

Volume 1 Report
Landscape and Visual Impact Analysis
St Patricks Plains Wind Farm





inspiring
place

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Cover photo: St Patricks Plains Wind Farm Preliminary Photomontage - Photomontage view from Highland Lakes Rd (Source: Epuron)



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Attachment A GIS specifications used in the study

Attachment B Frame of reference Central Plateau Landscape Character Type

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Attachment D Seen view analyses

Attachment E Viewing sensitivity categories

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Attachment G Turbine distance to nearest road

EXECUTIVE SUMMARY

Epuron Projects P/L ("Epuron") is currently investigating development of a wind farm which includes 50 turbines, each nacelle being 150m high with a blade length of up to 80m making a maximum total height from the ground to the tip of the blade of 230m. Each tower will have a 40m x 120m hard stand area. Most of the turbines will be connected to a sub-station via underground cables but some may require overhead powerline(s). The towers are clustered in two groups: those on the open ground of St Patricks Plains and those on the forested slopes and ridges of Bakers Tier.

The wind farm layout is the result of a number of investigations including preliminary analysis of impacts on flora and fauna and the landscape setting.

Epuron engaged Inspiring Place to prepare a landscape visual impact analysis (LVIA) of the proposed development as an important component of the EIS. Inspiring Place was supported by Epuron who collated existing data and prepared GIS mapping and photomontages as required to inform the analysis.

Covering some 10,000 hectares, the proposed wind farm is situated on private land in a variety of landscape settings including agricultural areas and native vegetation of moors and forests. The setting of the wind farm has a low to moderate scenic quality. Scenic quality in the areas from which the wind farm is seen, also ranges from low to moderate.

Epuron is seeking through this current study to understand the potential visual impacts of the proposed infrastructure and the opportunities to further eliminate or mitigate, as far as practical, any negative consequences that might arise.

The LVIA study applies the techniques of landscape visual impact analysis management employed by multiple agencies around the world. In general, landscape analysis seeks to identify the visual character of an area and then through appropriate management to retain that established character. While visual variety is valued, alterations that permanently or temporarily deviate from the existing character are considered a visual impact.

The system of analysis used herein, draws heavily on the past work of Forestry Tasmania and more recent work by Inspiring Place¹. The system is premised on analysis of factors that determine how people react to changes to the visual qualities of a place including: landscape character, sensitivity to change and the nature of the proposed alteration to determine the magnitude of impact or the extent to which the development unacceptably alters the character of its landscape setting (Section 2).

The LVIA has found that prior to any mitigation measures the significance of the visual impact of the proposed wind farm is **moderate-high**. The rating reflects the:

¹ Forestry Tasmania 1990 (updated 2006). **A manual for forest landscape management Forestry Tasmania**, Hobart and Inspiring Place 2020. A manual for evaluating the visual impact of pumped hydro energy storage prepared for Hydro Tasmania with GIS assistance from Entura.

visual impacts of the wind farm arising from its scale as an alteration type (Section 3) that is:

50 turbines, 230m high, spread across some 10,000 hectares of land and stretched along ~12 kilometres of a State highway designated as a tourist route;

the height, number and distribution of turbines which means the wind farm has the potential to be seen across a large geographic area (Section 5.1) and from multiple viewing areas by residents and visitors expecting an isolated natural landscape; and

the size of individual turbines in close proximity to the road in places which means these particular elements could have an overpowering presence;

landscape context, particularly the history of electricity generation and transmission and its effects on landscape character which combine to create a landscape character sub-type of utility, where electricity generation infrastructure is a readily apparent and characteristic feature threaded through a low-moderate scenic quality landscape (Section 4);

sensitivity of the landscape to change has been generally assessed as being low to moderate (with the exception of the Steppes Homestead and Steppes Hall which were rated as having high sensitivity) (Section 5.2);

low visual absorption capacity inherent in the landscape, particularly relative to the scale of turbines and the inability of landform or vegetation to physically mitigate the visibility of the wind farm (Section 6.1); and

off-setting influence of the scenic interest ascribed to wind farms (Sections 4.4 and 6.2).

The significance of the impact of the wind farm could be further reduced by:

altering the location of turbines away from the highway to reduce their visual dominance (Section 9.2.1); and

limiting the ‘visibility spill’ into adjacent landscape character units i.e. containing the view to a smaller geographic area through a reduction in the height of the turbines, particularly in the northern part of the wind farm to ensure no tips or turbines are visible along the approach to the site when traveling south along the Great Lake on Highland Lakes Road (Section 9.2.2).

The Proponent has agreed to each of the recommendations made in Section 9.2.1 which would result in a reduction of the significance of the visual impact of the wind farm to **moderate** across all viewing opportunities (Section 9.3).

Further mitigation could be gained by:

implementing the recommendations at Section 9.2.2 regarding visibility spill; or
generally reducing the number of turbines and/or their overall height.

While these measures have merit in reducing visual impact, the Proponent has determined that such a change would adversely affect the outcomes they desire in terms of cost and power generation

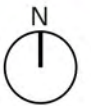
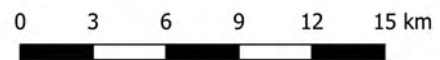
1. BACKGROUND TO THE CURRENT PROJECT




Tasmania's natural and cultural landscape is much admired and is celebrated in the arts and the promotional materials designed to brand the place as our 'clean and green ... natural state'. Tourism Tasmania's advertising campaigns tell us that 'behind the scenery' lies our point of difference in the world. For this reason, caution needs to be exercised and due consideration given to development that might significantly alter the scenic quality of Tasmania's landscape.

Epuron Projects P/L is proposing development of a wind farm at St Patricks Plains in the Central Highlands of Tasmania (Map 1.1).

Epuron has engaged Inspiring Place to undertake a landscape and visual impact analysis (LVIA) of the proposed development (the current study) as an important contribution to the EIS. In preparing this report, Inspiring Place has been supported by the GIS team at Epuron which has prepared the GIS mapping and photomontages used herein.

Epuron is seeking through this current study to understand the potential visual impacts of the proposed infrastructure and the opportunities to eliminate or mitigate, as far as practical, any negative consequences that might arise.



-  Project Boundary
-  Distance from nearest turbine
-  Wind Turbine

MAP 1.1 Location Map - St Patricks Plains Wind Farm

2. METHOD OF ANALYSIS

2.1 METHODOLOGY

There is a long history of visual values assessment and management dating from the 1960s in the United States. In Tasmania, the US system was largely adopted by the Forestry Commission Tasmania (now Sustainable Timber Tasmania) to guide its practices since the 1980s. The Forestry Commission published its methods in *A Manual for Forest Landscape Management*² in 1990 (revised 2006).

The Forestry Commission system has since been the primary visual management tool employed by Tasmanian planning professionals. Those working in the field have applied the system to the evaluation of the visual impact of wind farms, heavy industry, residential development, waste disposal operations and tourism attractions.

More recent work has built on that of the Forestry Commission, drawing into its processes more contemporary best practice assessment techniques (Figure 1)³.

Visual management is premised on aesthetic principles well understood by those in the visual arts, principles that have been tested in multiple settings and cultures through studies in environmental psychology and other fields. In general, visual landscape management seeks to retain the established character of the landscape. In many landscapes, change is expected as resources are developed, and patterns of settlement evolve. While visual variety is valued, alterations that permanently or temporarily deviate from the existing character are considered a visual impact.

The system of analysis used herein, draws heavily on the work of Forestry Tasmania while adopting elements from other sources where relevant⁴. The system is premised on analysis of factors that determine how people react to changes to the visual qualities of a place including landscape character and the response to their sensitivity to change and the nature of the proposed alteration⁵.

The analysis herein has been supported by GIS investigations and geo-spatially accurate photomontages from prominent and frequented viewpoints undertaken by Epuron. The technical specifications for the conduct of the various GIS analyses and photomontages are set out at Attachment A.

Note that scenic impact analysis is only one of the variables informing the evaluation of the wind farm. Epuron takes its environmental commitments seriously while at the same time it is

2 Forestry Commission Tasmania 1990 (reprinted 2006). *A Manual for Forest Landscape Management* Forestry Commission of Tasmania, Hobart.

3 Inspiring Place 2020. "A manual for evaluating the visual impact of pumped hydro energy storage" unpublished report to Hydro Tasmania with assistance from the GIS team at Entura (Hydro Tasmania).

4 Notably, Inspiring Place 2020. *ibid.*

5 Adapted from Inspiring Place 2020. *ibid.* pg. 36.

required to balance these considerations against economic, community, engineering, and statutory drivers.

2.2 LIMITATIONS

The reader should be aware that the visual quality of the landscape is only one element of how it is seen. Researchers have consistently shown that people’s emotional attachments and the cognitive meanings they ‘see’ in the landscape affect their perception of the beauty of a place and how this can be analysed. Multiple sensory inputs, cultural background and personal experience all affect how a viewer responds to a scene⁶.

To fully understand the ‘aesthetics’ of a place requires a multi-dimensional analysis that:

defines and analyses the physical attributes of the place;

examines the social attachments people have with it; and

looks at how human activities and the nature of the place combine to make a ‘cultural landscape’.

In professional planning three interrelated skill sets have developed to cover this range of activities:

visual management which systematically analyses the compositional elements of the landscape (as in this report);

⁶ Van Heijgen, E. 2013. **Human Landscape Perception: Report on Understanding Human Landscape Perception and How to Integrate and Implement this in Current Policy Strategies** report to the AONB High Weald Unit, United Kingdom.

social values assessment which uses a phenomenological approach⁷ to the evaluation of personal meaning to the appreciation of the visual value of the landscape – information that is typically gleaned from community engagement but also through review of artistic sources, myth, legend and local folk lore; and

cultural landscape assessment which uses historical analyses to understand the layers of activity that influence a landscape setting.

The latter two of these variables are outside the scope of this report. Nonetheless, by focusing on the visual elements of the landscape and the contrast between what is and what could be, the visual management system herein aims to provide a reliable, valid and representative mechanism for evaluating the aesthetic of the landscape and potential impacts to it.

⁷ Phenomenology is the study of human experiences, behaviours, situations and meanings as they arise in a person's everyday life i.e. their lifeworld, which is taken for granted, normally unnoticed and thus hidden as a 'phenomenon'. Various techniques of evaluating people's 'lifeworld' have enabled an identification of those places that have 'social value' to someone's daily life and therefore of consideration in an investigation of the impacts of a development.

VIEWING DISPOSITION

LANDSCAPE CONTEXT

ALTERATION TYPE

TOTAL SEEN VIEW
(SECTION 5.1) ▲

PHASE 1: PRELIMINARY ANALYSIS
(BY EPURON)

PHASE 2: DETAILED ANALYSIS
(INCLUDING FIELD WORK BY INSPIRING PLACE)

SITE ANALYSIS
CLIMATE
• GEOLOGY, GEOMORPHOLOGY, TOPOGRAPHY, SOILS
• SETTLEMENT AND USE
• LAND OWNERSHIP
• VEGETATION
PLANNING/STATUTORY FRAMEWORK
RECEPTOR COMMUNITIES
• OTHER
(SECTION 4.1)

DESCRIBE TYPE, SCALE AND LOCATION

FIRST PASS ANALYSIS OF POTENTIAL VISUAL IMPACTS

PRELIMINARY FIELD INVESTIGATIONS

MODIFY TO MITIGATE

REVISED ALTERATION TO BE ASSESSED
(SECTION 3)

IDENTIFY CRITICAL VIEW POINTS
(SECTION 5.2)

DETERMINE LANDSCAPE CHARACTER TYPE
(SECTION 4.2)

COMPOSITION OF THE VIEW
(SECTION 5.2)

FREQUENCY
(SECTION 5.2) ▲

DURATION
(SECTION 5.2)

VIEWING SITUATION
(SECTION 5.2) ▲

WITH DISTANCE
(SECTION 5.2) ▲

PUBLIC EXPECTATIONS
(SECTION 5.2)

VIEWING OPPORTUNITIES
(SECTION 5.2)

DEFINE AND MAP SCENIC QUALITY CLASSES USING FRAME OF REFERENCE
(SECTION 4.3) ▲

OFFSET SCENIC INTEREST
(SECTION 4.4/6.2)

OFFSET VISUAL ABSORPTION CAPABILITY
(SECTION 6.1)

SENSITIVITY
SEEN VIEW + VIEWER LOCATION + VISITORS + FREQUENCY + VIEWER EXPECTATION
(SECTION 5.2)

MAGNITUDE OF IMPACT
MAGNITUDE OF ALTERATION - OFFSETS
(SECTION 8)

MONTAGES
(ATTACHMENT F) ▲

DECISION POINT
SIGNIFICANCE OF VISUAL IMPACT
(SECTION 8)

HIGH

MEDIUM

LOW

VERY LOW

MITIGATE FURTHER
(SECTION 9)

BASIC MITIGATION

NO CHANGE

NON VISUAL CONSIDERATIONS
ECONOMY/COST
POLITICS
ENVIRONMENTAL
ENGINEERING

PUBLIC ENGAGEMENT: TBC

LVIA
REPORT WITH VALIDATION

ENGAGEMENT
PUBLIC INPUT: 2020

GIS AND MONTAGES BY EPURON

3. THE WIND FARM - ALTERATION TYPE

The visual characteristics of the proposed development affect the capacity of the landscape to visually absorb change and the resultant magnitude and significance of impacts. In assessing the potential impacts of the proposal, consideration has been given to the nature of the proposed alteration (its scale, shape and colour and the duration of the change). The following is a summary of the proposal.

The wind farm is spread across ~10,000 hectares that include a variety of landscape settings including agricultural areas and native vegetation of moors and forests. The towers are clustered in two groups: those on the open ground of St Patricks Plains and those on the forested slopes and ridges of Bakers Tier (Map 3.1) .

The wind farm is comprised of 50 turbines, each nacelle (hub) being 150m above ground level with a blade length of up to 80m making a maximum total height from the ground to the tip of the blade of 230m. Each turbine will have a 210m x 70m hard stand area adjacent to it during construction which will be reduced in size to 80m x 60m on completion of construction. All of the turbines will be connected to a sub-station and switchyard via underground cables.

