture grasses and weed species with a diversity of native grasses, rushes and herbs including *Poa labillardierei* (silver tussock) and *Austrodanthonia* sp. (wallaby grass), *Microlaena stipoides* var. *stipoides* (weeping grass), *Poa sieberiana* var. *sieberiana* (grey tussockgrass), *Ficinia nodosa* (knobby clubrush), *Pteridium esculentum* (bracken), *Acaena echinata* (spiny sheepsburr), *Acaena novae-zelandiae* (common buzzy), *Dichondra repens* (kidney weed), *Cotula australis* (southern buttons), *Drosera macrantha* (climbing sundew), *Sebaea ovata* (yellow sebaea), *Argyrotegium collinum* (common cottonleaf), *Geranium solanderi* (southern cranesbill), *Oxalis perennans* (grassland woodsorrel) and *Viola hederacea* (ivyleaf violet).

There was a large patch of the TASVEG vegetation community dry scrub (SDU) on the western slope of the Hayes Hill south a small area of which occurred within the proposed development area. The dry scrub community was dominated by *Kunzea ambigua* (white kunzea) along with *Melaleuca ericifolia* (giant honeymyrtle) and *Leptecophylla juniperina* subsp. *oxycedrus* (coastal pinkberry). The climbing herb *Clematis microphylla* (small-leaf clematis) was also present. There was also a smaller patch of *Bursaria-Acacia* woodland and scrub (NBA) on the edge of the south eastern end of the southern study area. This was a small patch of Bursaria spinosa (sweet bursaria) and *Dodonaea viscosa* subsp. *spatulata* (broadleaf hopbush) scrub. The understory was comprised of introduced pasture grasses and weed species.

The transmission line and access track routes were all through improved pasture. Where the transmission lines traversed the western slopes of the southern development area ridge there was a

greater cover of bracken (*Pteridium esculentum*) and knobby clubrush (*Ficinia nodosa*) along with pasture grasses and weed species.

Fourteen species of flora listed as threatened on the TSP Act have been recorded from within 5 km of the study area (Table 4-1). No flora species listed as threatened on the EPBC Act have been recorded from within 5 km of the study area (Table 4-1). There was habitat for only one listed threatened flora species identified as potentially occurring within the proposed development area, *Spyridium parvifolium* var. *molle* (soft dustymiller). This conspicuous species was not observed during the field survey. However, one threatened flora species not previously recorded within 5 km of the study area was located during the field survey, the small perennial sprawling herb *Asperula minima* (mossy woodruff) which is listed as rare on the TSP Act and is not listed on the EPBC Act. *Asperula minima* occurs in Victoria and Tasmania where it is a lowland species from north eastern Tasmania and the Furneaux Islands. It grows in coastal communities, eucalypt forest and cleared forest pasture. One patch of *Asperula minima* was recorded (Figure 4-1) which covered an area of approximately 1.5 m by 1.5 m. The plants in the patch were flowering at the time of survey on the 22nd of November 2013. No other threatened flora species were recorded within the development areas or along the transmission line and access track routes.

Table 4-1: Listed threatened flora species recorded from within 5 km of the study area.

Species	**Common name**	**Status**		**Potential for occurrence**
		TSP Act	**EPBC Act**	
Corybas fordhamii	Banded helmet orchid	Endangered	Not listed	Small helmet orchid which is only known from one site on Flinders Island where it grows in association with Melaleuca squarrosa in a seasonal streambed. Flowers late August to early October. No suitable habitat in study area, not recorded.
Cryptostylis leptochila	Small tongue-orchid	Endangered	Not listed	Found in open eucalypt forest with a paperbark and tea-tree shrubby understorey and in heathland southwest of Logan Lagoon on Flinders Island. Flowers November to March. No suitable habitat in study area, not recorded.
Cyrtostylis robusta	Large gnat-orchid	Rare	Not listed	Recorded from coastal scrub and she-oak forest. Marginal habitat present. Flowers June to August. No suitable habitat in study area, not recorded.
Elaeocarpus reticulatus	Blueberry ash	Rare	Not listed	Habitat is moist, sheltered sites in lowland forests. No suitable habitat in study area, not recorded.
Hakea ulicina	Furze needlebush	Vulnerable	Not listed	Large conspicuous shrub to 1.5 m with narrow sharp pointed leaves which occurs in heaths and scrubs. Limited suitable habitat in study area, not recorded.
Hypolepis muelleri	Harsh groundfern	Rare	Not listed	Ground fern to 1.5 m which grows along watercourses. . No suitable habitat in study area, not recorded.
Isopogon ceratophyllus	Horny conebush	Vulnerable	Not listed	Small spiky shrub to 60 cm that grows on acidic, sandy soils in dry heathlands. No suitable habitat in study area, not recorded.

Lachnagrostis billardierei subsp. tenuiseta	Small-awn blowngrass	Rare	Not listed	Blown grass that occurs in coastal scrub on sand dunes. No suitable habitat in study area, not recorded.
Leucopogon esquamatus	Swamp beardheath	Rare	Not listed	Small erect shrub to 60 cm that grows in sandy heaths No suitable habitat in study area, not recorded.
Leucopogon lanceolatus var. lanceolatus	Lance beard heath	Rare	Not listed	Tall shrub to 2 m with narrow lance shaped leaves that occurs in wet gullies and riverbanks, eucalypt forest and on stabilised dunes. No suitable habitat in study area, not recorded.
Potamogeton pectinatus	Fennel pondweed	Rare	Not listed	Aquatic herb that grows submerged in fresh to brackish/saline waters in rivers, estuaries and inland lakes. No suitable habitat in study area, not recorded.
Spyridium parvifolium var. molle	Soft dustymiller	Rare	Not listed	Erect much branched shrub to 50 cm that grows in riparian areas, on rocky slopes, open woodland and heath. Limited habitat present. Conspicuous species, not recorded.
Spyridium parvifolium var. parvifolium	Coast dustymiller	Rare	Not listed	Small erect shrub to 50 cm that grows in low, open woodland, scrubs and heath. No suitable habitat in study area, not recorded.
Xerochrysum bicolor	White alpine everlasting	Rare	Not listed	An annual or perennial herb known from heathland near the coast in the north-east, and in alpine areas. Flowers October to March. No suitable habitat in study area, not recorded.
Zygophyllum billardierei	Coast twinleaf	Rare	Not listed	Perennial herb that grows on calcareous sands, in forests, wetlands and heaths. No suitable habitat in study area, not recorded.

Shading indicates that there is potentially suitable habitat present.

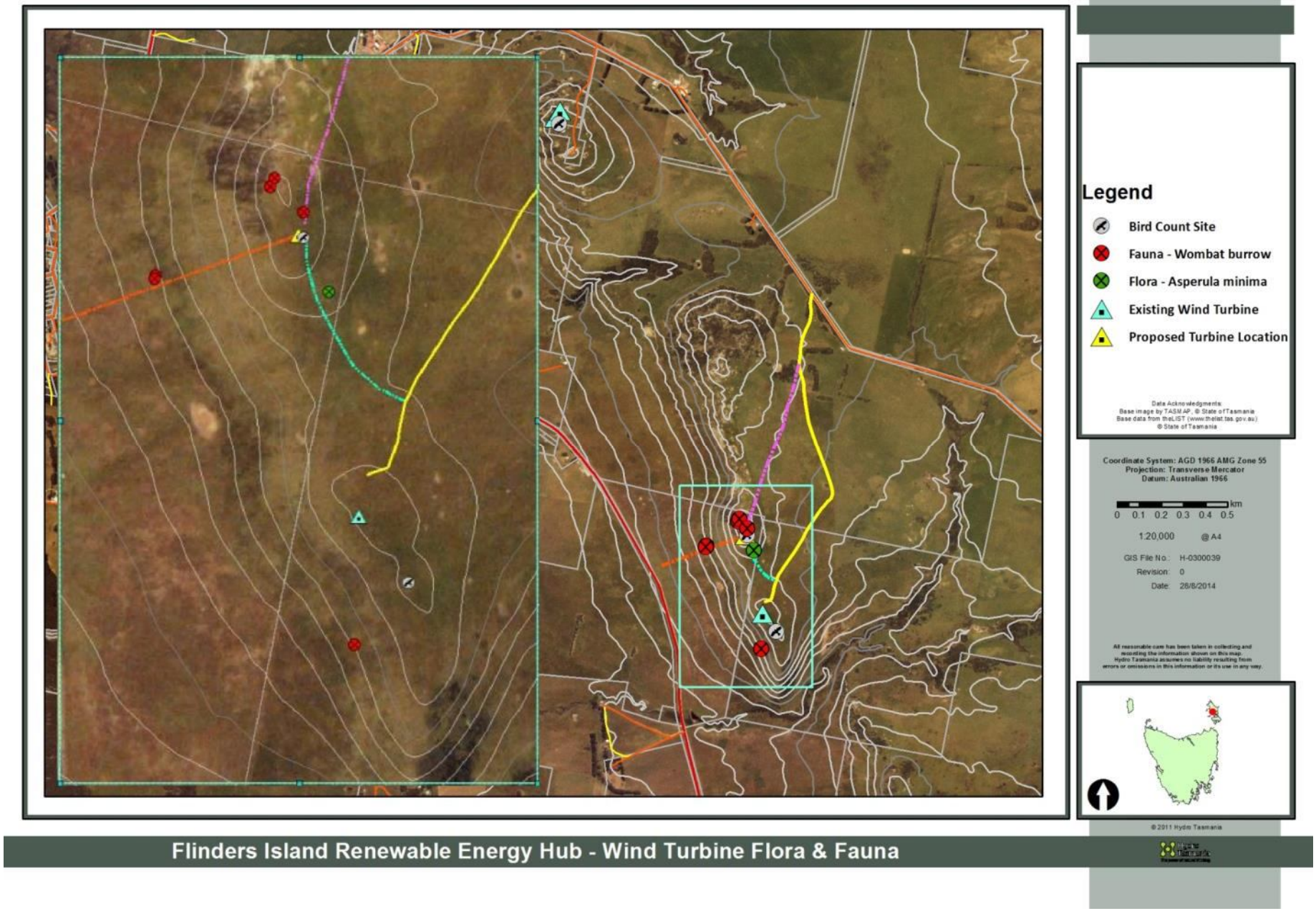


Figure 4-1: Vegetation map of the study area

4.2.3 Fauna

4.2.3.1 *Terrestrial fauna*

The proposed development areas provide little habitat for native fauna because it has been mostly cleared of native vegetation and converted to improved pasture for sheep and cattle grazing. The small area of *Kunzea ambigua* dominated dry scrub in the south ( ) is likely to provide shelter and foraging habitat for to nectar feeding invertebrates and birds (e.g. Crescent honeyeater and New Holland honeyeater) and also, within the improved pasture, there are areas of outcropping granite that are likely provide habitat for reptiles (e.g. metallic skink *Niveoscincus metallicus*, three lined skink *Bassiana duperryi*) and invertebrates.

Desktop studies identified five threatened fauna species which either have been recorded within 5 km of the site or were identified as potentially occurring on site if suitable habitat was present (Table 5 1). Only one threatened species was identified as potentially occurring on site, the Bass Strait wombat (*Vombatus ursinus ursinus*) which is listed as vulnerable on the EPBC Act. Signs of its presence were also recorded during the site survey including burrows (both active and disused) and scats. The Bass Strait wombat and is only known from Flinders Island where it occurs across the island. The locations of the wombat burrows found during the survey are shown in Figure 4-1. Other native mammal species observed on site were the red-necked wallaby (*Macropus rufogriseus*) and the echidna (*Tachyglossus aculeatus*).

Table 4-2: Listed threatened fauna species recorded within in 5 km of the study area.

Species	Common name	Status		Potential for occurrence
		TSP Act	EPBC Act	
Mammals				
Vombatus ursinus ursinus	Bass Strait wombat	Not listed	Vulnerable	Occurs over a wide range of habitats on Flinders Island including heathland, grassy woodland and introduced pastures. Burrows were located during the survey.
Pseudomys novaehollandiae	New Holland mouse	Endangered	Not listed	Restricted to dry coastal and near coastal heathland, and open, heathy forest on sandy soils. Recorded approximately 3 km north of site (Natural Values Atlas data). No suitable habitat in study area.
Amphibians				
Litoria raniformis	Green and gold frog	Vulnerable	Vulnerable	Occurs in or near permanent water such as streams, swamps, vegetated pools and farm dams. No wetlands or dams in study area. No suitable habitat.
Fish				
Galaxiella pusilla	Dwarf galaxias	Rare	Vulnerable	Occurs in still or slow-flowing waters such as ponds, swamps, drains and backwaters of streams. No ponds, swamps, streams or drains in study area. No suitable habitat.
Invertebrates				
Crustacea				

Engaeus martigener	Furneaux burrowing crayfish	Vulnerable	Endangered	Habitat includes boggy areas and small clear water creeks in high altitude wet ferny gullies, and poorly drained mossy tea-tree bog and a small grassy spring/soak in open dry eucalypt forest at lower altitudes (Doran 2000). No records on or adjacent to the site. No suitable habitat.

Shading indicates that there is potentially suitable habitat on site for these species.

4.2.3.2 *Avian fauna*

The site was originally surveyed to assess bird activity for a total of 18 days in November the March – September period in 2003. Given that the data was now over ten years old a bird utilisation survey was carried out over three days in November 2013 to assess whether there had been any detectable bird utilisation changes in that time even though the habitat conditions at the site have not substantially changed. The bird utilisation survey carried out in 2013 included 360 minutes of survey time over three observation sites, each visited 6 times for periods of 20 minutes.

The 2003 surveys detected twenty-three bird species, four of which were introduced species (Appendix D). The 2013 surveys detected eight species during the utilisation surveys over the three days in November 2013 (Table 4-3). Two species were introduced, the common starling and the Eurasian skylark. The weather conditions over the three days ranged from mild warm weather (16° C) with little wind to cool (12° C) with moderate winds and rain. Ninety-five per cent of bird movements were made by four bird species the introduced common starling and Eurasian skylark and the native forest raven and Pacific gull with each species making up around equal numbers of movements. These species also recorded the greatest number of movements per fine minutes of survey time (Table 4-3), with the common starling recording the highest number of movements per five minutes (0.75) and the pacific gull the least (0.57). However, almost half of the common starling movements were attributable to the recording of one flock of 25 birds recorded at the Hayes Hill north observation point. The Eurasian starling was recorded as making the most single bird movements particularly at the two Haynes Hill South observation points.

Overall the results of the bird species that were recorded are similar to those recorded in the 2003 surveys as evidenced by the risks presented in the Biosis Research report 'Comparison of potential collision risk for birds of different wind turbines for Flinders Island, Tasmania' prepared for Hydro Tasmania Consulting in April 2007 (Appendix D). The Biosis Research report found that the bird species at greatest risk of collision with wind turbines were the Eurasian skylark and the Pacific gull. The forest raven had a lower risk of collision. Of interest the introduced common starling was not recorded in the 2003 surveys and in this survey was relatively common particularly in the Hayes Hill north observation site. The recent bird utilisation survey did not reveal any significant changes in bird utilisation particularly of native species and the conclusion of the Biosis Research 2007 collision risk assessment are still relevant.

Table 4-3: Summary of bird utilisation survey data

Common name	Number of movements	% of movements	Number of movements per 5 min of survey time
Australian hobby	2	1	0.03
Brown falcon	1	1	0.01
Common starling	48	26	0.75
Eurasian skylark	47	25	0.69
Forest raven	45	24	0.72
New Holland honeyeater	1	1	0.01
Pacific gull	40	22	0.57
Superb fairy-wren	1	1	0.03
Grand Total	185	100	

No bird species listed as threatened on the TSP Act or the EPBC Act were observed during the November 2013 surveys however the previous studies have recorded listed bird species (see Table 4-4). The EPBC Act also includes species listed as 'migratory' and as 'marine' which includes species listed under international treaties and conventions for conservation to protect migratory species. Marine species includes birds that occur in Commonwealth marine areas which may be affected by actions that may have a significant impact on the environments of such areas. The proposed wind turbine is not in a Commonwealth marine area and is not likely to have a significant impact on the environments of any Commonwealth marine area. The nearest Commonwealth marine area is the Australian Territorial Waters over 9 km to the west of the site.