Other elements of the wind farm include:

- on-farm electrical cabling;

- a switchyard with a footprint of approximately 4 ha;

- a substation with a footprint of approximately 2 ha;

- an overhead transmission line, approximately 3 km in length, to provide connection to the TasNetworks Liapootah–Palmerston 220 kV transmission line which traverses the site;

- a permanent Operations and Management Building and storage area;

- two temporary construction compounds (one north, one south) encompassing site office, toilets, laydown areas and carpark;

- approximately 78 km of all-weather access tracks and roads will be required. This includes approximately 39 km of new tracks and 40 km of upgrades to existing tracks and roads;

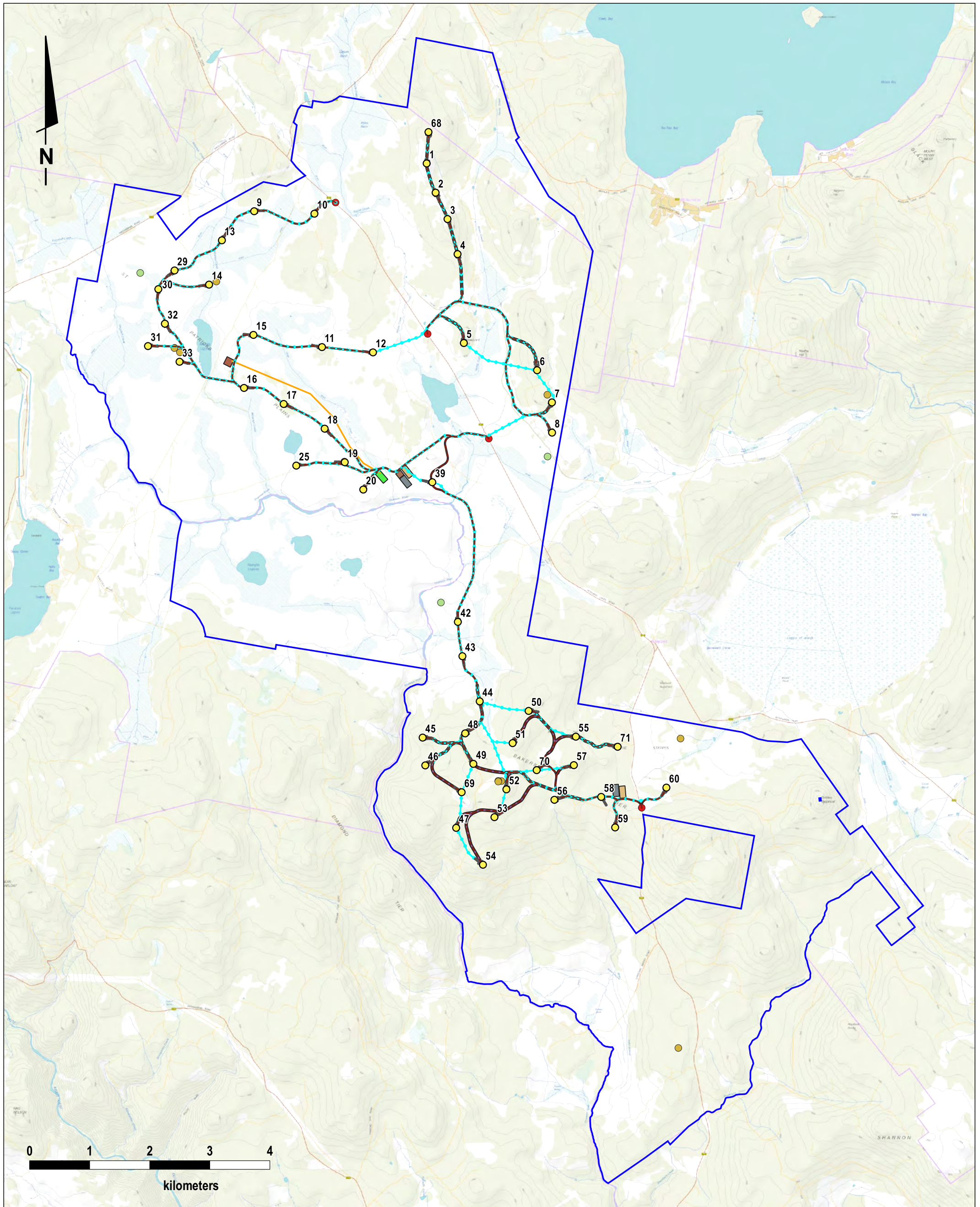
- two temporary concrete batching plants for construction; and

- permanent meteorological monitoring masts.

All temporary facilities will be removed on completion of construction of the wind farm and their sites rehabilitated.

To date the Civil Aviation and Safety Authority (CASA) have not required obstacle lighting on any of the Tasmanian wind farms including at Cattle Hill. The Proponent has not proposed aviation/obstacle lights on its turbines. The findings of this LVIA are premised on this basis.

However, the aeronautical requirements for marking and lighting of wind farms are currently under review by the International Civil Aviation Organization [sic] (ICAO), the Department of Infrastructure, Transport, Regional Development and Cities (DITRDC) and CASA. Should aviation lights be required, the findings of this LVIA must be reviewed.



LEGEND	
Site Boundary	SPP_M_Construction_Compound
Wind turbine	SPP_M_Batch_Plant
SPP_M_Access_Track	SPP_M_O&M_Facility
Underground reticulation	SPP_Permanent_MM_071220
Proposed powerline	SPP_Monitoring_120820
SPP_M_Substation	SPP_M_Access_Point
SPP_M_Switchyard	SPP_hardstands_241120
	SPP_Access_Track_estimated_impact_area_240221
	Hardstand footprint

	TITLE	
	Map 3.1 Site Layout	
PROJECT	DATE	CHECKED
St Patricks Plains Wind Farm	05032021	DB
	DRAWN	CHECKED
	JN	DB

DATE	DRAWN	CHECKED
05032021	JN	DB

4. LANDSCAPE CONTEXT

This step identifies the inherent elements that create the landscape character of the area and analyses this information to determine scenic quality and the priority for its protection.

4.1 SITE ANALYSIS - FACTORS INFLUENCING THE VISUAL SETTING

A range of biophysical (S4.1.1) and cultural factors (S4.1.2) influence the visual setting for the development to which various layers of legislation and policy apply (S4.1.3).

4.1.1 Natural values

Table 4.1 Biophysical factors influencing the visual setting of the development (continues following pages).

Factor	Comment	Influence on the Visual Setting of the Wind farm
Climate	<ul style="list-style-type: none"> temperate climate with continental conditions (i.e. more extreme conditions of temperature than land closer to the ocean) with temperatures below freezing and snow fall common moderate precipitation around 1300mm per annum at the Shannon Bureau of Meteorology weather installation rainfall exceeds evaporation resulting in numerous permanent water bodies 	<ul style="list-style-type: none"> cold climate growing conditions including frost heave will potentially hinder revegetation revegetation potentially difficult on flat areas prone to frosts such as occur in the northern portion of the wind farm site weather patterns can create striking ephemeral atmospheric effects, with frequent frosts, ice and snow
Geology ⁸	<ul style="list-style-type: none"> tertiary basalt plain 	<ul style="list-style-type: none"> geological origins create general lack of significant topography
Geomorphology and Topography	<ul style="list-style-type: none"> uplifted plateau at altitude up to 950m undulating, glaciated/periglacial landscape influenced by fluvial processes (running water) 	<ul style="list-style-type: none"> the general lack of topography is the principal contributor to the low scenic quality of the development area minor topographic features provide some limited screening
Surface Hydrology	<ul style="list-style-type: none"> surface water widely present in hollows as lakes, marshes and impoundments the Shannon River is the major water way through the development site 	<ul style="list-style-type: none"> water bodies (natural or human created) add value to the scenic quality of the area whose value is proportional to their size

⁸ Pemberton, M. 1986. *Land Systems of Tasmania: Region 5 – Central Plateau* Department of Agriculture, Tasmania.

Factor	Comment	Influence on the Visual Setting of the Wind farm
	<ul style="list-style-type: none"> • numerous minor stream channels • areas subject to waterlogging and flooding 	<ul style="list-style-type: none"> • water bodies are often a destination for recreational fishing
Soils	<ul style="list-style-type: none"> • rocky red-brown basalt soils with high fertility • high potential for sheet erosion where soils are exposed 	<ul style="list-style-type: none"> • freshly exposed soils, even though of a darker tone, will be visible in foreground views • wind driven sheet erosion is visible throughout the area and detracts from scenic quality
Flora	<ul style="list-style-type: none"> • patches of dry sclerophyll forests and montane grasslands including <i>Eucalyptus delegatensis</i> dry forests (white and <i>E. pauciflora</i> forest and woodlands across the wind farm site with patches of sub-alpine heath and high grass sedgeland patches amongst areas of improved pasture • surrounding forests of <i>Eucalyptus delegatensis</i> dry forests and <i>E. pauciflora</i> forest and woodlands • large cleared or naturally open plain/paddocks in the north of the wind farm 	<ul style="list-style-type: none"> • maximum height of forest type at 25m limits screening potential (i.e. moderate visual absorption capability) • climatic conditions mean relatively slow regrowth of native forest and its understory • turbines in the northern portion of the wind farm will be highly exposed due to the extent of open plain/paddocks there • The Sustainable Timber Tasmania 2019 Forest Management Plan⁹ allocates numerous areas adjacent to the development for production forest. Clearing of these areas may remove screening and, therefore, increase viewing opportunities to the turbines of the wind farm for a period of time. See Map 4.1.
Fauna	<ul style="list-style-type: none"> • Tasmanian devils (<i>Sarcophilus harrisi</i>), eastern quolls (<i>Dasyurus viverrinus</i>) and wedge-tailed eagles (<i>Aquila audax</i>) are known from the area 	<ul style="list-style-type: none"> • none

Table 4.1 Biophysical factors influencing the visual setting of the development (continued from previous pages)

In addition to these macro controls on the landscape setting, the area is sometimes influenced by striking ephemeral conditions that add atmosphere to the experience of the landscape.

These conditions can include:

strong angled lighting at sunrise and sunset that can highlight features and side-lighting that emphasizes the three-dimensional form of the landscape;

changing pattern of colours due to seasonal variation in flowering times and response to seasonal rainfall; and

⁹ See <https://www.sttas.com.au/sites/default/files/media/documents/plans/Forest%20Management%20Plan%20Oct%202019.pdf> (accessed 03.06.21)

patterns of low cloud and fog.

Further, variations in micro-scenery may feature any or all of the following qualities: uniquely textured vegetation and bark, well composed clusters of outcropping rock and vegetation, individually striking rock outcrops and/or vegetation forms as a result of weathering or old age. The quality of these features is enhanced when in combination with the ephemeral conditions described above.

Bushfire is common in the Tasmanian landscape as a natural occurrence, as a purposeful management tool or as a result of human sources such as sparks from machinery, downed powerlines and/or arson.

Fire is known to have been used as a management tool by Aboriginal people to create a landscape conducive to their needs (see Section 4.1.2). In more recent times, fire has been used as a tool in the regeneration of harvested forests, to promote ecosystem diversity and/or to reduce fuel loads and the potential catastrophic effects of wildfire.

While the occurrence of catastrophic fire is rare, predicted climate change suggests that more frequent and more intense fires will occur.

Whatever the source, bushfire has the potential to have significant impacts on the landscape with long term effects including the screening provided by existing vegetation. Depending on the nature of the fire, it may encourage replacement of vegetation communities or species that may or may not have good screening potential.

4.1.2 Social and cultural concerns

Aboriginal heritage

The evolution of the vegetation and fauna of the area was influenced by the practices of Aboriginal people¹⁰ of the Big River Tribe¹¹.

At other sites in Tasmania, the Aboriginal community have expressed an interest in traditionally used plants and food sources, some of which occur in the area of the development (albeit on private land). Minimising clearing of native vegetation to protect visual values, will go some way to mitigating concerns for the loss of traditionally used plant materials.

Forestry and agriculture

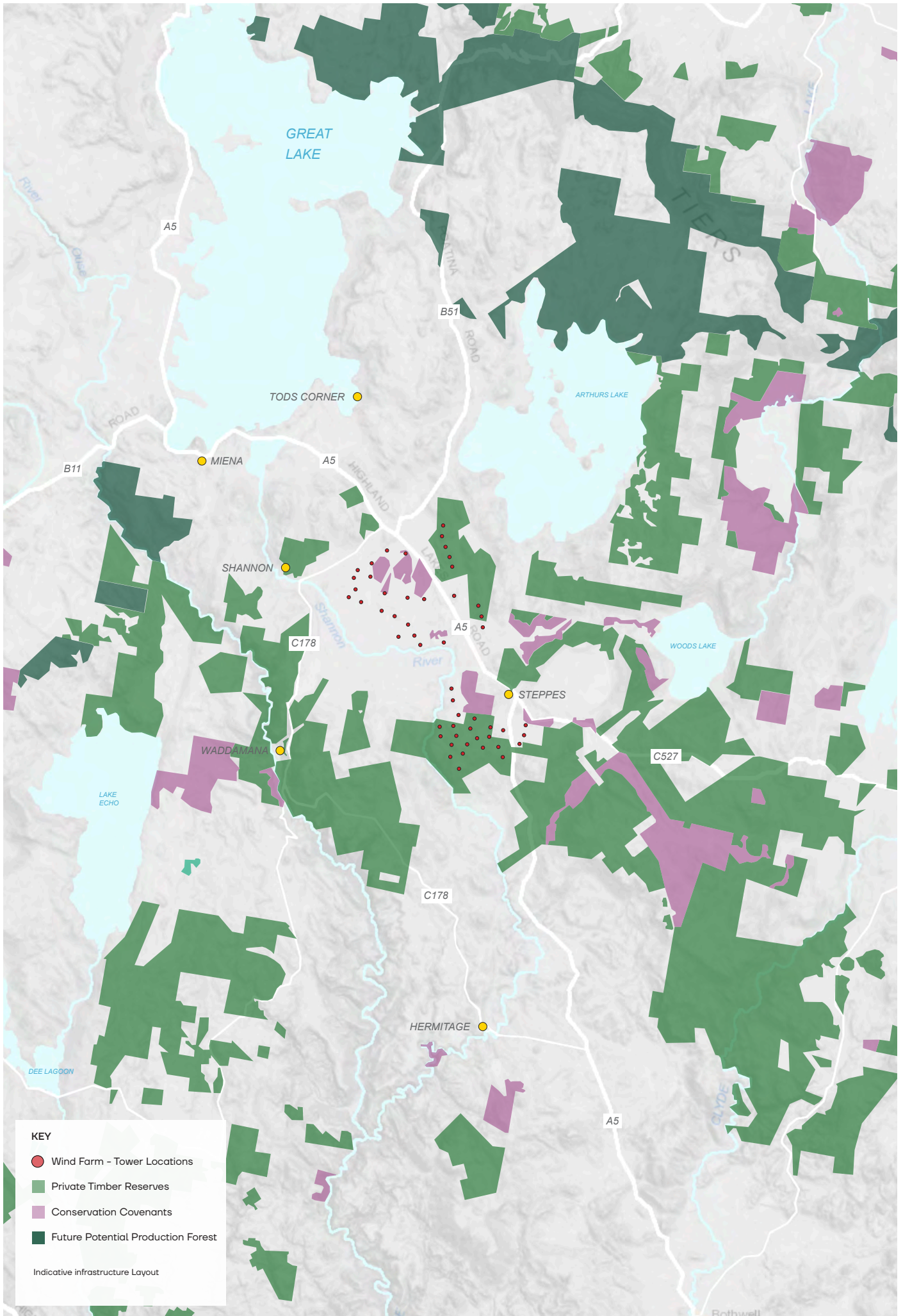
Forestry and agriculture have a long history in the area of the wind farm.

Forestry has had an impact on the region including areas of selectively logged forests and of monoculture plantation establishment.

The area is subject to future forestry operations with large swathes of remnant forest in the area zoned for Permanent Timber Production or nominated as Private Timber Reserves (Map 4.1). Where areas are logged, their screening value is eliminated or diminished for some time as regrowth occurs.

Agricultural practices have been focused on grazing supported by the clearing of land and the establishment of improved pasture across portions of the wind farm site and large areas of its surrounds.

¹⁰ Jackson, W.D. 1968. "Fire and the Tasmanian Flora" in the Tasmanian Yearbook 2:50-55. Commonwealth Bureau of Statistics, Hobart.
¹¹ Ryan, L. 1981. **The Tasmanian Aborigines** University of Queensland Press, St Lucia, Qld.



MAP 4.1 Forest Harvesting Map

Electricity generation

The Central Highlands are at the heart of the hydro-electricity story in Tasmania, the Waddamana Power station being the first in the State (commissioned 1916) and the centre-piece for what was to become the Great Lake Power Scheme (now the yingina/Great Lake Power Scheme). Today, hydro-electric development is a feature of virtually the whole of the region, some aspects of it being more readily apparent than others.

For instance, on approaching the wind farm from the south, transmission lines (the Waddamana-Lindisfarne and Waddamana-Bridgewater lines) are a dominant presence parallel to a long stretch of Highland Lakes Road, in places crossing over the road to run either side of it.

These same lines (the Waddamana-Lindisfarne and Waddamana-Bridgewater lines) are visible in many places from Waddamana Road as they run south from Waddamana. Closer to Waddamana the Cattle Hill (Bashan Plains) wind farm comes into view in conjunction with these transmission lines.

North from Waddamana, the Waddamana-Parknock high voltage line roughly parallels Waddamana Road to the north of the road. Three further high voltage lines (Waddamana-Palmerston, Liapootah-Palmerston and Liapootah-Palmerston No. 2) roughly parallel Waddamana Road to the east of Penstock Lagoon (a hydro impoundment).

All four lines converge on the northern edge of the wind farm, crossing Highland Lakes Road in close proximity to Poatina Road. From there they run parallel to Poatina Road as far as the northwestern edge of Arthurs Lake.

An open water race runs parallel to Waddamana Road from just north of Penstock Lagoon as far as its offtake at the Shannon Lagoon.

There are power stations at Tods Corner and Waddamana (decommissioned).