Table 4-4: Conservation status of birds recorded during the bird surveys.

Common name	**Scientific name**	**Status**			
		TSP Act	**EPBC Act**		
			Threatened	Migratory	Marine
Cape Barren Goose	*Cereopsis novaehollandiae*				✓
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	Vulnerable		✓	✓
Tasmanian Wedge-tailed Eagle	*Aquila audax fleayi*	Endangered	Endangered		
Pacific Gull	*Larus pacificus*				✓
Kelp Gull	*Larus dominicanus*				✓

No waterbirds or waders were observed during the survey, and there is no suitable habitat on or near the site. The nearest large wetlands occur on the east coast of Flinders Island at least 10-15 kilometres away. Due to the absence of suitable habitat on or near the site, combined with the

site's location on a high point in the landscape, there is little likelihood of these birds travelling across the site. In addition, the location of the turbine on the high points of a long ridgeline further reduces any chance of these birds utilising the site because they are more likely to follow lower-lying routes.

Modelling of the risk of bird collisions with the proposed turbine for all species recorded on site has been undertaken by Biosis Research. The Biosis report is included as Appendix D. The model provides a measure of the potential risk at different rates at which birds may avoid collisions. A 90% avoidance rate means that in one of every ten flights a bird would not avoid an obstacle in its path. The model provides outputs for 90%, 98% and 99% avoidance rates.

Note that the Biosis report evaluates different turbines types for the risk they pose to birds. These turbines are representative of the range of turbine sizes that were being considered for use on Flinders Island in 2007.

Risk to the Tasmanian Wedge-tailed Eagle

As detailed in the Biosis report (Appendix D), the bird utilisation data for Wedge-tailed Eagles (*Aquila audax fleayi*) at the site is sufficient to model for a prediction of an annual average number of fatalities associated with the wind turbine when combined with an estimate of numbers of the species that might interact with turbines.

Tasmania's Natural Values has records of nine wedge-tailed Eagle nest sites on Flinders Island (Table 4-5). One of the nest sites is within a radius of 10 km of the wind turbine site.

Table 4-5: Records of Tasmanian Wedge-tailed Eagle nest sites on Flinders Island.

Nest record (GTSpot Reference)	Location	MGA Easting	MGA Northing	Distance to wind turbine (km)
rnd 53	The Dutchman	599533	5557810	10
rnd 54	Mount Belstead	592997	5546620	11
rnd 55	Mount Razorback	592814	5544578	12
rnd 33	Mount Blyth	578576	5592012	37
rnd 42	Mount Bramich	603153	5574200	22
rnd 46	Brougham Sugarloaf	585147	5567549	12
rnd 589	Chew Tobacco Creek	594697	5556336	7

The Biosis Research modelling exercise assumed that all of the known Wedge-tailed Eagle territories on the island were occupied in a given year and that there were three within ten kilometres of the wind turbine site that were active. Note that the NVA has identified two of the nests that were within 10 km of the nest site as absent which means that those nests are no longer present. On the assumption that the home-ranges of all three of the pairs represented by nest sites within ten kilometres of the wind turbine might overlap, and with the additions of their offspring and a few non-breeding sub-adults, Biosis Research assumed that up to twelve individuals could move within the wind turbine site in a given year. The Biosis Research collision risk modelling for an annual population of twelve Wedge-tailed Eagles indicated that at a 90% avoidance rate 0.066 eagles would be at risk of collision per year which is quite low compared to wind farms with large turbines. The collision risk results for Flinders Island are likely to reflect the small number of Wedge-tailed Eagle flights observed during point counts, in combination with the small size and low number of turbines proposed for the site.

White-bellied Sea-eagle

There are no known white-bellied sea-eagle nests within 10 km of the proposed wind turbine site. As detailed in the Biosis report (Appendix D), predictions of the annual number of movements at risk of collision (0.002) for the White-bellied Sea-eagle (*Haliaeetus leucogaster*) are based on a single flight by an eagle observed during point counts. Since the site proposed for the turbine is approximately 3.5 km from the coast, the low level of white-bellied sea-eagle activity recorded during point counts is consistent with the habitat preferences of the species. This species is at low risk of collision with the turbine proposed for Flinders Island.

Potential effects

The proposed wind turbine will not significantly impact on native vegetation or threatened flora species as the development area is located in improved pasture and the location of the threatened flora species *Asperula minima* will be avoided as will be all Bass Strait wombat burrows. Therefore the proposed wind development will not have a significant impact on these species. The bird utilisation studies indicate that the overall risk of collision to significant native bird species is low and the bird species most at risk is the introduced species, the Eurasian skylark.

Management of Environmental Issues

Mitigation measures will be incorporated into the wind turbine design to reduce disturbance to flora and fauna species including:

- **Weed management**. The *Statutory Weed Management Plans* for African Boxthorn, slender thistle (*Carduus pycnocephalus*) and winged slender thistle (*Carduus tenuiflorus*), (*Weed Management Act 1999*) classifies the Flinders Island local government area as a Zone B municipality for all three weed species. The plan identifies that the management measure for African Boxthorn, slender thistle and winged slender thistle in Zone B municipalities is '*containment within municipal boundaries, protection of specified areas within municipal boundaries, and the prevention of spread to Zone A municipalities*'. Therefore a procedure to minimise the potential to spread African Boxthorn, slender thistle and winged slender thistle and other weeds and diseases including *Phytophthora cinnamomi* at the site, the following procedures will be implemented:
    - All machinery will be completely clean and free of soil material prior to entry to the site.
    - As far as practicable, construction will be confined to periods of dry weather.
    - Any gravel used for road construction will be sourced from quarries known to be free of Phytophthora.
- **Threatened species management**. The *Asperula minima* (mossy woodruff) population and all Bass Strait wombat burrows will be avoided. Surveys of the final infrastructure layout will be undertaken for *Asperula minima* and Bass Strait Wombat so that they can be marked and avoided if possible.
- **Habitat disturbance.** Ground disturbance will be kept to a minimum and erosion and sediment controls will be implemented as described in Section 4.2.1.

4.3 Biophysical environment

4.3.1 Aboriginal heritage

The Existing Environment

An Aboriginal heritage survey was carried out by Greg Jackman, Senior Archaeologist and Stephen Stanton, Aboriginal Heritage Officer in November 2013. The purpose of the survey was to record any Aboriginal sites or artefacts in the development area and make recommendations on their management.

An inspection of the Tasmanian Aboriginal Site Index revealed that no sites have been recorded in the development area. A field survey of the area failed to find any sites or artefacts of Aboriginal heritage significance.

Consultation with Aboriginal Heritage Tasmania (AHT), the FIAA and the Tasmanian Aboriginal Centre (TAC) was undertaken before the survey and consultation on the findings of the survey will be undertaken in the near future. The report on the finding is currently being prepared in accordance with the guidance issued by AHT, in accordance with the requirements of the *Aboriginal Relics Act 1975*.

Potential Effects

Based on the absence of any sites or artefacts of Aboriginal heritage significance during the site survey, it is unlikely that any sites or artefacts of Aboriginal heritage significant would be affected by the proposed development.

However there is potential for buried sites to be exposed during construction. As such the AHT 'Unanticipated Discovery Plan' should be followed in the event that cultural heritage items or skeletal material is uncovered during construction.

Management of Environmental Issues

The following measures will be undertaken to manage impacts on Aboriginal Heritage:

- If any cultural heritage items or skeletal material is uncovered during construction the AHT 'Unanticipated Discovery Plan' shall be implemented.
- If any cultural heritage items or skeletal material is uncovered during construction representatives of the Flinders Island Aboriginal Association shall be notified.

4.3.2 Visual amenity

The Existing Environment

The proposed wind turbine site and surrounds is cleared agricultural land scattered with small remnants of degraded heath. The site occupies a ridgeline which runs roughly north-south. This ridgeline is a prominent feature of the landscape and is visible from Whitemark and from Lady Barron Road. Some development has already taken place on the ridge with the two older wind turbines north of the development site having been installed in 1988 and 1994, and more recently a turbine has been installed near the proposed development site by a private developer. The newest of these turbines has a hub 30m high, and blade diameter of 30m. The older turbines have a hub 20m and 15 m, with blades approximately eight and ten metres long respectively. There are also communications facilities on Hayes Hill operated by Telstra and the Tasmanian Fire Service.

Potential Effects

Assessing the visual impact of any development is problematic due to the subjective nature of people's responses. Some people may find the wind turbine an intrusion on the landscape, while others will see the turbine as having aesthetic appeal. Visual effects are also complicated as perceptions can change over time. The Flinders Island community is likely to accept the new turbine because the existing turbines on Hayes Hill and the proposed development site are well-known features on the landscape. The new turbine will be of a similar size to the most recent wind turbine, with maximum tower heights of 55m and blades up to 26m long.

The 'visual catchment' of the wind turbine consists of the surrounding area from which the turbine is either wholly or partially visible. This area extends to the south-east of the site back along Lady Barron Road to a point near Ranga, a distance of some 6 km, and to just north of the Flinders Aerodrome, approximately 5 km to the north-west. The turbine will also be visible from the sea.

To assist in the assessment of the visual effects resulting from the proposed wind turbine, photomontages (photographic representations) of the landscape were prepared by Hydro Tasmania for a previous application for this project in 2007.

Modelling of two-bladed 'Windflow' turbine and the three-bladed Vestas V52 machine were 'combined' with photographs taken at various points around the site. The resulting photomontages depict an accurate simulation of the appearance and scale of the wind turbine on the landscape, however one turbine has been constructed. The turbine images have been purposefully enhanced to give a 'worst-case' scenario for visual assessment purposes. Three viewing points have been used for the photomontages. These are:

- The ponds on the outskirts of Whitemark (Viewpoint1);
- The access track off the western side of Lady Barron Road near Nalinga Creek (Viewpoint 2); and
- The junction of Trousers Point Road and Lady Barron Road (Viewpoint 3).

The coordinates and locality map for these viewpoints are shown below in Figure 4-2.

The point near the ponds on the outskirts of Whitemark represents the view people will see when driving into and out of town. This site is approximately 3.5 km from the turbine. As shown on Figures 3 and 6, in good weather, the turbine is visible from this point. In cloudy conditions or poor light, the turbine would be more difficult to see.

The point on the access track off Lady Barron Road is approximately one kilometre from the turbine. In general the turbine is highly visible on the landscape.

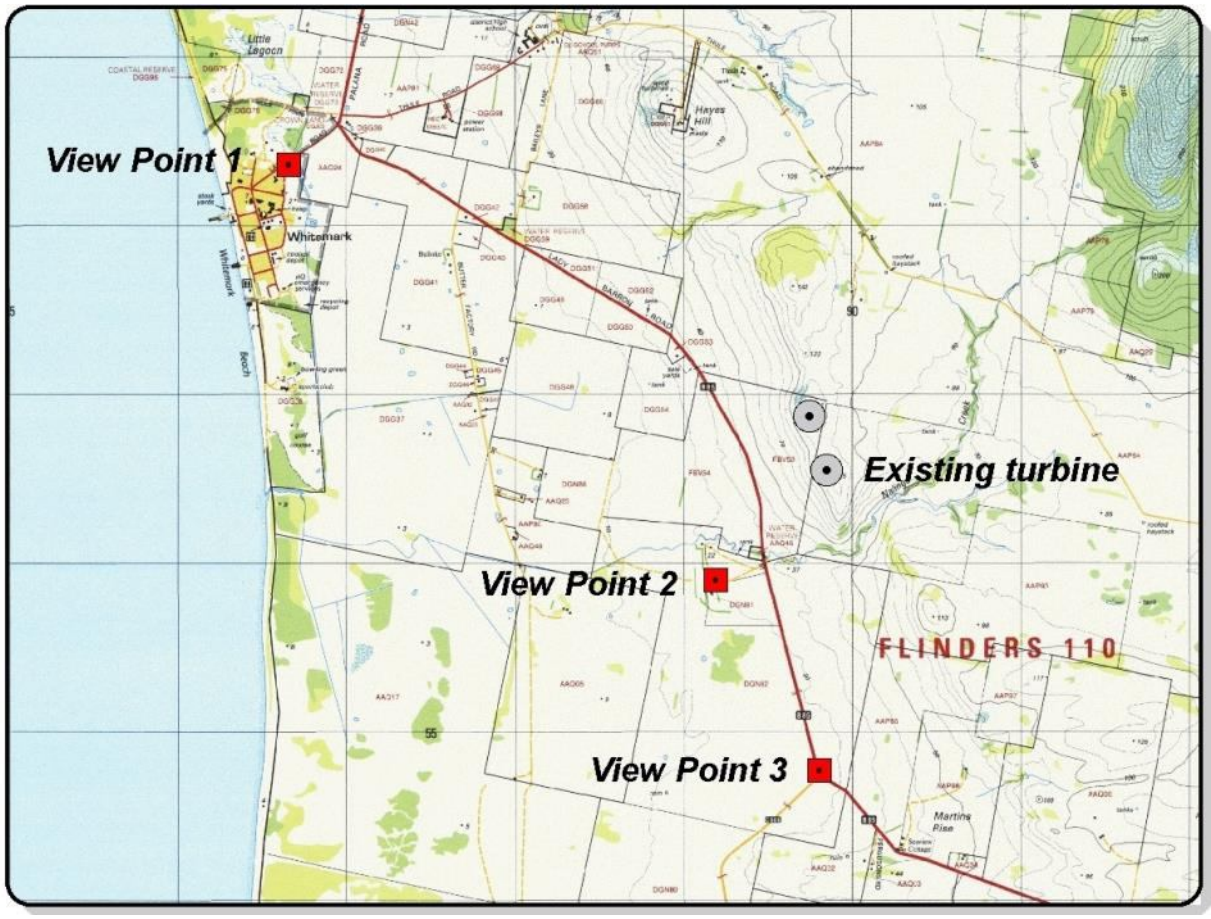
Other components associated with the wind turbine, including the access road and the above-ground transformer should not be visible from these points. The distribution line running downhill from the site will have timber poles about ten metres high, and this line will be visible from Lady Barron Road.

Management of Environmental Issues

To minimise the visual impact of construction activities on the amenity of the locality:

- All work sites will be kept tidy and free of rubbish and waste all time. Wastes should be segregated into separate bins for recycling or disposal at a licensed disposal site. Waste management should be included in site induction training to ensure all personnel are aware of the appropriate identification, segregation and labelling of waste.

- All works will take place in a defined works area and vegetation clearing will be kept to a minimum. Where vegetation clearance is undertaken, efforts will be made to limit the impact to the area required to establish hard stands, underground cabling and access roads.
- Areas disturbed during construction will be rehabilitated.



Viewpoint Datum: AGD66, Projection: AMG Zone 55

View Point 1: Easting: 586654, Northing: 5558351, Distance to Nearest turbine in view: 3425m

View Point 2: Easting: 589190, Northing: 5555890, Distance to Nearest turbine in view: 865m

View Point 3: Easting: 589800, Northing: 5554760, Distance to Nearest turbine in view: 1590m

Figure 4-2 Photomontage Viewpoints

Figure 4-3 Viewpoint 1, Top photo with 850kW turbine, Bottom photo with 500kW, Existing Turbine on Right

Figure 4-4 Viewpoint 2, Top photo with 850kW turbine, Bottom photo with 500kW, Existing Turbine on Right

Figure 4-5 Viewpoint 3, Top photo with 850kW turbine, Bottom photo with 500kW, Existing Turbine on Right

4.3.3 Communications interference

The Existing Environment

A study to examine the potential of the wind turbine to cause interference to local radio communication services, including television reception, was initially carried out by Hydro Tasmania's Telecommunication Services Group in July 2002. This study was updated in 2007 and is presented as Appendix B. All radio services licensed with the Australian Communications and Media Authority (ACMA) within a 50 kilometre radius from the wind turbine site were examined in this report.