All of the lakes in the area have been modified as storages for hydro purposes. Great Lake, Arthurs Lake and Woods Lake are part of the yingina/Great Lake-South Esk power scheme. Lake Echo contributes to the Derwent power scheme. Penstock Lagoon, originally built to supply water to the Waddamana Power Station, is no longer used for electricity generation.

Water levels in the lakes regularly go up and down depending on generating requirements. At higher levels, inundated forests remain visible creating a stark scenery (say for instance at Arthurs Lake) and at lower levels expansive shorelines (particularly at Great Lake) are exposed, some with multiple dead trees (Arthurs Lake).

The dam wall at Miena, a prominent feature in the landscape from Highland Lakes Road, is promoted as a stopping point on the highway. The Penstock Levees 1 and 2 are readily accessible and visible from Waddamana Road.

Most recently, the Cattle Hill wind farm has been developed on the eastern shore of Lake Echo, west of Bashan Road (C177). The wind farm consists of 48 turbines. The wind farm is visible from Waddamana Road when traveling north from the A5. The Cattle Hill wind farm links to the existing high voltage transmission lines passing the site.

Settlement patterns

Residential living areas and individual residences are located within the viewshed to the wind farm. Early pastoralists were recorded in the area as early as 1817¹² where they found open, grassy plains well suited to grazing. The Hermitage was established not long after this, and from the mid 1800s other historic properties including at the Steppes.

More recently, shack developments have arisen in the area because of the proximity to nearby fisheries and their location in semi-natural settings, albeit settings impacted or created by the presence of hydro-electric development. Some may have retained blocks of native vegetation on their properties for their scenic and environmental values. Residents of these settlements have a familiarity with the landscape that is deeper than that of visitors, with changes in the naturalness of the landscape likely viewed as being an undesirable visual impact and an intrusion on their sense of place.

Miena is the location with the largest cluster of residences/shacks in the region stretching for some distance along the southern shore of yingina/Great Lake. In the absence of vegetation, the tips of some turbine blades may be seen from parts of Miena but realistically, the wind farm will be unseen from the settlement.

Other, smaller shack settlements are scattered around the more immediate periphery of the wind farm, particularly to the north and east, with smaller settlements to the west. GIS analysis of the seen view in the absence of vegetation indicates that the wind farm is not visible from Tods Corner and that views of the wind farm vary including from: Flintstone (1-10 tips max), Wilburville (1-10 tips max), Morass Bay (1-10 tips max), Arthurs Lakes (up to 30 tips), the eastern shore of Penstock Lagoon (less than 10 and up to 50 tips depending the location in the cluster of shacks) and at the Shannon settlement (up to 50 tips). In places, screening by existing vegetation reduces the actual number of views available of the wind farm (see Section 5.1 for further discussion regarding seen views).

Other significant properties in the area include the heritage listed Steppes Homestead, Hermitage (owned by one of the involved landowners), the property known locally as Wihareja" at 4244A Wadamanna Road (also owned by one of the involved landowners) and Christian Marsh (also owned by one of the involved landowners), all of which remain active farming/forestry establishments.

The density of settlement is low, with approximately 85 residences/shacks and 3 historic buildings being located within 20 kilometres of the wind farm. Of the 85 residences, 3 are located within the wind farm property boundary.

¹² Von Stieglitz 1958. *The History of Bothwell* Telegraph Publications, Launceston.

Tourism and Recreation

Highland Lakes Road (A5) is part of the 'Heartlands', a designated Tourism Tasmania road trip that includes the Central Highlands – the 'Heartlands' promoted as “a wild landscape of lakes, mountains and moors with a rich hydro-industrial legacy”¹³. Sealing of the final section of the Highland Lakes Road was recently completed as part of the State Government’s Visitor Infrastructure Upgrade Program. As a result, the A5 is now sealed through from Deloraine on the Bass Highway to Melton Mowbray on the Midland Highway. The Central Highlands Council also promotes the area via its “Highlands Tasmania” touring map which highlights use of A5 and Waddamana Road (C178) as routes worth traveling.

The “Highlands Power Trail” (Bothwell to Miena) includes Waddamana Road from its junction with the Highland Lakes Road (A5) in the south and its reconnection in the north. Stops along the trail promote the history of hydro-electric development in the area which was challenged by ‘exposed conditions’ and where workers ‘battled the elements’ and ‘tough conditions and isolation’¹⁴.

Tourists are mainly drawn to the region because of its close proximity to nearby recreational fishing areas. Brown trout were introduced to Great Lake and the Shannon in 1870 and rainbow trout not long after. Soon after, the Central Plateau became the favourite fishing ground in the State.

With the hydro-electric power schemes from the early 1910s, water bodies increased in size providing greater area and depth, adding to the value of the recreational fishery. Today, the Central Plateau remains a sought after destination for recreational fishing both on its lakes and along its rivers despite the harshness of the scenery and the exposure to the elements with the landscape’s openness. The Inland Fisheries Service ensures there is sufficient water in these storages for fishing purposes.

Arthurs Lake is considered to be one of Tasmania’s most popular trout fisheries and Penstock Lagoon is a fly fishing water of high repute. Lake Echo is considered a consistent producer of quality trout. The Shannon Lagoon is much written about as a fly-fishing location. Little is published about fishing in the Shannon River below the lagoon because it runs across private land and has no public access.

Tourists passing through the area are encouraged to stop and take in the Steppes Sculptures and the Steppes Homestead, both located within the Steppes State Reserve managed by the Tasmanian Parks and Wildlife Service. The Steppes Homestead is a site of historic significance as part of the early settlement of the area for sheep grazing. The Steppes Sculptures are a monument dedicated to those who “share in the love and care of the Highlands of Tasmania”¹⁵.

13 See <http://centralhighlands.tas.gov.au/wp-content/uploads/Highlands-Tasmania-Touring-Map.pdf> (accessed 27.11.20).

14 See <https://www.hydro.com.au/things-to-do/highlands-power-trail/driving-tips> (accessed 27.11.20).

15 See <https://www.roamingdownunder.com/steppes> (accessed 07.12.2020).

Local Residents Opinion

The wind farm proposal is in proximity to the settlements of Miena (87 permanent residents), Tods Corner (8 permanent residents), Flintstone (4 permanent residents), Morass Bay (4 permanent residents), Wilburville (16 permanent residents), Shannon (0 permanent residents) and Waddamana (4 permanent residents)¹⁶. These census figures do not include other buildings that may be used as residences on an occasional or temporary basis (e.g. holiday home, huts, shacks).

The web-site managed by residents opposed to the wind farm speaks to a strong connection to the landscape, a familiarity with the landscape setting and concern about changes in the character of the landscape, that is impacts on their perceived sense of 'remoteness' and the loss of the area's 'unique scenery'¹⁷.

4.1.3 Planning Scheme

The *Central Highlands Interim Planning Scheme 2015* (the Scheme¹⁸) is largely mute on landscape or scenic amenity protection apart from a brief mention in the Planning Scheme Objectives under clause 3.0.6 Natural Environment: Regional Objectives which states that one desired outcome is to recognise and protect the significant values of the region including its scenery. This is to be achieved through the application of codes protecting "landscape" amongst other things. However, the Scenic Landscape Code, where consideration is typically given to landscape values, is not used in the Scheme.

Elsewhere in the Scheme, little consideration is given to landscape values. For instance, under the Scheme, the wind farm and the bulk of the area around it are zoned Rural Resource. Nothing in the Zone Purpose, Local Area Objectives, Desired Future Character Statements or Use Standards refers to the protection of landscape values or scenery.

Small pockets of land at Flintstone, Tods Corner, the Barren Plains Road, Wilburville and Morass Bay are zoned Low Density Residential, with a small area of land at Wilburville zoned Rural Living. Similar to the Rural Resource Zone, nothing in the Zone Purpose, Local Area Objectives, Desired Future Character Statements or Use Standards refers to the protection of landscape values or scenery.

A parcel of land encompassing the Steppes Conservation Area is zoned Environmental Management as are several small sections of the Shannon River. Nothing in the Zone Purpose, Local Area Objectives or Desired Future Character Statements refers to landscape values or scenery. The performance criteria under Use Standards do, however, refer to uses not having an "unreasonable impact upon the amenity of the surrounding area" – amenity being the "qualities, conditions or factors that makes or contributes to the making of the locality, place or

¹⁶ Population based on 2016 Census ABS data.

¹⁷ See <https://www.noturbineactiongroup.org/>

¹⁸ Note that a new planning scheme is currently on display for public review.

building harmonious, pleasant or enjoyable". Amenity in this definition is likely to include landscape values.

The Historic Heritage Code recognises the need to protect the historic cultural heritage significance of heritage places. The Steppes Hall is a listed place in the Scheme and the Tasmanian Heritage Register.

4.2 LANDSCAPE CHARACTER TYPE

Landscape character types are "physiographic regions with common distinguishing visual characteristics of landform, waterform, vegetation and cultural influences"¹⁹. It is generally agreed there are 11 regional landscape 'character types' in Tasmania (Map 4.2).

The wind farm falls into the Central Plateau Landscape Character Type (LCT). The Central Plateau LCT is described as being undulating and generally barren as a result of glaciation, with large water bodies and pockets of eucalypt forests and woodlands. All of these features occur in parts of the immediate area of the wind farm. Hydroelectricity generation, recreation and tourism are seen as the most important land uses in the character type set amongst areas of seasonal grazing and forestry²⁰.

As discussed and of importance to this study, electricity generation is a feature of much of the area of the wind farm, some electricity infrastructure being more readily apparent than others. The breadth and diverse nature of the Central Plateau landscape character type and the extent to which electricity generation is a feature of the LCT, but not all of it, suggests further differentiation is required to define the nature of the landscape in the area of the wind farm.

In other regions of the State this has been achieved by defining landscape character "sub-type" to demarcate units of varying sizes that share many of the common landscape features of the LCT but also have distinctive common environmental and cultural influences that can be readily identified²¹.

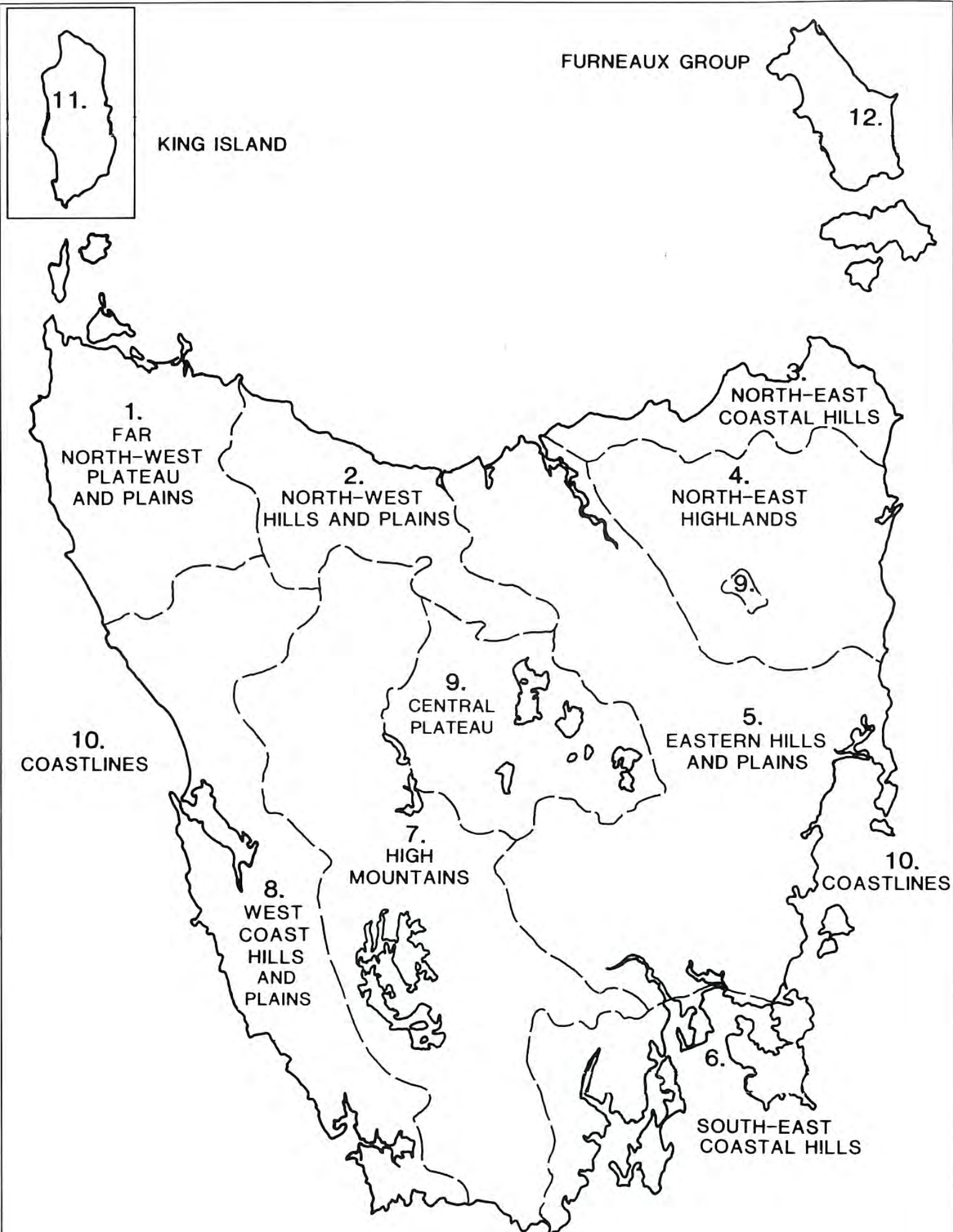
The overall result of historic development in the area of the wind farm means that its landscape character is a sub-type of utility, where electricity generation infrastructure is readily apparent and a dominant feature of the landscape. The sub-type includes features such as impoundments of varying sizes subject to rise and fall, high voltage transmission lines and way-leaves, other hydro infrastructure and a wind farm. These elements are threaded through a low-moderate scenic quality landscape (see Section 4.3) with large expanses of improved pasture for grazing in varying condition, a modicum of remnant forests and commercial forestry and sparsely populated living areas. The sub-type covers the area of the wind farm (St Patricks Plains), the full extent of which is likely larger but is not defined herein.

19 Forestry Commission op. cit. (1990). p. 49

20 Forestry Tasmania 1990. *ibid.* pgs 165 and 171.

21 Forestry Commission 1990. *op.cit.* pg 159. In this case, other sub-types for the Central Plateau LCT might include a "highland lakes sub-type" and a "tiers sub-type". These remain to be defined by others.

Landscape Character Types



MAP 4.2 Landscape Character Types (Source: Forestry Commission 1990)

4.3 SCENIC QUALITY

A frame of reference has been developed for the Central Plateau landscape character type that enables aspects of scenic quality to be assessed into classifications of high, moderate and low based on the attributes of the type area (Attachment B). The frame of reference is applicable to the landscape character sub-type where the proposed wind farm is to be located.

Evaluation of the setting of the wind farm against the criteria of the frame of reference for the Central Plateau LCT indicates the **low-moderate scenic quality** of the landscape – that is large tracts of land lack distinctive features or variety that would rate as having high scenic quality.

Extensive areas of flat land on the plains support large acreages of improved pasture with scattered trees. These flat areas are seen in contrast to the low rolling hills of the tiers north and south of the wind farm. These hills retain areas of remnant woodland and forest with little discernible variation in vegetation type.

St Patricks Plains is dotted with small water bodies and marshes. The Shannon River bisects the plains running generally north to south from its source at yingina/Great Lake. Although relatively large in size, the Shannon River is largely unseen because of the low rolling topography it traverses across the St Patricks Plains, and then between the Diamond Tier and the Bakers Tier south to where it parallels the Highland Lakes Road.



Photograph 4.1 A low-moderate scenic quality landscape - improved pasture in the foreground (low scenic quality) with rolling forested hills as backdrop (moderate scenic quality) (Source: Inspiring Place).

4.4 SCENIC INTEREST

Dame Sylvia Crowe in her classic text *The Landscape of Power* suggested that “The balanced landscape which we need at this point in our evolution, is one in which the excitement and possibilities of the new machines may in certain areas be seen contrasted against the peaceful background of a landscape matured in the age-tested harmony of nature.”²² Her assertion being that development should not be solely judged on its visual properties but should also be valued for its form, layout, design and symbolism and the degree to which these enthuse the imagination and the ‘aesthetic emotion’²³.