A review of ACMA database of licenced radio services was undertaken in November 2013 and identified no change in the location of services since the preparation of the study.

Communications services on Flinders Island are:

- fixed point-to-point radio links;
- mobile radio and mobile phone services;
- television services;
- a Fire Services paging transmitter at Walkers Lookout; and
- an aeronautical service located at Flinders Island Airport.

Potential Effects

A wind turbine may have differing effects on radio services depending on the type and frequency of service and the location of the turbine with respect to the service. There are three main classes of effect – *obstructive, reflective* and *scattering* interference.

With *obstructive* interference, the turbine breaks the path of the radio transmission between transmitter and receiver, causing the power received from the transmitter to be reduced below what would normally be received. *Reflective* interference can occur when the turbine is not directly in the path of the signal, but causes a reflection of the transmitted signal which is out-of-phase to the main beam. *Scattering* interference is closely related to reflective interference and occurs when the wind turbine is located in the incident field and interference from the moving blades causes fluctuating 'ghost images'.

Most interference problems with wind turbines emanate from turbines which have metallic or carbon fibre blades. Interference is caused by the rotating action of the blades presenting a large conductive area which causes the obstruction or reflection. However, all of the turbine blades proposed for use on Flinders Island are made of fibreglass with metallic strips running along the blade edges for lightning protection. The metal lightning protection within the blades has communications interference potential.

The steel towers and the electrical generators and switching components mounted in the nacelle can interfere with communication signals, but this is uncommon in turbines that comply with Australian electrical compatibility standards. All the turbines proposed for Flinders Island comply with electromagnetic compatibility standards.

The study found the potential for the wind turbine to adversely effect communications services on Flinders Island to be low. There is limited potential for television services in the Thule Road and Lady Barron Road area between Whitemark and the wind turbine site to be affected by the wind turbine development.

The distribution line connection to the Island's electricity grid is not expected to produce any interference issues, particularly since the section on the ridge top will be placed underground and relatively short (10 metre high) timber poles will be used for the overhead section.

Management of Environmental Issues

The following measures will be undertaken in relation to communications interference:

- All generators will comply with the relevant electromagnetic interference standards to ensure the towers do not produce electromagnetic interference.
- Once the number and type of turbine to be used at the site are finalised, letters will be sent to the licensee of each possibly affected radio service, advising of the intention to install the turbine, asking that any concerns regarding the wind turbine be raised.
- Once the number and type of turbine to be used at the site are finalised, the need for a signal strength survey will be considered. This survey would cover the residences within two kilometres of the proposed site and a few sites in Whitemark. The availability of digital television in the area may be tested to ensure the presence of an alternative to traditional television broadcasts.
- Once the number and type of turbine to be used at the site are finalised, Flinders Island Airport will be notified of the development to enable any concerns to be raised. This is in addition to any further liaison with CASA.

Hydro Tasmania will investigate communications interference issues associated with the wind turbine as appropriate.

4.3.4 Noise

The Existing Environment

The proposed wind turbine is in a sparsely populated area surrounded by grazing land. There five dwellings in the immediate surrounding area. There is a dwelling approximately 1.5 kilometres to the north of the site on Thule Road, and another on Lady Barron Road approximately 850m to the northwest. There is also a cluster of three houses approximately 900 metres to the south-west of the site, just off Lady Barron Road.

Background noise measurements and subsequent modelling of three possible turbine types and transformer noise have been carried out by Hydro Tasmania, based on turbine models and a layout scenario typical of these options. The wind turbine noise impact assessment report is included as Appendix C.

Background noise levels were measured by a continuous noise logger at a point about 515 metres to the south-west of the site and at another point about 460 metres to the north-east over a three week period. The equivalent of 17 days worth of continuous data was collected at each location. Data indicated that there is higher background noise to the west of the site compared to the eastern side.

When background noise measurements are combined with the results of turbine and transformer noise modelling, the overall noise impact of the development can be predicted with a high degree of confidence.

Potential Effects

Noise impact assessment has been undertaken based on turbine manufactures data for the turbine manufacturer options proposed at the turbine location proposed. The noise modelling also includes the effect of the existing adjacent privately operated wind turbine (Enercon E30,

owned by the 'Blowing in the wind Pty Ltd – 'Joule Logic Pty Ltd' joint venture) and it should be noted that this modelling assumes that this turbine is installed to the original manufactured design and is operated within its noise compliance limits and maintained in such a way that noise levels are not increased beyond the manufacturers rating.

Noise impacts at nearby residences from the proposed wind turbine are expected to be minimal and well within acceptability criteria. Noise modelling using sound power data supplied by the turbine manufacturers and by the transformer manufacturers indicates that wind turbine noise will be greatest at the closest of the dwellings to the south-west of the site. The maximum sound pressure level post-commissioning is expected to be 39 dB(A) at this house. Note that the noise modelling does not take into account the shielding affects of topography or obstacles, or the absorption effects of ground cover. This means that there is some over-prediction of the sound levels. This over-prediction is likely to be around 1-2 dB(A) in 'line of sight' to the turbine and as much as 10-12 dB(A) in other cases. In general terms the wind comes from the west around 55% of the time, from the east 25% of the time, from the north 15% of the time and from the south around 5% of the time. So the houses closest to the wind turbine are upwind from the turbine for the majority of the time, which will help reduce the noise impact. As such any noise impacts experience at nearby residences are expected to be minimal and within acceptable guideline limits as identified in Standards NZS 6808:2010 Acoustics – wind farm noise.

In the event Hydro Tasmania uses turbine not modelled in this study, a further assessment of the potential noise impacts will be undertaken to demonstrate compliance with the Standards NZS 6808:2010 Acoustics – wind farm noise, and submit it to the Flinders Island Council for approval prior to construction commencing.

The potential noise impacts associated with increased heavy vehicle traffic in the areas through which construction materials will be transported is not considered to be significant. Traffic associated with the construction activities therefore is not considered to present a significant impact to the existing environment

Management of Environmental Issues

The following measures will be undertaken in relation to noise issues:

- Construction work during wind turbine installation should be restricted to daylight hours (nominally 0700 to 1800). Some variation to this may be required so as to take advantage of favourable weather conditions. Any work outside of these hours will be agreed with Hydro Tasmania prior to commencement.
- Machinery and vehicles should be maintained in accordance with manufacturers specifications and will be in good repair.
- If requested by Council a compliance survey of the operational noise levels shall be conducted post commissioning of the wind turbine.

Additionally, it is recommended that Council ensure that future housing developments are not located too close to the wind turbine in order to ensure that residents are not exposed to unacceptable noise emissions from the facility.

Hydro Tasmania will investigate noise issues associated with the wind turbine as appropriate.

4.3.5 Hazards – Materials, waste, fire and air quality

Potential Effects

Liquids fuels such as diesel and petrol, lubricating and hydraulic oils and coolants will be used in construction machinery, vehicles and other equipment. It may be necessary to maintain and refuel such equipment on site and as such the storage of this material on site may be necessary.

These refuelling and maintenance activities carry a possibility of spillage to and contamination of land, water or increase risk of fire.

Waste materials produced as part of the proposed development may include the following:

- Soil, clay and rock excavated as part of the construction activities and not required for use on site.
- Packing materials and general construction waste.
- Oily wastes.
- General refuse.

Poor site management practices have the potential to result in contamination of land, water, or increase risk of fire. In addition, poor site management of waste may result in adverse impacts on visual amenity of the locality.

Management of Environmental Issues

The following measures will be undertaken in relation to materials, waste, fire and air quality:

- Formal waste containment to be provided at the construction site to facilitate regular rubbish removal. Oily waste will be recycled, where possible.
- Waste is to be removed from the site for disposal at a licensed waste disposal facility on a regular basis;
- Controlled wastes should be removed from site by an appropriately licensed waste contractor;
- Where possible, wastes should be segregated into separate bins for recycling or disposal at a licensed disposal site. Waste management should be included in site induction training to ensure all personnel are aware of the appropriate identification, segregation and labelling of waste;
- Hazardous materials will need to be managed in accordance with applicable State and Commonwealth dangerous goods requirements and relevant standards;
- Hazardous materials will need to be stored at a dedicated location nominated for the storage and handling of these materials;
- Storage and handling of controlled wastes (eg. waste oils, chemicals) is a priority. Wastes need to be stored in accordance with appropriate Australian Standards for that material (eg. AS. 1940:2004);
- Spillage to any bunds (including contaminated rainwater collecting in bunds) will need to be disposed of as controlled waste using an appropriately licensed waste cartage contractor;
- There should be no burning of any waste material on-site;
- There should be no dumping or burying of waste on-site;

- Where practicable, fuels and oils should not be stored at the site during construction. Where it is necessary to store fuels the store should be an appropriately bunded and secure facility that is located at least 50 metres away from watercourses.

4.3.6 Socio-economic benefits

The proposed Flinders Island Wind turbine has the potential to bring about several positive outcomes with direct and indirect benefits for the local economy.

As a new technology industry, wind energy developments are leading to investment, job creation and skills development. It is estimated that the construction of the whole Flinders Island Hybrid Energy Hub project will involve capital expenditure in the order of $13 million dollars. Hydro Tasmania will endeavour to employ local contractors wherever possible, and there will be flow-on effects to local services and hospitality industries. There will be up to 12 jobs associated with the on-site construction works, and regular visits to the site by maintenance crews throughout the 20 year life of the facility.

The wind turbine may be seen as a tourist attraction, and there could possibly be an enhancement of the 'clean and green' image of the Flinders Island region through the production and increased use of renewable energy. This image provides an important market advantage for local produce and tourism.

Community pride in the region could be bolstered, as people in the area would be involved (either directly or indirectly) in this technically advanced, environmentally responsible development. The following measures will be adopted during the project:

- Hydro Tasmania and its contractors will employ local labour where practical and comply with safe and efficient work practices.
- Hydro Tasmania and its contractors will source accommodation, food supplies, fuel and materials locally wherever practical and the workforce will be accommodated in pre-existing facilities in the region.

4.4 Environmental auditing

In order to ensure that environmental management measures are appropriately applied throughout the project, site works are subject to auditing by Hydro Tasmania in accordance with its ISO14001 accredited Health, Safety and Environmental Management System.

4.5 Summary of environmental management

Aspect	Management requirement
Topography, geology, soils and water quality	The following measures will be adopted at the site. • A stormwater management plan will be prepared as part of the Construction Environmental Management Plan for the project. • Soil and vegetation disturbance will be kept to the minimum area necessary for the practical and economical completion of the project. • Movement of vehicles and equipment will

Aspect	Management requirement
	be restricted to designated areas. • Drainage works will be installed to divert upslope runoff around disturbed areas and stockpile sites via stable pathways. Runoff from disturbed areas will be directed through sediment control devices such as sediment fences and will be discharged to stable, well-vegetated areas. • Cleared vegetation and excavated topsoil will be stockpiled and used in rehabilitation works. • Rehabilitation of disturbed areas will be carried out as soon as practicable. • The access will be spread with gravel to minimise dust.
Flora and Fauna	The following measures will be undertaken to manage impacts on Aboriginal Heritage: • Weed management. The *Statutory Weed Management Plans* for African Boxthorn, slender thistle (*Carduus pycnocephalus*) and winged slender thistle (*Carduus tenuiflorus*), (*Weed Management Act 1999*) classifies the Flinders Island local government area as a Zone B municipality for all three weed species. The plan identifies that the management measure for African Boxthorn, slender thistle and winged slender thistle in Zone B municipalities is '*containment within municipal boundaries, protection of specified areas within municipal boundaries, and the prevention of spread to Zone A municipalities*'. Therefore a procedure to minimise the potential to spread African Boxthorn, slender thistle and winged slender thistle and other weeds and diseases including *Phytophthora cinnamomi* at the site, the following procedures will be implemented: o All machinery will be completely clean and free of soil material prior to entry to the site. o As far as practicable, construction will be confined to periods of dry weather. o Any gravel used for road construction will be sourced from quarries known to be free of Phytophthora. • Threatened species management. The *Asperula minima* (mossy woodruff) population and all Bass Strait wombat burrows will be avoided. Surveys of the final infrastructure layout will be undertaken for *Asperula minima* and Bass Strait

Aspect	Management requirement
	Wombat so that they can be marked and avoided if possible. • Habitat disturbance. Ground disturbance will be kept to a minimum and erosion and sediment controls will be implemented as described in Section 4.2.1
Aboriginal heritage	The following measures will be undertaken to manage impacts on Aboriginal Heritage: • If any cultural heritage items or skeletal material is uncovered during construction the AHT 'Unanticipated Discovery Plan' shall be implemented. • If any cultural heritage items or skeletal material is uncovered during construction representatives of the Flinders Island Aboriginal Association shall be notified.
Visual impact	To minimise the visual impact of construction activities on the amenity of the locality: • All work sites will be kept tidy and free of rubbish and waste all time. Wastes should be segregated into separate bins for recycling or disposal at a licensed disposal site. Waste management should be included in site induction training to ensure all personnel are aware of the appropriate identification, segregation and labelling of waste. • All works will take place in a defined works area and vegetation clearing will be kept to a minimum. Where vegetation clearance is undertaken, efforts will be made to limit the impact to the area required to establish hard stands, underground cabling and access roads. • Areas disturbed during construction will be rehabilitated.
Communications interference	The following measures will be undertaken in relation to communications interference: • All generators will comply with the relevant electromagnetic interference standards to ensure the towers do not produce electromagnetic interference. • Once the number and type of turbine to be used at the site are finalised, letters will be sent to the licensee of each possibly affected radio service, advising of the intention to install the turbine, asking that any concerns regarding the wind turbine be raised.

Aspect	Management requirement
	• Once the number and type of turbine to be used at the site are finalised, the need for a signal strength survey will be considered. This survey would cover the residences within two kilometres of the proposed site and a few sites in Whitemark. The availability of digital television in the area may be tested to ensure the presence of an alternative to traditional television broadcasts. • Once the number and type of turbine to be used at the site are finalised, Flinders Island Airport will be notified of the development to enable any concerns to be raised. This is in addition further liaison with CASA.
Noise	The following measures will be undertaken in relation to noise issues: • Work should be restricted to daylight hours (nominally 0700 to 1800). Some variation to this may be required so as to take advantage of favourable weather conditions. Any work outside of these hours will be agreed with Hydro Tasmania prior to commencement. • Machinery and vehicles should be maintained in accordance with manufacturers specifications and will be in good repair. • When the wind turbine make, model and layout have been finalised, a revised noise impact assessment shall be submitted to Council in order to confirm that noise emissions from the wind turbine will be acceptable at all dwellings in the vicinity, and comply with the SEPP Noise. • A compliance survey of the operational noise levels shall be conducted post commissioning of the wind turbine.
Materials, waste, fire and air quality	The following measures will be undertaken in relation to materials, waste, fire and air quality: • Formal waste containment be provided at the construction site to facilitate regular rubbish removal. Oily waste will be recycled, where possible. • Waste is to be removed from the site for disposal at a licensed waste disposal facility on a regular basis; • Controlled wastes should be removed from site by an appropriately licensed waste contractor; • Where possible, wastes should be segregated into separate bins for recycling or disposal at a licensed disposal site. Waste management should be included in site induction training to

Aspect	Management requirement
	ensure all personnel are aware of the appropriate identification, segregation and labelling of waste; • Hazardous materials will need to be managed in accordance with applicable State and Commonwealth dangerous goods requirements and relevant standards; • Hazardous materials will need to be stored at a dedicated location nominated for the storage and handling of these materials; • Storage and handling of controlled wastes (eg. waste oils, chemicals) is a priority. Wastes need to be stored in accordance with appropriate Australian Standards for that material (eg. AS. 1940:2004); • Spillage to any bunds (including contaminated rainwater collecting in bunds) will need to be disposed of as controlled waste using an appropriately licensed waste cartage contractor; • There should be no burning of any waste material on-site; • There should be no dumping or burying of waste on-site; • Where practicable, fuels and oils should not be stored at the site during construction. Where it is necessary to store fuels the store should be an appropriately bunded and secure facility that is located at least 50 metres away from watercourses.