Accordingly, in trying to understand the potential impact of the wind farm on the existing landscape, the aspects of the development that may lend positive character to the landscape need to also be considered. These qualities are considered as ‘scenic interest’ as distinct from ‘scenic quality’. Measuring and ascribing value to scenic interest attempts to account for Crowe’s suggestion that industrial infrastructure may have value in the visual landscape for the fascination found in its built form and/or the visible expressions of its workings.

More specifically, scenic interest can be found to be associated with:

the design aesthetic – the harmony of design and planning;

a unity of function – where unity refers to the perception that form and function share a common association;

legibility – that is, the rational and understandable layout of features and a strong and fitting relationship between the proposed elements and the character of their surrounds;

a general sense of order – e.g. tidiness, the rehabilitation of disturbances and the lack of incongruous elements that detract from a sense of hierarchy or the integrity of a development;

a strong presence – generated by scale or colour and valued where these are in keeping with the character and scale of the development’s surrounds; and

the excitement and possibilities of a new technology – the evident suggestion of new, environmentally friendly and highly engineered and designed facilities, including use of modern materials, to lend interest to otherwise utilitarian functional elements.

22 Crowe, S. (Dame Sylvia) 1958. **The Landscape of Power** Architectural Press, London. pg 21.

23 The first response on seeing the landscape is an emotional one. Clive Bell in his treatise on the aesthetics of art (Bell, C. 1914. **Art** Oxford University Press edition of 1987, pg. 6.), stated that “the starting point for all systems of aesthetics must be the personal experience of a peculiar emotion” which he called the “aesthetic emotion” Bell recognised that emotional response arises from the “significant form” of an artwork (e.g. a wind turbine), achieved by combining lines, shapes, colour and textures, to which are added here concepts of how the scene is arranged and the circumstances in which we experience the view (e.g. the wind farm layout).

In response to these factors, a scenic frame of reference for rating ‘scenic interest’ was previously developed²⁴ and later refined in other Tasmanian studies²⁵ (Attachment C).

While scenic interest does not necessarily mitigate negative visual impacts, it does, nonetheless, ameliorate them by adding positively to the landscape setting thus contributing to the acceptability of the impact.

The experience of the scenic quality of the landscape has been impacted by previous hydro-electric developments which have limited “scenic interest” that might offset their distraction from the experience of the landscape. By comparison, the wind farm could be a highlight for many in an otherwise drab landscape with limited scenic value. Indeed, in a study of wind farms in South Australia, the presence of a wind farm was found to add interest and diversity to an otherwise mediocre landscape and thus enhanced perceived scenic quality²⁶. Such could be the case in the case of the St Patricks Plains wind farm.

24 Jerry de Gryse Pty Ltd 1994. “Bell Bay Major Industry Zone: Visual Values Assessment and Management” unpublished report to the Bell Bay Major Industry Zone Steering Committee

25 Inspiring Place 2001. “North West Industrial Area Visual Aesthetics Assessment” unpublished report to Thompson Brett Engineers and Inspiring Place 2000. ‘Musselroe Wind Farm and Associated Transmission Line Visual Values Inventory and Impact Assessment’ unpublished report to Hydro Tasmania and Inspiring Place 2002. “Heemskirk Wind Farm and Associated Transmission Line Visual Values Inventory and Impact Assessment” unpublished report to Hydro Tasmania.

26 Lothian, A., 2008. “Visual impact assessment of some developments in South Australia.” **Australian Planner** 45 (4): 35–41.

5. SENSITIVITY

Most landscapes are viewed from multiple locations and subsequently the viewpoints vary in the degree of sensitivity to alterations to the landscape character of a setting. Various factors contribute to the rating of sensitivity, amongst these is the 'seen view', that is, the location of a viewpoint ('from where is the landscape seen?') and the frequency of viewing from representative viewpoints ('how often is a part of the landscape viewed?'). The 'seen view' for the wind farm is discussed in Section 5.1.

This information is then further evaluated in Section 5.2 in relation to the wind farm in terms of:

viewing distance ('from how far away is the landscape seen?');

duration of viewing ('for how long is part of the landscape viewed?'); and

expectations of the viewer ('who is doing the viewing and what do they expect to see?')

Together, the information in Sections 5.1 and 5.2 provide an estimation of the sensitivity of the various settings to change.

5.1 SEEN VIEW ANALYSIS

Wind turbines are by design, intentionally prominent and, therefore, are conspicuous in the landscape.

GIS mapping was used to identify all areas from which each element of the wind farm could be seen and for the wind farm as a whole (Attachment D). The GIS examines the view in the absence of vegetation, that is, the theoretical seen view based on topographic screening alone (digital elevation mapping – DEM). Examination of the view without vegetation is the commonly adopted technique used in strategic planning by visual management professionals²⁷ as it accounts for the loss of vegetation from fire, senescence, clearing, disease, etc.

Digital elevation mapping (in the absence of vegetation) (Map 5.1 Turbine Visibility, Map 5.2 Tip Visibility) indicates that the wind farm will be most visible within 5 kilometres of the wind farm ((foreground and middleground (see inset)) where most or all of the 50 towers and/or their blade tips will be potentially seen from multiple locations. In the absence of vegetation these include from the Highland Lakes Road, along Waddamana Road and Poatina Road, from the Steppes Homestead and the Steppes Hall, the residences at the Shannon and from Penstock Lagoon.

²⁷ Forestry Commission 1990. op.cit. pg 113. Nonetheless, project level design considers the value of existing vegetation for its potential to screen development and mitigate impacts as is the case herein.

The maps indicate that in the absence of vegetation, distant views are constrained by adjacent topographic features (Barren Tier and ridgelines to the northeast and landforms southwest of the Steppes Homestead) and further out by other elevated ranges out to 20kms (background).

Distance is measured in terms of foreground (0-1 km), middleground (1-5 km), background (5-20 km) and far background (>20 km) (Figure 11). Detail, colour and texture are strongest in the foreground. The middleground is the most visually critical area of the landscape where alterations are typically seen in their fullness with sharp edges and colour clearly visible. In the background the emphasis is on the outline or edge of features as colour and texture are indiscernible. In the far background line and shape dominate as colour and texture become indistinguishable.

In the foreground and middleground (ie out to 5 km) the northern portion of the wind farm is more exposed to viewing due to the large open paddocks in which it sits (Photomontage 5.1). Proximate views from the road means viewers will readily identify the strong contrast between the wind farm and the adjacent landscape even though their views may be fleeting. Viewers in nearby residences will have sustained opportunities to identify the strong contrast between the infrastructure of the wind farm and the landscape in which they are living.

The southern portion of the wind farm is seen from greater distances due to the siting of turbines on the higher ground of the Baker Tier on both its north and south facing slopes. Adjacent vegetation in this area provides some measure of screening of the base of the turbines in long distance views. In closer more proximate views from the Highland Lakes Road, vegetation has greater screening value because of its immediacy to the viewer.

The mapping in the absence of vegetation (DEM) indicates that multiple turbines and/or the tip(s) of their blades could be seen by the well-sighted under favourable conditions (i.e. accounting for weather, time of day, sun angle, etc.) from locations ± 50 kilometres away (far background²⁸). Map 5.2 shows up to 50 tips being visible from elevated positions west and southwest into the State Forests of the Florentine, the hills southeast of Bothwell and Kempton and at some limited locations northwest on the Central Plateau. The areas seeing up to 50 turbines in the absence of vegetation at ± 50 kms is much more limited and again restricted to high elevations (Map 5.1).

It is assumed that the magnitude of the impact of the visibility in the far background (>20kms) will not be significant. Many of the mapped viewing locations are in State Forest or on private land or in areas not typically visited by the public or from concentrations of private residences.

Further, at distances (>20kms) the wind farm will:

only form a small portion of an observer's field of vision;

potentially be detected but without sufficient size or contrast to compete with other elements in the landscape;

²⁸ The Bureau of Land Management in the United States describes the distance zone beyond 24 km (15 miles) as 'seldom seen'.

likely framed against other background elements (as opposed to being seen against the sky and particularly when viewing from higher elevations);

be muted in colour; and

less recognisable, suffering from ‘distance decay’ where there is a reduced capacity to identify and recognize features²⁹.

It is unlikely that at these distances, the whole of any one tower will be seen, with lower portions of the towers screened by adjacent vegetation and or landform.

At very long distances, tip motion is also less likely to be seen, if seen at all and only when viewed face on and in the clearest of air, especially if the blades are not turning. At right angles, blade movement would likely not be seen.

Accounting for vegetation the proposed infrastructure will be less seen in the landscape than the DEM suggests owing to the extent, density and height of forested areas and the complexity of the local topography which together help contain visibility of the hubs and tips (Photomontage 5.2).

‘Viewing opportunities’ are those places with a similarity of their location and a general equivalence of views to the proposed wind farm. Viewing opportunities can be grouped based on categories of viewing typically used in visual impact analysis³⁰ including views from state highways (Map 5.3), protected areas, listed historic properties, settlements and recreational areas (Attachment E).

Table 5.1 summarises results of the GIS mapping about the theoretical visibility of the tips and hubs (i.e. in the absence of vegetation) from various key locations around the wind farm. The general area of most of these locations was visited during fieldwork to confirm the accuracy of the data³¹. Epuron have prepared photomontages³¹ from some locations that give a more realistic representation of the number of tips and turbines that would be visible if vegetation were taken into account (see Attachment F).

As mentioned, however, remnant vegetation is not a permanent fixture of the landscape due to fire, senescence, clearing, disease, etc. Map 3, for instance, showed areas of Private Timber Reserves and Future Potential Production Forest – areas which are all potentially subject at various times to clearing (and in some cases recent clearing) for the establishment of plantation forests. In some instances, removal of existing forest or established plantations will open more of the wind farm to viewing. This is particularly the case in the southern part of the wind farm where much of the remnant forests on the Bakers Tier and Goldies Sugarloaf are in Private Timber Reserves. These forests are particularly important in limiting views of turbines

²⁹ Miller, D.R., S. Bell, M. McKeen, P.L. Horne, J.G. Morrice, and D. Donnelly. 2010. “Assessment of Landscape Sensitivity to Wind Turbine Development in Highland. Summary Report. Prepared by Macaulay Land Use Research Institute for the Highland Council [Scotland].

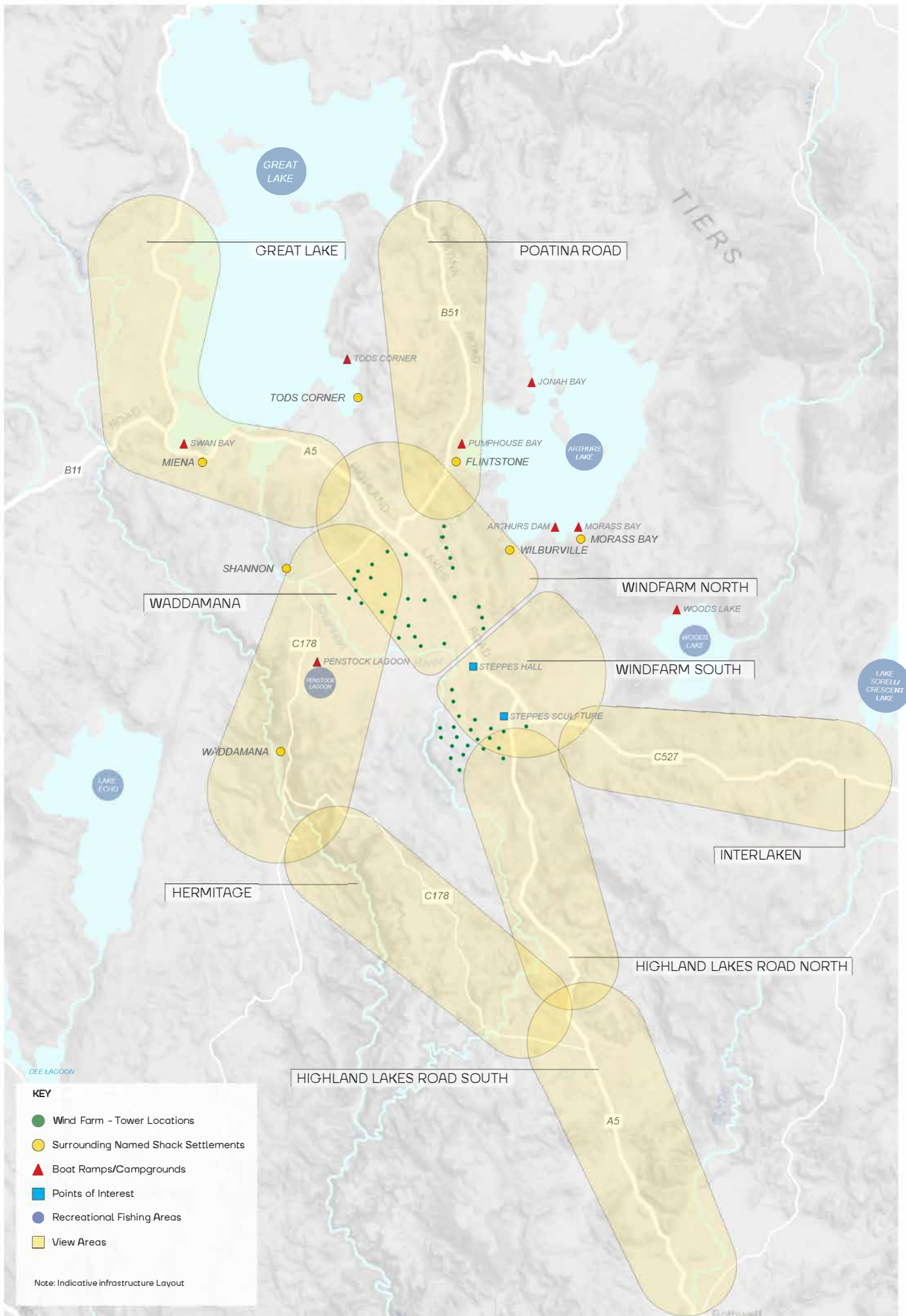
³⁰ Forestry Tasmania categorized the sensitivity of varying types of viewpoints based on viewer numbers and their likely level of concern about changes in the landscape. A more refined version of the Forestry table first applied in Victoria’s forests in the late 1970s and used herein analyses similar variables but draws distinction between sensitivity arising from numbers of viewers (who may only have moderate or little concerns about change) compared with those where there is less frequent viewing but a clearly higher concern about change (say for instance from a remote walking track of national significance) (Attachment E).

³¹ Residences on private land were not accessed. For residences on private land, locations nearby were examined that approximated the expected view from the mapped dwelling.

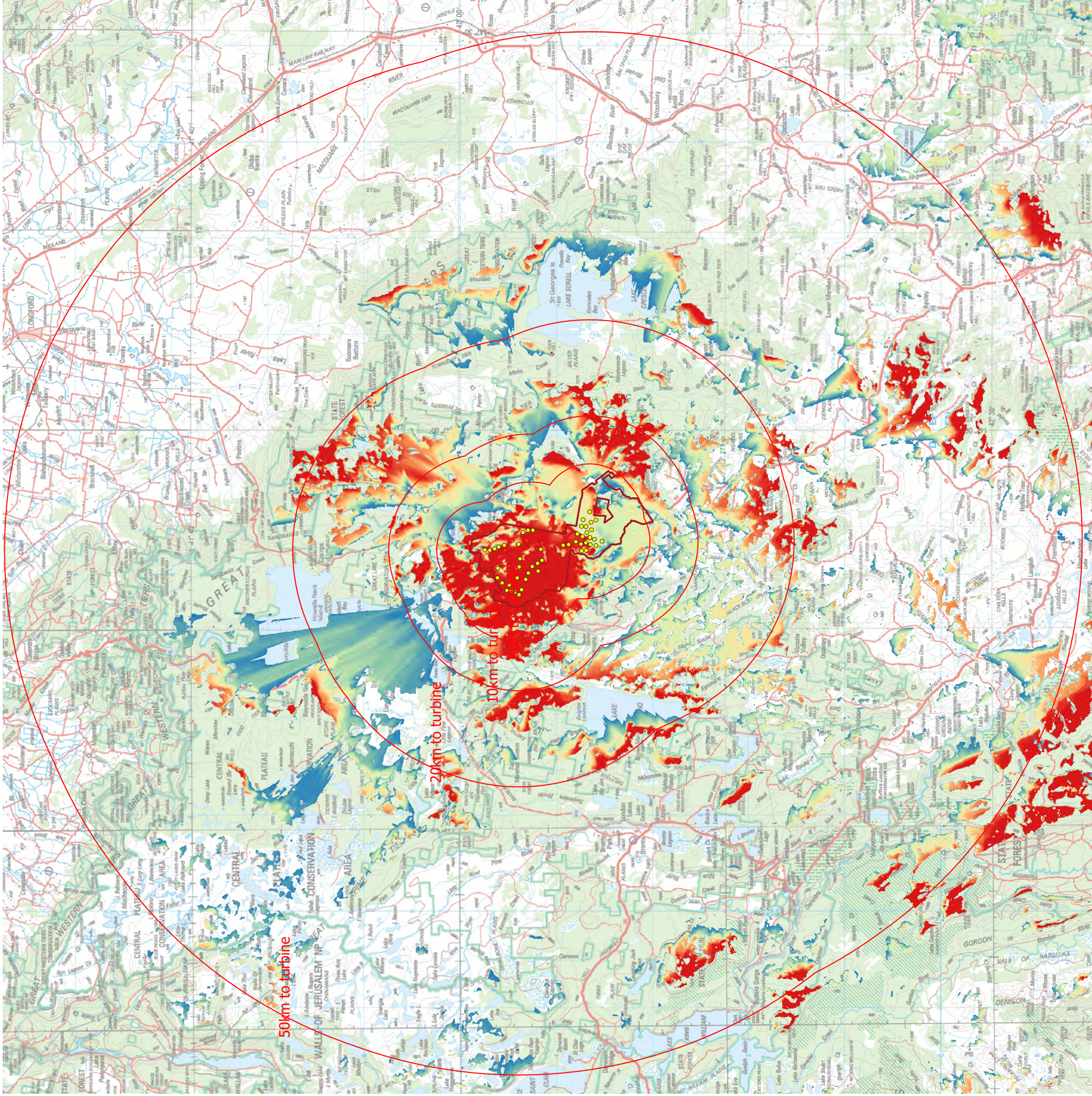
to be located in this area in views from the Highland Lakes Road in the area of the Steppes Reserve³² that will protect its screening value, and from Interlaken Road.

Construction of some turbines in the south of the wind farm near the Steppes homestead will result in the removal of remnant vegetation to allow for the 40m x 120m hard stand area required for construction of the towers thereby reducing the screen potential of the forests in these areas at the time of establishment of the wind farm.










³² Note that the Steppes Reserve itself is protected by a conservation covenant that would preclude the clearing of forests within it.



MAP 5.1 Viewing Opportunities



Legend

-  Project Boundary
 -  Distance from nearest turbine
 -  Wind turbine
- Number of Tips Visible**
-  1.0000
 -  10.0000
 -  20.0000
 -  30.0000
 -  40.0000
 -  50.0000

Notes:

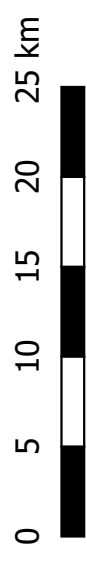
- ZVI assumes a tip height of 231m and a hub height of 150m.
- ZVI is based on a digital elevation model and does not account for any screening by vegetation.

Map 5.2

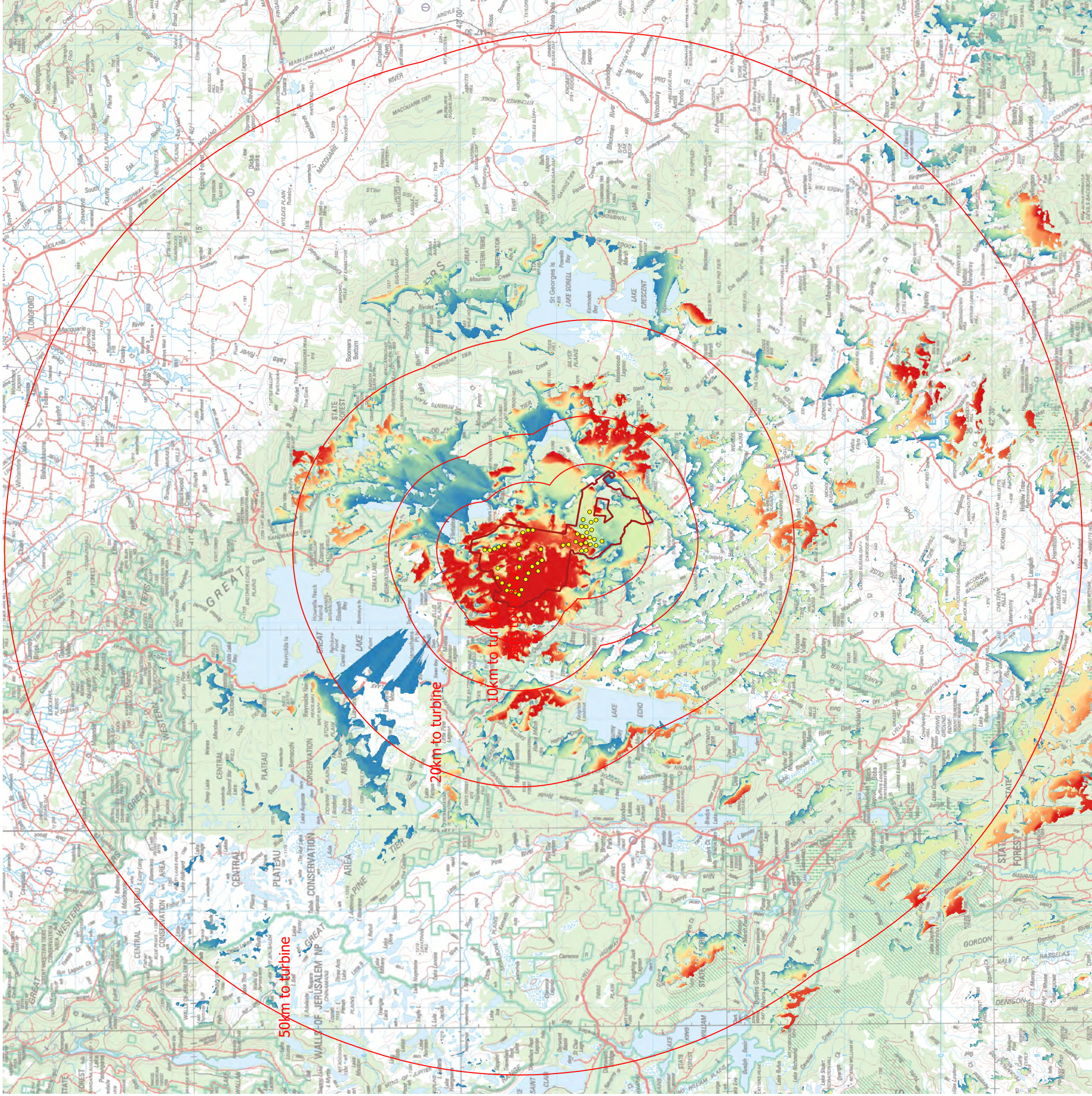
Tip visibility within 50km

EPURÓN










Date: 06/05/21



St Patricks Plains Wind Farm



Legend

-  Project Boundary
 -  Distance from nearest turbine
 -  Wind turbine
- Number of Tips Visible**
-  1.0000
 -  10.0000
 -  20.0000
 -  30.0000
 -  40.0000
 -  50.0000

Notes:

- ZVI assumes a tip height of 231m and a hub height of 150m.
- ZVI is based on a digital elevation model and does not account for any screening by vegetation.

Map 5.3

Hub visibility within 50km

EPURÓN

Date: 06/05/21



St Patricks Plains Wind Farm

Table 5.1 Theoretical visibility of the wind farm from key locations in absence of vegetation (continues next page).³³

Theoretical visibility of Wind Farm from Viewing Opportunities and Key Locations		
Publicly accessible roads	Theoretical Visibility of Tips in the Absence of Vegetation	Theoretical Visibility of Hubs in the Absence of Vegetation
Highland Lakes Road South (A5 South)	M Up to 30 tips theoretically visible along North section of A5 up to Dungrove. Southern section of C527 not mapped as over 20 kilometers from the nearest turbine	M Up to 20 hubs theoretically visible along North section of A5 up to Dungrove. Southern section of C527 not mapped as over 20 kilometers from the nearest turbine
Highland Lakes Road North (A5 North)	M Majority of up to 30 tips theoretically visible. Small section of area where 40 tips theoretically visible	M Majority of up to 20 hubs theoretically visible. Small section of where theoretically 30 hubs visible
Wind Farm South (A5)	M-H 20+ up to 50 tips theoretically visible increasing with distance from the highway	M-H 20+ up to 50 hubs theoretically visible increasing with distance from the highway
Wind Farm North (A5)	H Up to 50 tips theoretically visible	H Up to 50 tips theoretically visible
Great Lake (A5)	L Up to 10 tips theoretically visible on A5. Small section where 20 tips theoretically visible near Liawenee	L Up to 10 hubs theoretically visible on A5 between Miena and Liawenee
Power Trail South (C178 South)	M Up to 20 tips theoretically visible	L Up to 10 hubs theoretically visible
Power Trail North (Waddamana Road) (C178 North)	H Up to 50 tips theoretically visible. Southern section of C178 near Waddamana Largely unseen	H Up to 50 hubs theoretically visible. Southern section of C178 near Waddamana largely unseen
Arthurs Lake Road (C525)	H Up to 50 tips theoretically visible in limited locations.	H Up to 50 hubs theoretically visible in some limited locations
Poatina Road (B51)	H Up to 50 tips theoretically visible between Penstock Lagoon and B51 - A5 intersection. Up to 30 tips theoretically visible North of Penstock Lagoon	H Up to 50 hubs theoretically visible between Penstock Lagoon and B51 - A5 intersection. Largely unseen north of Penstock Lagoon
Interlaken Road (C527)	H Up to 50 tips theoretically visible along C527 towards the Western section near Steppes. Eastern section of C527 not mapped as over 20 kilometers from the nearest turbine.	H Up to 48 hubs theoretically visible along C527 towards the Western section near Steppes. Eastern section of C527 not mapped as over 20 kilometers from the nearest turbine.
Named Shack Settlements		
Tods Corner	L Largely unseen	L Largely unseen
Flintstone	L Up to 10 tips theoretically visible	L Up to 10 hubs theoretically visible
Wilburville	M Up to 40 tips theoretically visible	L Up to 10 hubs theoretically visible
Morass Bay	M Up to 30 tips theoretically visible	L Up to 10 hubs theoretically visible
Shannon	H Up to 50 tips theoretically visible	H Up to 50 hubs theoretically visible
Eastern shore Penstock Lagoon	H Up to 50 tips theoretically visible	H Up to 50 hubs theoretically visible
Points of Interest		
Steppes Historic Site/Steppes Sculpture	H Up to 50 tips theoretically visible	H Up to 30 hubs theoretically visible
Steppes Hall (Tasmanian Heritage Register) (see Photomontage 5.1)	H Up to 50 tips theoretically visible	H Up to 48 hubs theoretically visible
Boat Ramps/Campgrounds		
Swan Bay, Great Lake (boat ramp)	L No likely viewing	L No likely viewing
Miena, Great Lake (boat ramp)	L No likely viewing	L No likely viewing

³³ Frequency of viewing was considered low where <10 elements of the wind farm (hubs or tips) would be theoretically visible, moderate where >11 but ≤40 elements would be theoretically visible and where high ≥40 elements would be theoretically visible

Theoretical visibility of Wind Farm from Viewing Opportunities and Key Locations		
Publicly accessible roads	Theoretical Visibility of Tips in the Absence of Vegetation	Theoretical Visibility of Hubs in the Absence of Vegetation
Tods Corner, Great Lake (boat ramp)	L No likely viewing	L No likely viewing
Woods Lake (boat ramp and campground)	L Up to 10 tips theoretically visible	L Up to 10 hubs theoretically visible
Morass Bay Arthurs Dam, Arthurs Lake (boat ramp)	M Up to 30 tips theoretically visible	L Up to 10 hubs theoretically visible
Boat Ramps/Campgrounds		
Jonah Bay, Arthurs Lake (boat ramp and campground)	M Up to 30 tips theoretically visible	L Up to 10 hubs theoretically visible
Pumphouse, Arthurs Lake (camping only)	M Up to 30 tips theoretically visible	M Up to 30 hubs theoretically visible
Penstock Lagoon (boat ramp and campground)	H Over 50 tips theoretically visible	H Up to 50 hubs theoretically visible
Recreational fishing		
Lake Echo	M Up to 20 tips theoretically visible from its western shore	M Up to 20 hubs theoretically visible from its western shore
Penstock Lagoon	H over 50 tips theoretically visible in parts with portions of the wind farm potentially seen from the whole of the lake	H Up to 50 hubs theoretically visible in parts with portions of the wind farm potentially seen from the whole of the lake
Great Lake	M up to 20 tips theoretically visible in its southern reaches (out to 20 kms from the nearest turbine) with potential visibility further afield (unmapped)	L Up to 10 hubs theoretically visible in its southern reaches (out to 20 kms from the nearest turbine) with potential visibility further afield (unmapped)
Arthurs Lake	H up to 50 tips theoretically visible from the northeast corner of the lake with some potential viewing of the wind farm from the southeast of the lake	M up to 20 hubs theoretically visible from the northeast corner of the lake with some potential viewing of the wind farm from the southeast of the lake
Woods Lake	M up to 20 tips theoretically seen, with some theoretical viewing to the wind farm from the whole of the lake	L up to 10 tips theoretically seen, with some theoretical viewing to the wind farm from the whole of the lake

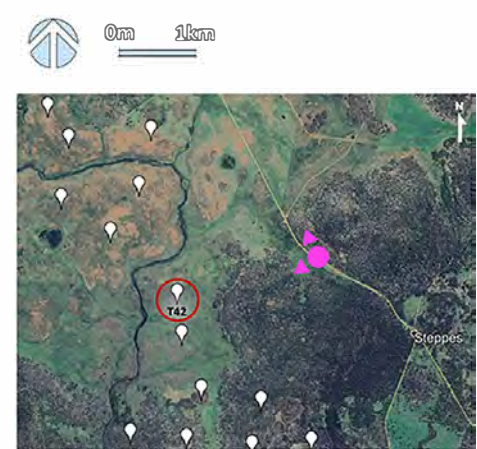
Table 5.1 Theoretical visibility of the wind farm from key locations (continued from previous page).