5. Conclusion

The proposed development is a vital part of the wider Hydro Tasmania Flinders Island Hybrid Energy Hub project with this portion consisting of a single wind turbine, transmission line and ancillary infrastructure on land east of Whitemark on Flinders Island having been designed to consider the functional requirements of the installation and minimise the environmental impacts of the project.

By virtue of the use classification as a Public Utility (major) being considered a discretionary use in the Rural zone the application is able to be considered under s57 of LUPAA.

The development will not unreasonably impact upon any values of the site and any impacts on the surrounding environmental can be easily protected through good construction management practices that will be identified in a Construction Environmental Management Plan. In addition, Hydro Tasmania's Heath Safety and Environmental Management System will apply to the construction of the development and ensure that it is undertaken in accordance with Best Practice Environment Management.

The proposal is able to be considered and meets all of the mandatory requirements under the Flinders Island Planning Scheme. It is submitted that the proposal should be approved.

Appendices

A. Certificate of title

the list

RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
123215	1
EDITION	**DATE OF ISSUE**
6	20-Feb-2008

SEARCH DATE : 28-Aug-2014
SEARCH TIME : 02.31 PM

DESCRIPTION OF LAND

Parish of METTA, Land District of FLINDERS
Lot 1 on Sealed Plan 123215
Derivation : Part of Lot 21627 & Part of Lot 13890 and 21567
Gtd to Charles Victor Nyman
Prior CT 201893/1

SCHEDULE 1

C781797 TRANSFER to HYDRO-ELECTRIC CORPORATION Registered 20-Feb-2008 at 12.01 PM

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
SP 123215 FENCING PROVISION in Schedule of Easements

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

the list

FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

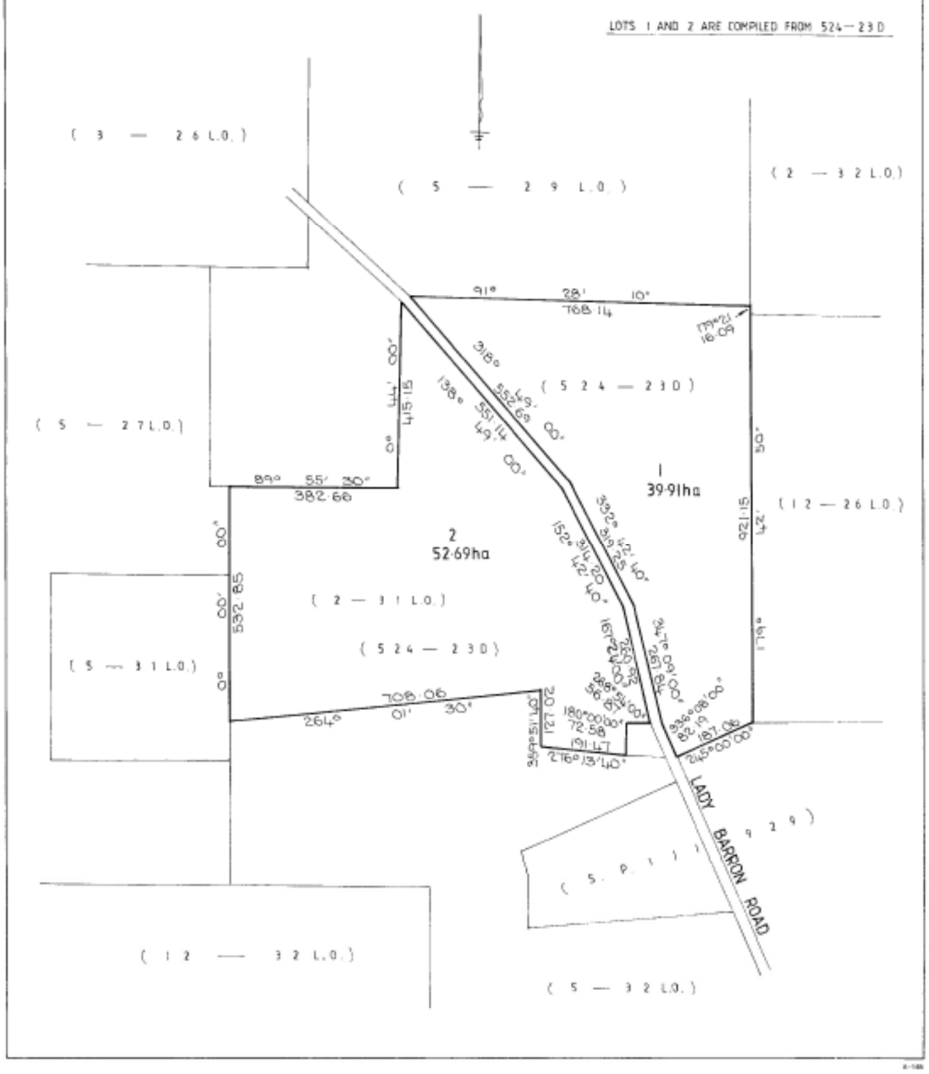
23 / 81 (308-)

OWNER DONALD CHARLES BLUNDSTONE GARRY RAYMOND BLUNDSTONE FOLIO REFERENCE C.T. VOL. 201893 FOL. 1 GRANTEE WHOLE OF LOT 21627 (113A 3R 32P) PART OF LOT 13890 (200A 0R 15P) & LOT 21567 (470A 3R 27P) GRANTED TO CHARLES VICTOR NYMAN.	PLAN OF SURVEY BY SURVEYOR LOCATION LAND DISTRICT OF FLINDERS PARISH OF METTA SCALE 1:7500 LENGTHS IN METRES	REGISTERED NUMBER SP 123215 APPROVED EFFECTIVE FROM 26 MAR 1996 Recorder of Titles

MAPSHEET MUNICIPAL CODE No. 49 110	LAST UPI No. 490020	LAST PLAN No. 524-23D	ALL EXISTING SURVEY NUMBERS TO BE CROSS REFERENCED ON THIS PLAN

COMPILED PLAN

LOTS 1 AND 2 ARE COMPILED FROM 524—23D



Search Date: 28 Aug 2014 Search Time: 02:31 PM Volume Number: 123215 Revision Number: 02 Page 1 of 1

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SCHEDULE OF EASEMENTS

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

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SCHEDULE OF EASEMENTS

NOTE: THE SCHEDULE MUST BE SIGNED BY THE OWNERS & MORTGAGEES OF THE LAND AFFECTED. SIGNATURES MUST BE ATTESTED.

REGISTERED NUMBER

SP123215

EASEMENTS AND PROFITS

PAGE 1 OF 2 PAGES

Each lot on the plan is together with:-
(1) such rights of drainage over the drainage easements shown on the plan (if any) as may be necessary to drain the stormwater and other surplus water from such lot; and
(2) any easements or profits a prendre described hereunder.
Each lot on the plan is subject to:-
(1) such rights of drainage over the drainage easements shown on the plan (if any) as passing through such lot as may be necessary to drain the stormwater and other surplus water from any other lot on the plan; and
(2) any easements or profits a prendre described hereunder.
The direction of the flow of water through the drainage easements shown on the plan is indicated by arrows.

(THIS IS A SINGLE PAGE FORM)

(USE FOLDED FORM FOR MULTIPLE PAGES)

FENCING PROVISION

Donald Charles Blundstone & Garry Raymond Blundstone as Vendors
The Vendors shall not be required to fence.