St Patricks Plains Wind Farm Preliminary Photomontage

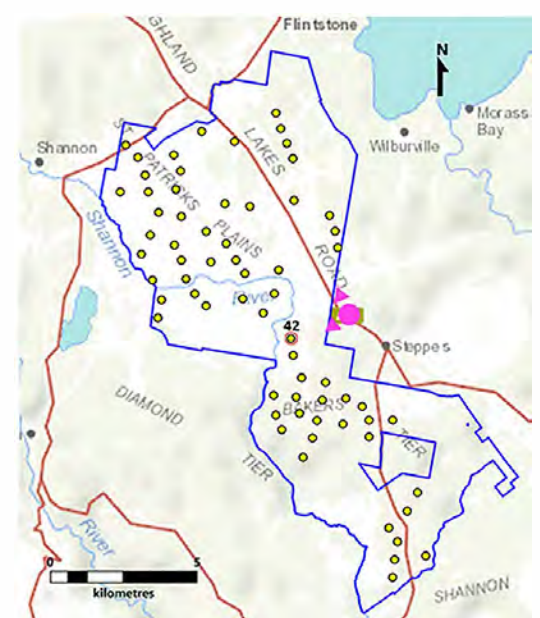


Photomontage 5.1 View from Highland Lakes Rd
 Approximate distance to closest visible wind turbine T42 is 1,990 metres

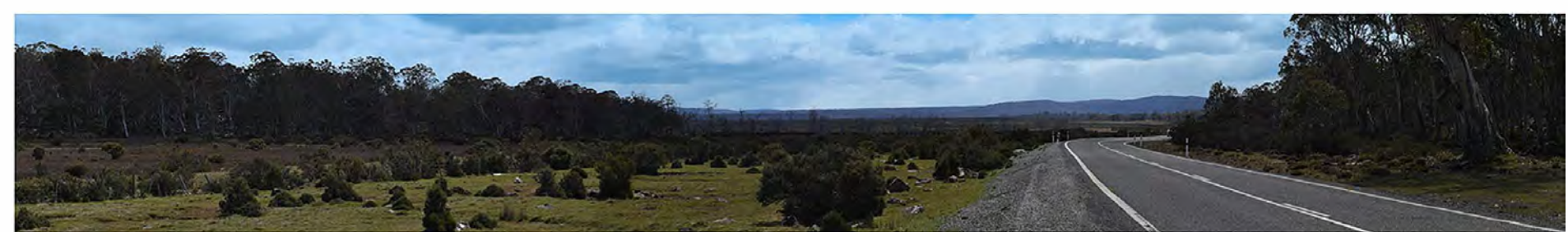
Legend
 Approximate photo location and indicative view direction toward St Patricks Plains Wind Farm turbines



Aerial location plan



Site layout plan



89° panorama

General Notes

Photos taken at 2:17pm on 11th December 2019.
 Coordinates: E:489928, N:5339947
 Elevation: 916m AHD
 Camera: Nikon D610, 50mm 1:1.4D Lens
 Original Format - A0 Landscape
 240m tip height, 150m hub height and 180m rotor.

This viewpoint has a horizontal view angle of around 67 degrees.
 This is a preliminary layout only and is subject to change as detailed planning proceeds.
 Closest visible turbine indicated by red line.

* The purpose of this Photomontage & Wireframe is to provide a 'representation' of the possible visual impact of this project for the purpose of discussion. The layout is subject to change in accordance with the planning process. These images give a reasonable impression of the scale of turbines and the distance to turbines, but due to vegetation screening and the complexity of working off useful landscape features, they cannot be 100% accurate. A static image cannot convey turbine movement, different lighting, weather and seasonal conditions that vary through time and resolution of image.

5.2 SENSITIVITY

Table 5.2 sets out a hierarchy of rating of sensitivity for a number of factors ranging from high to low.

Table 5.2 Hierarchy of sensitivity various factors (continues next page)

Factor	High sensitivity	Moderate sensitivity	Low sensitivity
Composition of the view	Uniform, apparently natural landscape High scenic quality setting	→	Patterned landscape of mixed land use and/or vegetation Degraded/Low scenic quality setting
	Alteration is the focus of a panoramic view	→	Alteration seen as fractional part of a wider landscape
	View is from a fixed point	Viewer is on the move but the alteration is seen as part of a focused view	Viewer is on the move
Frequency of viewing (number of viewers)	Alteration seen by large numbers of viewers ³⁴ .	→	Alteration unseen or seen by limited numbers of viewers
Visibility	Multiple views from a location to the alteration	→	Limited or no view from a location to the alteration
Distance	Alteration seen in the foreground (near)	→	Alteration seen in the background (far)
Duration	Alteration permanently in the view or part of a focused view	→	Alteration only seen in glimpses
Location	Promoted public viewing area with high visitation views the alteration	→	Isolated viewing area, low visitation with views to the alteration
	Residential living areas, permanent living with views to the alteration	→	Isolated homes, temporary living with views to the alteration
Viewer Expectation	Alteration traverses/located in a natural, apparently	→	Alteration traverses/located in a highly

³⁴ See for instance Forestry Commission 1990. Op. cit. pg 51 or Scenic Spectrums Pty Ltd adapted from Williamson, D. and Calder, S. 1979. "Visual Resource Management of Victoria's Forests: A New Concept for Australia in **Landscape Planning** Volume 6, Issues 3-4, Pages 313-341.

Factor	High sensitivity	Moderate sensitivity	Low sensitivity
	natural or largely undisturbed landscape		modified landscape

Table 5.2 Hierarchy of sensitivity various factors (continued from previous page)

Table 5.3 evaluates the sensitivity of the viewing opportunities to the impacts that might arise from the wind farm taking into account the viewing situation (i.e. disposition, scenic quality and condition of the landscape), the theoretical and likely frequency of viewing, the distance from the wind farm, the duration of the view and viewers' expectations per Table 5.2.

Table 5.3 Evaluation of sensitivity by viewing opportunity (location) (continues following pages)

Viewing Opportunities	Viewing Situation: Disposition, Scenic Quality, Condition	Theoretical frequency of views to wind farm elements (tips/hubs)	Likely frequency of views to wind farm elements accounting for vegetation (tips/hubs)	Distance from infrastructure	Duration ³⁵	Viewer expectation	Sensitivity of the Place
Publicly accessible roads							
Highland Lakes Road South (A5 South) – principal route through the Central Highlands providing access to settlements and residences, recreation areas. Nominated tourist route – the ‘Highlands’ with likely continuing increase in the use of the A5 a tourist route following completion of the sealing of the entire road in 2019.	<p>Approaching from the south the landscape is broad and open with views across paddocks to the low treed hills of the Diamond, Bakers and Shannon Tiers</p> <p>The road is paralleled through a long length (+8 kms) by high voltage powerlines, at times immediately adjacent to the road either side.</p> <p>Focused views in part to the wind farm with glimpses of hubs and turbines above the skyline of the Tiers.</p> <p>Generally low scenic quality</p>	M/M	M/L	>15 kms	~5 minutes (from 20km out from wind farm to intersection with C178) [1]	<p>Frequent travellers through the area are likely to understand the history of settlement and hydro-industrialisation and its effects on the natural landscape.</p> <p>Tourism visitors would most likely be uninformed of the history of settlement and electricity generation and be confronted by the presence of the transmission towers immediately adjacent to the road.</p>	Low – scenic concerns of a moderate numbers of users viewing the landscape for a relatively lengthy period lessened by distance to the wind farm, existing diminution of the already low-moderate scenic quality and visual impact of existing hydro-electric infrastructure.
Highland Lakes Road North (A5 North) - principal route through the Central Highlands providing access to settlements and residences, recreation areas. Nominated tourist route – the Highlands	<p>Approaching from the south the landscape is initially broad and open with views across paddocks to low treed hills of the Diamond, Bakers and Shannon Tiers.</p> <p>Closer to the wind farm pockets of forests and retained trees filter views.</p> <p>Orientation of the road to the wind farm varies.</p> <p>Generally moderate scenic quality</p>	M/M	M/M	1 km out to 15 kms	~13 minutes (from intersection with C178 to first turbines) [1]	<p>Frequent travellers through the area are likely to understand the history of settlement, expecting to see open grazing pastures with retained trees.</p> <p>Tourism visitors would likely be expecting landscapes of increasing naturalness as they rise towards the Central Plateau.</p>	Low - Moderate – scenic concerns of a moderate numbers of users viewing the landscape for a relatively lengthy period lessened by low-moderate scenic quality.
Wind Farm South (A5) - principal route through the Central Highlands providing access to settlements and residences, recreation areas. Nominated tourist route – the Highlands. Strong presence of Steppes Homestead	<p>This southern portion of the wind farm is set in a forested landscape on the rolling ridges of the Tiers including areas of established plantation forest with some limited clearing for pasture.</p> <p>Turbines are seen through the trees to multiple turbines and blades above. Towers to the east of the road are set in an open paddock, the closest tower 480m from the road. Tower 71 is the closest of all towers to the road at 330m.</p> <p>Views from the road are perpendicular to the path of travel.</p>	M-H/M-H	M /M	<1 km to 3 km 4 closest turbines 330-760m from highway (#s 71, 58, 60).	~6 minutes (from first turbines to Steppes Hall) [1]	<p>Frequent travellers through the area likely understand the history of settlement, plantation forestry and the retention of the forests either side of the highway.</p> <p>Tourism visitors arriving from the south would likely be expecting landscapes of increasing naturalness as they rise towards the Central Plateau, particularly as they approach the Steppes Homestead through a forested landscapes.</p>	<p>Moderate – scenic concerns of a moderate numbers of users viewing the landscape for a relatively lengthy period while traveling through a modified, but naturalistic setting (more so than previously experienced when traveling from the south).</p> <p>Moderate-High – towers closest to road imposing</p>

³⁵ Time was calculated at 80kms/hr generally [1], 70kph where it passes through settlements (such as through Miena) or where road alignment demands greater attention [2].

Viewing Opportunities	Viewing Situation: Disposition, Scenic Quality, Condition	Theoretical frequency of views to wind farm elements (tips/hubs)	Likely frequency of views to wind farm elements accounting for vegetation (tips/hubs)	Distance from infrastructure	Duration ³⁵	Viewer expectation	Sensitivity of the Place
	Generally moderate scenic quality					<p>Turbines in this setting would seem incongruous to visitors, albeit they would have gradually become aware of them as they approached the site from the south and would be well aware if they had arrived from the north.</p> <p>Close proximity of several towers to highway potentially creates an imposing presence on the viewer.</p>	
<p>Wind Farm North (A5) – principal route through the Central Highlands providing access to settlements and residences, recreation areas. Nominated tourist route – the Highlands</p>	<p>This portion of the wind farm is set in an open and expansive plain with limited to no screening by vegetation. Traveling north this half of the wind farm is framed by vegetation before the open plain is entered.</p> <p>High voltage powerlines (3 no.) are feature of the northern portion of this area</p> <p>Turbines are readily seen as a group. Tower 5 to the east of the road is within 440m.</p> <p>Generally low scenic quality</p>	H/H	H/H	<p><1 km to 3 km from A5/±1 km to 5km from Waddamana Road</p> <p>Closest towers range from 320m to 500m away from Highland Lakes Road (#10 and #5).</p>	~6 minutes (Steppes Hall to intersection with B51) [1]	<p>Frequent travellers through the area likely understand the history of settlement, expecting to see open grazing pastures with retained trees.</p> <p>Tourism visitors arriving from the south will be aware of the wind farm and more accepting of it having been exposed to it over a longer period of time. Tourism visitors from the north may be surprised by the scale of the wind farm having seen little if any evidence of it before crossing the Barren Tier out of Miena.</p> <p>Close proximity of several towers to highway potentially creates an imposing presence on the viewer</p>	<p>Moderate – scenic concerns of a moderate numbers of users viewing the landscape for a relatively lengthy period while traveling through a modified setting.</p> <p>Moderate-High – towers closest to road imposing</p>
<p>Great Lake (A5) – principal route through the Central Highlands providing access to settlements and residences, recreation areas. Nominated tourist route – the Highlands</p>	<p>Highway parallels Great Lake in an expansive landscape with long, distant views to the northern portion of the wind farm.</p> <p>The landscape through which Highland Lakes Road passes is one of isolation and exposure which is partially diminished by shack settlements but not to the degree that the character of the place is lost.</p> <p>Limited number of tips/turbines theoretically visible over the top of the Barren Tier from far background (>20km) to the middleground when traveling from north to south.</p> <p>Generally low-moderate scenic quality</p>	L/L	L/L	>5 km	~20 minutes (Liawenee to Barren Tier) [2]	<p>Viewers from the north have arrived in the area via the scenic climb through the escarpment of the Western Tier and then across the expansive landscape across yingina/Great Lake and its backing forests.</p> <p>Seeing turbines in this setting may seem incongruous to visitors.</p>	<p>Moderate – scenic concerns of a moderate numbers of users viewing the landscape for a relatively lengthy period with expectations of an isolated landscape.</p>

Viewing Opportunities	Viewing Situation: Disposition, Scenic Quality, Condition	Theoretical frequency of views to wind farm elements (tips/hubs)	Likely frequency of views to wind farm elements accounting for vegetation (tips/hubs)	Distance from infrastructure	Duration ³⁵	Viewer expectation	Sensitivity of the Place
Power Trail South (C178 South) – Infrequent use largely restricted to local property owners and recreational users (fishing and hunting). Named tourism route – the “Highlands Power Trail”	<p>The wind farm is obliquely oriented to the road (30° on the right). The road alignment demands attention.</p> <p>Principal viewing in this unit is in the southern half of the route where up to 30 hubs (40 tips) could theoretically be briefly viewed over the top of the tiers to the north. More typically up to 10 hubs (10-30 tips) along 14-15kms of road after which views to the wind farm are constrained by landform in the northern part of the unit.</p> <p>In the north of the unit road users will experience the Cattle Hill wind farm as they approach Waddamana.</p> <p>Generally low-moderate scenic quality through the unit.</p>	M/M	L/L	~5km	~25 minutes (turn off from A5 to Waddamana) [2]	<p>Frequent travellers through the area likely understand the history of settlement, expecting to see pastures and/or retained vegetation including overhead transmission lines and the existing wind farm.</p> <p>Seeing turbines in this setting would not seem incongruous to visitors given presence of existing wind farm and powerlines.</p>	Low – scenic concerns of a low numbers of users (many local to the area and therefore inured to the view) viewing the landscape for a relatively lengthy period.
Power Trail North (Waddamana Road) (C178 North) – Infrequent use largely restricted to local property owners and recreational users (fishing and hunting).	<p>Road leaving Waddamana runs through forested and hilly landscape that initially screens view to wind farm. Transmission lines visible on west side of road.</p> <p>Saddle reached at ‘Hilltop’ from which point the wind farm comes increasingly, then quickly and fully (50 tips), into the theoretical view as a backdrop to Penstock Lagoon and remaining largely in full view until A5 is reached.</p> <p>Generally low-moderate scenic quality through the unit.</p>	H/H	H/M	<1km to 5km	~15 minutes (from Waddamana to A5) [2]	<p>Frequent travellers through the area are likely to understand the history of settlement, expecting to see pastures and/or retained vegetation. Frequent visitors to the area are also likely understand the history of hydro-electricity development of the area</p> <p>Residences at Penstock Lagoon have opportunities for long, sustained viewing through the seasons and potentially over years of visiting the area.</p>	Moderate – scenic concerns of a moderate numbers of users viewing the landscape for a relatively lengthy period with expectations of an isolated landscape.
Arthurs Lake Road (C525)- Infrequent use largely restricted to local property owners and recreational users (fishing and hunting).	<p>Generally forested landscape with good screening by vegetation and/or landform to theoretically visible tips. Some limited elevated views at right angles to the road and/or over the shoulder when traveling northwest. Increased theoretical viewing opportunity going southeast oblique to path of travel through trees to nearest turbines.</p> <p>Passes through the settlement of Wilburville from where the road turns to the northwest away from wind farm. Eventually crosses under powerlines at A5.</p> <p>Generally low-moderate scenic quality.</p>	H/H	M/M	2-3kms	4-5 minutes (from Wilburville to A5) [1]	Frequent visitors to the area likely understand the history of settlement, expecting to see pastures and/or retained vegetation and understand the role of hydro-electricity in the development of the landscape and Arthurs Lake.	Low – scenic concerns of a low number of users viewing the landscape for a relatively lengthy period with expectations of an isolated landscape.
Poatina Road (B51) – Infrequent use largely restricted to local property owners and recreational	Generally traveling through forested landscape from north (Great Lake Conservation Area). First theoretical views of tips from ~6kms south of Cramps Bay to tips ~11.5kms away.	H/H	H/M	≥1.5km	~13 minutes [from Cramps Bay (~ first location tips	Frequent visitors to the area likely understand the history of hydro-electricity development of the area including its impacts on the water level of yingina/Great Lake, the	Low – scenic concerns of a low number of users viewing the landscape for a relatively lengthy period with expectations of an isolated landscape.