SIGNED by DONALD CHARLES BLUNDSTONE and)
GARRY RAYMOND BLUNDSTONE as registered)
proprietors of Folio of the Register)
Volume 201893 Folio 1 in the presence of)

Solicitor
Launceston.

SUBDIVIDER :	PLAN SEALED BY :
FOLIO REF :	DATE :
SOLICITOR & REFERENCE :	..... REF No. / ..... Town Clerk/Council Clerk/Admin. Officer

NOTE: THE TOWN CLERK/COUNCIL CLERK MUST SIGN THE CERTIFICATE FOR THE PURPOSE OF IDENTIFICATION.

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SCHEDULE OF EASEMENTS

RECORDER OF TITLES

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Tasmanian Government

Signed for and on behalf of
WESTPAC BANKING CORPORATION
ARBN 007 457 141

Signature of Witness

Full Name and Occupation of Witness

Acting Supervisor

Mortgagee under mortgage
or
Encumbrancee under encumbrance

No. 5292 141

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RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

SEARCH OF TORRENS TITLE

VOLUME	FOLIO
208390	1
EDITION	**DATE OF ISSUE**
8	08-May-2012

SEARCH DATE : 28-Aug-2014
SEARCH TIME : 02.50 PM

DESCRIPTION OF LAND

Parish of METTA, Land District of FLINDERS
Lot 1 on Plan 208390
Derivation : Lot 21412 Gtd to F S Smith; Lots 22792 and 25630 Gtd to P G Hay; Lot 22794 Gtd to C Hay
Prior CT 2398/13

SCHEDULE 1

C560720 TRANSFER to FLINDERS ISLAND ABORIGINAL ASSOCIATION INCORPORATED Registered 02-Dec-2005 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
C672039 CAVEAT by Indigenous Land Corporation Registered 02-Dec-2005 at 12.01 PM
D50112 LEASE to FIRE DEVELOPMENTS PTY LTD of a leasehold estate for the term of 10 years commencing 1-May-2012 (of that part of the said land within described shown on Annexure Plan 'A' attached to the said Lease) Registered 03-May-2012 at noon
D50130 MORTGAGE to The State of Tasmania of the leasehold estate of FIRE Developments Pty Ltd only Registered 08-May-2012 at noon

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

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FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

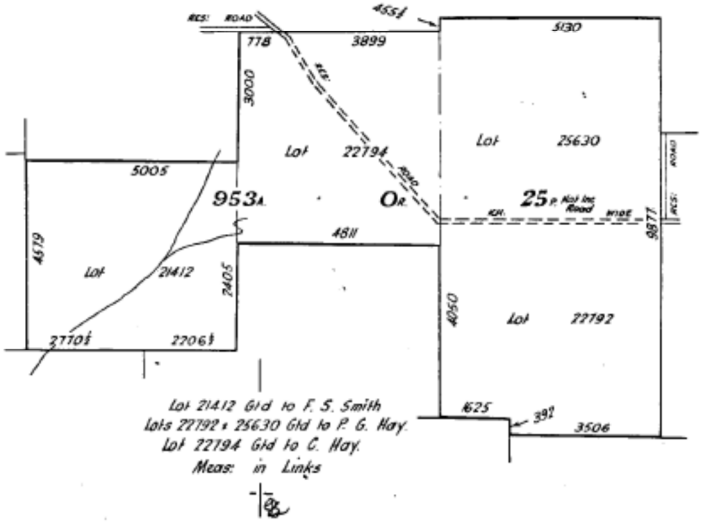
ANNEXURE TO CERTIFICATE OF TITLE VOL. 2398 FOL. 13

Recorder of Titles

REGISTERED NUMBER

208390

Lot 1 of this plan consists of all the land comprised in the above-mentioned cancelled folio of the Register.



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RESULT OF SEARCH

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

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SEARCH OF TORRENS TITLE

VOLUME	FOLIO
245575	1
EDITION	**DATE OF ISSUE**
8	08-May-2012

SEARCH DATE : 28-Aug-2014
SEARCH TIME : 02.52 PM

DESCRIPTION OF LAND

Parish of METTA, Land District of FLINDERS
Lot 1 on Plan 245575
Derivation : Lots 15514, 15516, 15517, 17709 and 19753 Part of Lots 15515 & 17765 Gt to R Gardner Lot 21868 Gt dto F P Hart & Ors 6A-1R-16Ps Gtd to P G & J R Hay
Prior CT 4394/74

SCHEDULE 1

C560720 TRANSFER to FLINDERS ISLAND ABORIGINAL ASSOCIATION INCORPORATED Registered 02-Dec-2005 at noon

SCHEDULE 2

Reservations and conditions in the Crown Grant if any
C672039 CAVEAT by Indigenous Land Corporation Registered 02-Dec-2005 at 12.01 PM
D50112 LEASE to FIRE DEVELOPMENTS PTY LTD of a leasehold estate for the term of 10 years commencing 1-May-2012 (of that part of the said land within described shown on Annexure Plan 'A' attached to the said Lease) Registered 03-May-2012 at noon
D50130 MORTGAGE to The State of Tasmania of the leasehold estate of FIRE Developments Pty Ltd only Registered 08-May-2012 at noon

UNREGISTERED DEALINGS AND NOTATIONS

No unregistered dealings or other notations

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FOLIO PLAN

RECORDER OF TITLES

Issued Pursuant to the Land Titles Act 1980

Tasmanian Government

ANNEXURE TO CERTIFICATE OF TITLE FOLIO OF REGISTER

VOL. 4394 FOL. 74

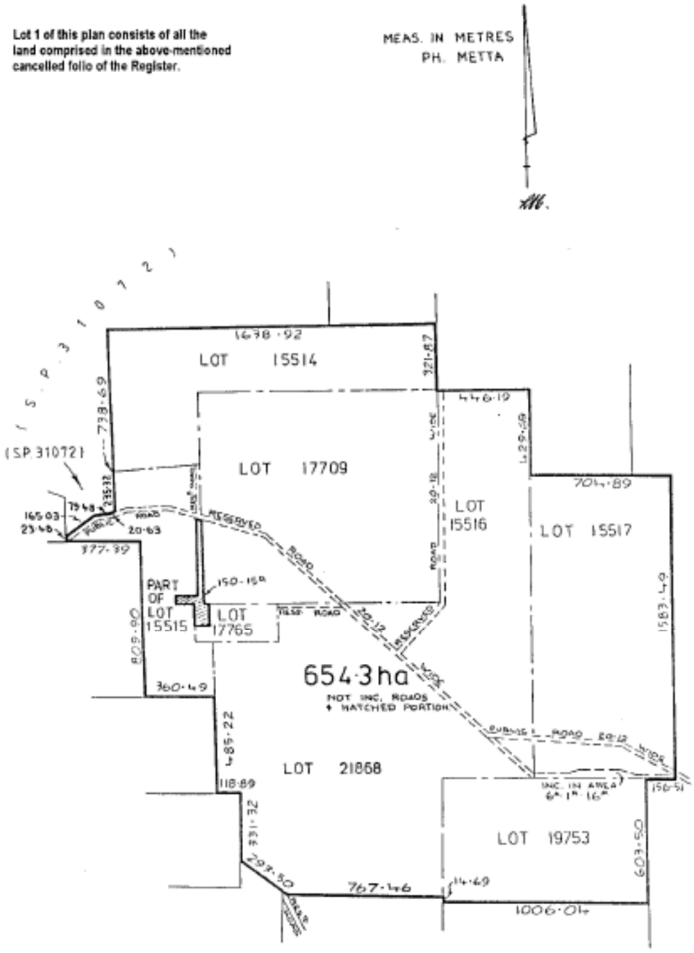
REGISTERED NUMBER

245575

Acting Recorder of Titles

Lot 1 of this plan consists of all the land comprised in the above-mentioned cancelled folio of the Register.

MEAS. IN METRES
PH. METTA



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B. Flinders Island Wind turbine Interference Study

C. Flinders Island Wind turbine - Noise Impact Assessment

D. Comparison of potential collision risk for birds of different wind turbines for Flinders Island, Tasmania April 2007