Viewing Opportunities	Viewing Situation: Disposition, Scenic Quality, Condition	Theoretical frequency of views to wind farm elements (tips/hubs)	Likely frequency of views to wind farm elements accounting for vegetation (tips/hubs)	Distance from infrastructure	Duration ³⁵	Viewer expectation	Sensitivity of the Place
users (fishing and hunting) with some transport.	<p>Powerlines to east of road prominent from turn off to Arthurs Lake (C525).</p> <p>Landscape opens on approach to A5, 50-50 tips theoretically visible across paddocks on the east of the road for the last 2km of the journey.</p> <p>Generally moderate-low scenic quality throughout.</p> <p>Shack settlement clustered in various locations.</p>				theoretically visible) to A5] [1]	establishment of Poatina Road and presence of powerlines.	
Interlaken Road (C527) - Infrequent use largely restricted to local property owners and recreational users (fishing and hunting) with some transport.	<p>Sparse and fire affected forested landscape including plantation forests. Undulating topography reveals theoretical views to up to 50 tips from 10kms out from the southern portion of the array, lessening on lower elevation and then 50+ again from ~3kms out.</p> <p>Some focused views to southern portion of array some from elevated positions framed by vegetation either side of the road.</p> <p>Generally low scenic quality throughout.</p>	H/H	H/M	<300m out from Tower 73 up to 14kms out from wind farm	~15 minutes (from first theoretically visible tips to A5) [1]	Frequent visitors to the area likely understand the history of limited settlement expecting to see some limited clearing for agriculture and retained forests.	Low - scenic concerns of a low number of users viewing the landscape for a relatively lengthy period with expectations of an isolated landscape.
Shack Settlements							
Miena – 87 residents (2016), +150 residences/shacks. Largest settlement on the plateau including tourist accommodation, pub and petrol.	Residential views include expanse of yingina/Great Lake in foreground, hydro impoundment and other hydro-electric infrastructure.	L/L	L/L	±10km	Residential areas have opportunities for long, sustained viewing through the seasons and potentially over years	Residents understand the history of the area and recognise the impacts of hydro-electric development on the scenery while appreciating isolation of the area and its apparently natural (but degraded) setting.	Low - Moderate - scenic concerns of a moderate numbers of users viewing the landscape for a relatively lengthy period with expectations of an isolated landscape but at a greater distance.
Tods Corner – 8 residents (2016), ~20 residences/shacks	Residential views include hydro impoundment and other hydro-electric infrastructure including the Tods Corner Power Station.	L/L	L/none	~7.5km to 20km	Residential areas have opportunities for long, sustained viewing through the seasons and potentially over years	Residents understand the history of the area and recognise the impacts of hydro-electric development on the scenery while appreciating isolation of the area and its apparently natural (but degraded) setting.	Low - Moderate - scenic concerns of a very small number of users viewing the landscape for a relatively lengthy period understanding of the history of the place but with expectations of an isolated landscape.

Viewing Opportunities	Viewing Situation: Disposition, Scenic Quality, Condition	Theoretical frequency of views to wind farm elements (tips/hubs)	Likely frequency of views to wind farm elements accounting for vegetation (tips/hubs)	Distance from infrastructure	Duration ³⁵	Viewer expectation	Sensitivity of the Place
Flintstone (includes boat ramp) – 4 residents (2016), ±125 residences/ shacks	Residential views include hydro impoundment and 3 close proximity (<100m from nearest houses) high voltage transmission lines. Theoretically up to 20 visible tips from boat ramp and shacks.	L/L	L/none	~3.3km to 15km	“	Residents understand the history of the area and recognise the impacts of hydro-electric development on the scenery while appreciating isolation of the area and its apparently natural (but degraded) setting.	Low - Moderate – scenic concerns of a moderate number of users viewing the landscape for a relatively lengthy period understanding of the history of the place but with expectations of an isolated landscape.
Wilburville – 16 residents (2016), ±100 residences/ shacks	Residential views include hydro impoundment and other hydro-electric infrastructure. Limited views to wind farm through relatively dense vegetation forests. Some tips visible (up to 20). Settlement and surrounds low scenic quality.	M/L	L/none	~3.5km to 11.5km	“	Residents understand the history of the area and recognise the impacts of hydro-electric development on the scenery while appreciating isolation of the area and its apparently natural (but degraded) setting.	Low - Moderate – scenic concerns of a moderate number of users viewing the landscape for a relatively lengthy period understanding of the history of the place but with expectations of an isolated landscape.
Morass Bay – 4 residents (2016), ±40 residences/ shacks	Residential views include hydro impoundment and other hydro-electric infrastructure. Theoretically up to 20 visible tips from boat ramp and shacks. Settlement and surrounds low scenic quality.	M/L	L/none	~7.1km to 14km	“	Residents understand the history of the area and recognise the impacts of hydro-electric development on the scenery while appreciating isolation of the area and its apparently natural (but degraded) setting.	Low - Moderate – scenic concerns of a very small number of users viewing the landscape for a relatively lengthy period understanding of the history of the place but with expectations of an isolated landscape.
Shannon – 0 residents (2016), ±12 residences/ shacks	Residences likely have filtered views to high voltage power line west of settlement and are arrived at having passed numerous hydro infrastructure elements (from both the north and the south). Residences theoretically see 50-52 tips but views largely screened by adjacent vegetation. Settlement and surrounds low-Moderate scenic quality.	H/H	M/M	~3.6km to 14.8km	“	Residents understand the history of the area and recognise the impacts of hydro-electric development on the scenery while appreciating isolation of the area and its apparently natural (but degraded) setting.	Low – scenic concerns of a very small number of users viewing the landscape for a relatively lengthy period understanding of the history of the place but with expectations of an isolated landscape.
Eastern shore Penstock Lagoon - # residents unknown, 17 residences/ shacks	Some residences theoretically see 50 tips but views are largely screened by adjacent vegetation. Settlement and surrounds low-Moderate scenic quality.	H/H	M/M	~3km out to 11km	“	Residents understand the history of the area and recognise the impacts of hydro-electric development on the scenery while appreciating isolation of the area and its apparently natural (but degraded) setting.	Moderate – scenic concerns of a small number of users viewing the landscape for a relatively lengthy period understanding of the history of the place but with expectations of an isolated landscape.
Points of Interest							
Steppes Historic Site/Steppes Sculpture	Homestead includes home and numerous out-buildings in a forested setting. Situated at intersection with Interlaken Road (C57) Theoretical viewing of up to 30 tips.	H/M	M/M	~1.5km to 10.3km	10-15 minutes depending on length of time spent at the site	Visitors can readily imagine the hardship of life on the Steppes having arrived at the homestead and having travelled some distance through the bleak, expansive, seemingly uninhabited landscapes of the Central Highlands.	High-Moderate – scenic concerns by relatively low number of visitors for protection of the setting of a promoted heritage site whose value lies in the interpretation of the isolated conditions at the time of settlement.

Viewing Opportunities	Viewing Situation: Disposition, Scenic Quality, Condition	Theoretical frequency of views to wind farm elements (tips/hubs)	Likely frequency of views to wind farm elements accounting for vegetation (tips/hubs)	Distance from infrastructure	Duration ³⁵	Viewer expectation	Sensitivity of the Place
	<p>Homestead surrounds low-moderate scenic quality.</p> <p>The Reserve is protected by a conservation covenant.</p>					Turbines in this setting may seem incongruous to visitors, albeit they would have gradually become aware of them as they approached the site from the south and would be well aware if they had arrived from the north.	
Steppes Hall (Tasmanian Heritage Register)	<p>Hall sits at the transition between forest and open pasture.</p> <p>Theoretical viewing of up to 10 tips.</p> <p>Hall surrounds are generally low-moderate scenic quality.</p> <p>Identified by the community as the 'Gateway to the Highlands'</p>	H/H	H/H	~1.8km to 8km	Short visits by members of the community	<p>The Hall is an unexpected and unmarked presence in the landscape that visitors would likely overlook in passing.</p> <p>Visitors expectation would more than likely be focused on their experience of the road i.e. assuming landscapes of increasing naturalness as they rise towards the Central Plateau, particularly as they approach through forested landscapes from the south.</p>	Moderate – scenic concerns by relatively low number of visitors for protection of the setting of a heritage site whose value lies in the interpretation of the isolated conditions at the time of settlement.
Boat Ramps/Campgrounds							
Swan Bay, Great Lake (boat ramp)	<p>Expansive, unattractive areas of lake edge exposed frequently.</p> <p>Some limited theoretical viewing.</p>	L/L	None/none	~10.9km to 21km	Short duration while launching and retrieving boats	<p>Anglers understand the history of the area and recognise the impacts of hydro-electric development on the scenery while appreciating isolation of the area and its apparently natural (but degraded) setting.</p> <p>Wind farm would seem incongruous given location at the heart of the Central Highlands.</p>	Low - Moderate - scenic concerns of a moderate number of users viewing the landscape for a relatively lengthy period understanding of the history of the place but with expectations of an isolated landscape with minimal visual intrusion.
Miena, Great Lake (boat ramp)	<p>Expansive, unattractive areas of lake edge exposed frequently.</p> <p>Views include widely scattered residential/shacks and forested hill slopes of Barren Tier.</p>	L/L	None/none	~9.5km to 20km	"	"	Low - Moderate - scenic concerns of a moderate number of users viewing the landscape for a relatively lengthy period understanding of the history of the place but with expectations of an isolated landscape with minimal visual intrusion.
Tods Corner, Great Lake (boat ramp)	<p>Views include hydro impoundment and other hydro-electric infrastructure including the Tods Corner Power Station and settlement opposite across bay.</p> <p>Expansive, unattractive areas of lake edge exposed frequently.</p>	L/L	L/L	~9.7km to 21km	"	Anglers understand the history of the area and recognise the impacts of hydro-electric development on the scenery while appreciating isolation of the area and its apparently natural (but degraded) setting.	Low - scenic concerns of a low number of users viewing the landscape for a relatively lengthy period understanding of the history of the place but with expectations of an isolated landscape.
Woods Lake (boat ramp and campground)	Lake and campground users encounter drowned forests as a feature of the lake edge.	L/L	L/none	~11km to ~18.5km	"	"	Low - scenic concerns of a low number of users viewing the landscape for a relatively lengthy period understanding of the history of the place but with expectations of an

Viewing Opportunities	Viewing Situation: Disposition, Scenic Quality, Condition	Theoretical frequency of views to wind farm elements (tips/hubs)	Likely frequency of views to wind farm elements accounting for vegetation (tips/hubs)	Distance from infrastructure	Duration ³⁵	Viewer expectation	Sensitivity of the Place
							isolated landscape with minimal visual intrusion.
Morass Bay, Arthurs Lake (boat ramp)	Lake users encounter drowned forests as a feature of the lake edge. Theoretically up to 20 visible tips from boat ramp and shacks. Settlement and surrounds low scenic quality.	M/L	L/none	~7.1km to 14km	"	"	Low - scenic concerns of a low number of users viewing the landscape for a relatively lengthy period understanding of the history of the place but with expectations of an isolated landscape.
Jonah Bay, Arthurs Lake (boat ramp and campground)	Lake and campground users encounter drowned forests as a feature of the lake edge	M/M	L/M	~8.7km to 20km	"	"	Low - scenic concerns of a low number of users viewing the landscape for a relatively lengthy period understanding of the history of the place but with expectations of an isolated landscape.
Pumphouse, Arthurs Lake (camping only)	Campground users encounter drowned forests as a feature of the lake edge	M/M	L/L	~4.2km to 20km	"	"	Low - scenic concerns of a low number of users viewing the landscape for a relatively lengthy period understanding of the history of the place but with expectations of an isolated landscape.
Penstock Lagoon (boat ramp and campground)	Lake and campground users encounter hydro-electricity infrastructure including filtered views to high voltage transmission lines to the east of the lake.	H/H	M/M	~5.5km to 12km	"	"	Low - Moderate - scenic concerns of a moderate number of users viewing the landscape for a relatively lengthy period understanding of the history of the place but with expectations of an isolated landscape with minimal visual intrusion.
Recreational fishing							
Lake Echo	Lake set in a backdrop of steep-sided forested hills. Lake users experience, unattractive areas of exposed lake edge and drowned forests. Proposed wind farm theoretically visible in conjunction with Cattle Hill wind farm.	M/L	L/None	~15km to 21km (nominally central location on the lake)	Varies potentially upwards of 4 hours	"	Low - scenic concerns of a low number of users viewing the landscape for a relatively lengthy period understanding of the history of the place but with expectations of an isolated landscape.
Penstock Lagoon	Of the adjacent waterbodies, the lagoon is the least impacted. As it is no longer used for hydro-electric production lake levels are stable and drowned forests of other water bodies are not present. Considered good quality location for fishing.	H/H	M/M	~4.5km to 11km (nominally central location on the lake)	"	"	Low - Moderate - scenic concerns of a moderate number of users viewing the landscape for a relatively lengthy period understanding of the history of the place but with expectations of an isolated landscape.

Viewing Opportunities	Viewing Situation: Disposition, Scenic Quality, Condition	Theoretical frequency of views to wind farm elements (tips/hubs)	Likely frequency of views to wind farm elements accounting for vegetation (tips/hubs)	Distance from infrastructure	Duration ³⁵	Viewer expectation	Sensitivity of the Place
Great Lake	<p>Lake users experience changing lake levels and periodically large areas of unattractive exposed lake perimeter.</p> <p>Up to 20 tips visible from portions of the lake. Likely vegetation on the Barren Tier would screen many of these.</p> <p>Landscape has moderate-high scenic quality based on presence of water body, background vegetation and landform.</p>	M/L	L/none	~13.5km to 25km (nominally central location on the southern half of the lake)	"	"	Moderate – scenic concerns of a moderate number of users viewing the landscape for a relatively lengthy period understanding of the history of the place but with expectations of an isolated landscape with minimal visual intrusion.
Arthurs Lake	<p>Lake users experience changing lake levels and periodically large areas of unattractive exposed lake perimeter and drowned forests.</p>	H/M	M/M	~10.5km-20km (nominally northwest corner location on the lake)	"	"	Low - Moderate – scenic concerns of a moderate number of users viewing the landscape for a relatively lengthy period understanding of the history of the place but with expectations of an isolated landscape with minimal visual intrusion.
Woods Lake	<p>Lake users experience, unattractive areas of exposed lake edge and drowned forests.</p>	M/L	L/L	~9km to 17.5km (nominally central location on the lake)	"	"	Low – scenic concerns of a low number of users viewing the landscape for a relatively lengthy period understanding of the history of the place but with expectations of an isolated landscape with minimal visual intrusion.

Table 5.3 Evaluation of sensitivity by viewing location (continued from previous pages)

6. VISUAL IMPACT OFFSETS

The potential magnitude of the visual impact of the wind farm is offset by two factors: visual absorption capability (Section 6.1) and scenic interest (Section 6.2).

6.1 VISUAL ABSORPTION CAPABILITY

Visual absorption capability (*VAC*) is a measure of the relative inherent ability of a landscape to accommodate visual change. Visual absorption capability is considered an offset in the evaluation of the magnitude of impact expected in its absence.

Absorption capability is affected by:

physical factors (topography, prominence, vegetation, soils);

perceptual factors (distance, aspect to the viewer, number of viewing points, number of viewers and duration of viewing);

visual characteristics of the alteration (form, scale, colour and contrast to surrounds and the permanency of the alteration): and

scenic interest.

Table 6.1 concerns itself with the physical factors affecting *VAC* and how they range from high to low across each factor with boundaries between ranges strongly influenced by local conditions.

Table 6.2 evaluates the physical factors affecting the visual absorption capacity of the landscape in each of the viewing opportunities.

In general, the physical capability of the landscape to visually absorb the elements of the wind farm is **moderate**, varying according to the location in the array. In general *VAC* is limited by the purposeful scale of the wind turbines which makes them inherently prominent. *VAC* is further reduced by the colour of the turbines (white) where they contrast with adjacent forest vegetation.

Factor	High VAC	Moderate VAC	Low VAC
Slope	Flat	—————▶	Steep
Prominence	Wind farm seen against the skyline or on a ridgeline	—————▶ —————▶	Wind farm seen against a backdrop
Vegetation	Tall	—————▶	Low height
	Open, patterned	—————▶	Uniformly dense vegetation
Soils	Dark	—————▶	Light

Table 6.1 Visual Absorption Capacity for Various Factors

The VAC of the southern portion of the wind farm is influenced by the position of the turbines on the ridgeline of and on the northern face of Bakers Tier (max height ~920m AHD). In longer distance views, the location of turbines on the ridgeline means that some of the advantage of screening by surrounding landforms is lost.

Some visual absorption benefit in distant views is gained for the northern part of the wind farm, afforded by its location on the flatter landscape of St Patricks Plain (~850-900m AHD), which is framed by low forested hills on its north (~1000-1050m AHD), east (~900m AHD) and southern flanks (920m AHD). Nonetheless, the overall height of the infrastructure in this part of the wind farm is such that it is at least theoretically visible from yingina/Great Lake above the surrounding landforms in the absence of vegetation.

The forests around and within the wind farm are short in stature, attaining a maximum height of 25m. The screening potential of this vegetation limits its ability to effectively conceal the turbines particularly where the vegetation has an open pattern in the immediate foreground i.e. the screening vegetation is in small patches or singular trees as is the case in parts of the northern portion of the wind farm. In these views, the visual absorption capability would be low to moderate where viewers are looking across such vegetation and would see the turbines/tips above the tree canopy.

Where there is uniformly dense vegetation immediately adjacent to the viewer in the foreground between the viewer and the turbines/tips its screening value is greater. For instance, at the Steppes Homestead, the turbines are set some distance away (1800m minimum) and there is a large area of uniformly dense forest between the viewer and the turbines. The VAC in this area would be higher.

Where forests or trees have been removed the conditions for regeneration slows growth due to poor soils, frequent frosts and freezing winter conditions limiting VAC.

The rocky red-brown basalt soils of the wind farm have a high VAC.

6.2 SCENIC INTEREST

Ascribing value to scenic interest suggests that industrial infrastructure has value in the visual landscape for the fascination found in its built form and/or the visible expressions of its workings.

As discussed in Section 4.4, “scenic interest” can be seen as an offset to visual impact that ameliorates environmental impacts by adding positively to the landscape setting.

The proposed St Patricks Plains wind farm would be considered to have a **moderate** scenic interest arising from:

the elegance of the utilitarian form of the turbines and their obvious relationship to their purpose as wind generating infrastructure;

its location in a setting of low scenic quality and its role in adding diversity to an otherwise featureless landscape;

the strong presence of the arrays in a landscape influenced by the history of electricity generation and transmission in the region; and

its role as a source of clean, environmentally friendly electricity.

7 MAGNITUDE OF IMPACT

Visual impact refers to the lack of contextual fit and coherence in a landscape. Visual impacts occur where change to the scenic attributes of the landscape is brought about by the introduction of visual contrasts that alter the viewing experience. Visual impacts can be positive or negative, those that detract from the viewers appreciation of the scene are considered negative.

The alteration type (Section 3) and its apparent deviation from the existing landscape character (Section 4) and the ability of the landscape to absorb or mitigate change (Section 6) all interact to affect the magnitude of the visual impact.

Table 7.1 sets out the criteria for evaluating magnitude of impact as high, moderate and low. The assessment is an overall one using information from the previous sections to determine the overarching influence on the viewing opportunity.

Magnitude of Impact	Rationale
High	Changes contrast strongly with the landscape character and viewing experience where the alteration will be viewed as a permanently dominant change
Moderate	Changes that are permanently visible but of a scale that is sub-ordinate to the setting or of an alteration type consistent with the landscape character and viewing experience
Low	Changes that are permanently visible but of a scale or alteration type that is subsumed in the setting and consistent with the landscape character and viewing experience

Table 7.1 Definitions of magnitude of impacts criteria

Table 7.2, then applies this hierarchy to each of the viewing opportunities. Table 7.2 suggests that despite the number and size of the turbines and the spread of the wind farm over some 10000 hectares its magnitude is generally low to moderate depending on the location from which it is viewed. VAC contributes strongly to the ratings as does the apparent fit of the wind farm with the landscape character sub-type. The more moderate rating of magnitude is typically associated with areas having foreground views where VAC is low.

Table 7.2 Magnitude of impact (continues following page)

Viewing Opportunities	Magnitude of Impact	Rationale
Publicly Accessible Roads		
Highland Lakes Road South (A5 South)	Low	Moderate visibility in background views as part of a panoramic landscape. Moderate to high VAC due to topographic and vegetative screening. Consistent with the landscape character sub-type
Highland Lakes Road North (A5 North)	Low	Moderate visibility in middleground views as part of a panoramic landscape. Moderate to high VAC due to topographic and vegetative screening. Consistent with the landscape character sub-type
Wind Farm South (A5) -	Moderate Moderate-High	Moderate visibility in foreground views. Moderate to high VAC due to vegetative screening with dense contiguous forest immediately adjacent to the highway. Consistent with the landscape character sub-type. Towers #60, #71, #59 and #58 are close to the road and would have greater presence in the absence of vegetation.
Wind Farm North (A5)	Moderate Moderate-High	Moderate visibility in foreground views. Generally limited screening but seen within a flat landscape (low-moderate VAC). Moderate VAC in parts where there is vegetative screening. Consistent with the landscape character sub-type Tower #5 is close to the road and would have a greater presence than other towers along the east of Highland Lakes Road. Tower #10 is very close to the road and would have greater presence, particularly in the absence of vegetation and a greater magnitude due to its visual conflict with the adjacent high voltage powerlines.
Great Lake (A5)	Low	Background views as part of a panoramic landscape. Moderate to high VAC due to topographic and vegetative screening. Consistent with the landscape character sub-type

Viewing Opportunities	Magnitude of Impact	Rationale
Power Trail South (C178 South)	Low	Limited middleground viewing as part of a panoramic landscape. Moderate to high VAC due to topographic and vegetative screening. Consistent with the landscape character sub-type
Power Trail North (Waddamana Road) (C178 North)	Moderate	Foreground viewing from the road. Moderate to high VAC due to vegetative and topographic screening. Consistent with the landscape character sub-type.
Arthurs Lake Road (C525)	Low	Limited foreground viewing from the road. Generally high to moderate VAC due to vegetative and topographic screening. Consistent with the landscape character sub-type.
Poatina Road (B51)	Low	Limited foreground viewing from the road. Generally high to moderate VAC due to vegetative and topographic screening. Consistent with the landscape character sub-type.
Interlaken Road (C527)	Low	Limited foreground viewing from the road. Generally high to moderate VAC due to vegetative and topographic screening. Consistent with the landscape character sub-type.
Named Shack Settlements		
Miena, Tods Corner, Flintstone, Wilburville, Morass Bay	Low	Largely unseen. Generally high to moderate VAC due to vegetative and topographic screening. Consistent with the landscape character sub-type.
Shannon,	Moderate	Middleground views (Shannon). Generally high to moderate VAC influenced by presence or absence of vegetative screening. Consistent with the landscape character sub-type.
Eastern shore of Penstock Lagoon	Moderate	Foreground (Eastern shore of the lagoon) Generally high to moderate VAC influenced by presence or absence of vegetative screening. Consistent with the landscape character sub-type.

Viewing Opportunities	Magnitude of Impact	Rationale
Points of Interest		
Steppes Historic Site/Steppes Sculpture	Low	Foreground to middleground views (in the absence of vegetation) (nearest turbine 1800m). Vegetation screens views from the homestead. Generally high VAC due to vegetation density and depth. Inconsistent with the story of the homestead as an isolated location where the wind farm could be seen.
Steppes Hall (Tasmanian Heritage Register)	Moderate	Middleground views (in the absence of vegetation) (nearest turbine 2400m) as part of a panoramic landscape. Moderate to low VAC due to sparseness of vegetation. Consistent with the landscape character sub-type.
Boat Ramps/Campgrounds		
Swan Bay, Great Lake (boat ramp), Mienna, Great Lake (boat ramp), Tods Corner, Great Lake (boat ramp), Woods Lake (boat ramp and campground), Morass Bay, Arthurs Lake (boat ramp), Jonah Bay, Arthurs Lake (boat ramp and campground), Pumphouse, Arthurs Lake (camping only), Penstock Lagoon (boat ramp and campground)	Low	Foreground to background views in the absence of vegetation. VAC varies from low (where no vegetation) to high where vegetation and/or topography provide screening. All locations are consistent with the landscape character type (most facilities provided by Hydro as part of their social contract).
Recreational fishing		
Lake Echo, Great Lake, Arthurs Lake, Woods Lake	Low	Background views in the absence of vegetation. Moderate to high VAC accounting for vegetation and topography. Consistent with the landscape character sub-type.
Penstock Lagoon	Moderate	Middleground views in the absence of vegetation. Low-moderate VAC accounting for existing vegetation and topography. Consistent with the landscape character sub-type.

Table 7.2 Magnitude of impact (continued from previous page)

8. SIGNIFICANCE OF IMPACT

The significance of impact is an amalgam of its magnitude (Section 7) and the sensitivity of the landscape to change (Section 5). The significance of impact suggests the level of requirement for the application of mitigation measures to reduce the level of impact.

Table 8.1 illustrates how sensitivity and magnitude of impact can be evaluated to determine the significance of an impact.

		Magnitude of Impact (Section 7)		
		Low	Moderate	High
Sensitivity (Section 5)	Low	Low	Low	Moderate
	Moderate	Low	Moderate	High
	High	Moderate	High	High

Table 8.1 Significance of Impact

An impact of high significance likely requires a design response and enhanced mitigation measures to reduce the significance of the impact.

Impacts that are rated moderate are those where the magnitude of impact is either moderate to high and the sensitivity is low to moderate or where sensitivity is high but the magnitude of impact is low. In these situations basic mitigation measures and VAC are relied upon to reduce visual impacts. Treatments may vary in selected areas where either the magnitude of impact or sensitivity varies to that for the larger viewing opportunity.

Impacts that are rated a low significance include those where the magnitude of impact is low to moderate and occurs in areas where the sensitivity to change is low to moderate. In these situations inherent migration measures are generally relied on but basic mitigation measures may be required in selected areas where the magnitude of impact or sensitivity is greater than for the larger viewing opportunity.

Table 8.2 applies the criteria for rating significance of impact to each of the viewing opportunities.

Note that Table 8.2 identifies the significance of the impact prior to the application of mitigation measures. Identification of the magnitude of impact prior to mitigation indicates the intensity of mitigation efforts required to achieve a lower level of impact enabling an understanding of the likely residual magnitude of impact if all mitigation measures are applied (Section 11).

Table 8.2 Magnitude of impact (continues following page)

Viewing Opportunities	Sensitivity (Section 5)	Magnitude of Impact (Section 7)	Significance of Impact Prior to Mitigation
Publicly Accessible Roads			
Highland Lakes Road South (A5 South)	Low	Low	Low
Highland Lakes Road North (A5 North)	Low-Moderate	Low	Low
Wind Farm South (A5) – general	Moderate	Moderate	Moderate
- towers close to road	Moderate-High	Moderate-High	High
Wind Farm North (A5) – general	Moderate	Moderate	Moderate
- towers close to road	Moderate-High	Moderate-High	High
Great Lake (A5)	Moderate	Low	Low
Power Trail South (C178 South)	Low	Low	Low
Power Trail North (Waddamana Road) (C178 North)	Moderate	Moderate	Moderate
Publicly Accessible Roads			
Arthurs Lake Road (C525)	Low	Low	Low
Poatina Road (B51)	Low	Low	Low
Interlaken Road (C527)	Low	Low	Low
Shack Settlements			
Miena, Tods Corner, Flintstone, Wilburville, Morass Bay	Low-Moderate	Low	Low
Shannon	Low	Moderate	Low

Viewing Opportunities	Sensitivity (Section 5)	Magnitude of Impact (Section 7)	Significance of Impact Prior to Mitigation
Eastern shore of Penstock Lagoon	Moderate	Moderate	Moderate
Points of Interest			
Steppes Historic Site/Steppes Sculpture	High-Moderate	Low	Moderate
Steppes Hall (Tasmanian Heritage Register)	Moderate	Moderate	Moderate
Boat Ramps/Campgrounds			
Swan Bay, Great Lake (boat ramp), Miena, Great Lake (boat ramp),	Low-Moderate	Low	Low
Tods Corner, Great Lake (boat ramp), Woods Lake (boat ramp and campground), Morass Bay, Arthurs Lake (boat ramp), Jonah Bay, Arthurs Lake (boat ramp and campground), Pumphouse, Arthurs Lake (camping only),	Low	Low	Low
Penstock Lagoon (boat ramp and campground)	Low-Moderate		
Recreational Fishing			
Lake Echo, Woods Lake	Low	Low	Low
Great Lake, Arthurs Lake	Low-Moderate		Low
Penstock Lagoon	Low-Moderate	Low-Moderate	Moderate

Table 8.2 Magnitude of impact (continued from previous page)

9. MITIGATION OPPORTUNITIES

Visual impact mitigation is the actions taken (in order of preference) to:

avoid an impact altogether;

minimise impacts to limit the significance of an action;

rectify an impact by repairing, rehabilitating, or restoring the affected landscape; and/or

reduce or eliminate an impact over time.

The capital, opportunity and/or operational costs of mitigation measures can vary substantially depending on the type of measure, the extent of its application, and whether ongoing maintenance is required. Some measures require higher capital costs but less on-going costs during operation. Others require ongoing or periodic maintenance costs that can be expensive. Still others, such as site restoration, are routinely applied as best management practices and serve multiple purposes for mitigation.

In the case of a wind farm, opportunity costs would arise from a reduction in the number of turbines, a reduction in their height and/or from their relocation to locations with less exposure to prevailing winds.

9.1 GENERAL CONSIDERATIONS

The foregoing sections have identified the visual contrast between the wind farm and the character of the surrounding landscape (their significance of impact – Section 9), this despite significant work by Epuron to mitigate potential visual and other impacts including:

GIS compilation of data about scenic quality and seen views;

preparation of photomontages from a variety of viewpoints identified by the community to better understand the presence of the wind farm in the landscape (Attachment F);

preliminary visual analysis investigations that have reduced the number of turbines from over 67 to 50 (as assessed herein) and their height from 240m to 230m (as evaluated herein);

the siting of facilities on relatively flat ground;

their stated preference to avoid the use of any night lighting, including aviation warning lighting³⁶; and

the establishment of the wind farm in a similar location to other electricity generating infrastructure (particularly in proximity to existing high voltage transmission lines which remove the impacts that could have arisen from a longer length additional transmission infrastructure).

Additional gains in mitigating visual impacts can be made through preparation prior to construction including:

development of a vegetation rehabilitation plan addressing required works during and after construction including:

early commencement of local seed and scion collection for use in rehabilitation;

early, pre-construction planting of areas at the peripheries of and throughout the wind farm where additional screening would be effective using locally native tree species;

retention of vegetation, slash and chipped materials for reuse; and

a maintenance/follow-up program to ensure success of rehabilitation activities; and

consideration during planning and detailed design of elements to:

locate works and storage areas away from and out of sight of adjacent highway corridors using existing disturbed areas as far as possible i.e. existing access tracks, cleared ground, eroded areas, etc) and taking advantage of screening by retained vegetation;

³⁶ As indicated at Section 3, should aviation lights be required by CASA or any other regulatory body, the findings of this LVIA must be reviewed.

constrain disturbance during construction to avoid the loss of vegetative cover and the impacts of erosion by clearly identifying the limit of works;

vary the shape of any forest clearing to avoid linear openings in the vegetation canopy (particularly important on Bakers Tier); and

use semi-matt finish to turbine towers, nacelles and blades to reduce glint; and

insertion of the following measures into the construction contract:

penalty clauses in construction contract to protect existing vegetation and to minimise disturbance;

strict construction boundaries around all elements to limit unnecessary disturbance to existing vegetation;

dust and wind erosion control requirements;

erosion and sediment control requirements;

stockpile/spoil pile management requirements including the separation of topsoil and vegetative matter from sub-soil and rock and correct replacement of these layers; and

requirements for good housekeeping including prohibition of onsite burning, maintenance of clean worksites, use of tire wash to reduce tracking of sediments onto roads and progressive removal of stakes and flagging.

9.2 SPECIFIC PLANNING AND DESIGN CONSIDERATIONS

The significance of impact of the wind farm could be further reduced by:

altering the location of turbines away from the highway; and

limiting the ‘visibility spill’ into adjacent landscape character units.

9.2.1 Overpowering presence of turbines

Several towers are in such close proximity to the highway that they cannot readily be legibly ‘read’ by viewers without having to scan up and down their length (see

Attachment G). ‘Legibility’ (see Section 4.4) is important to the perception of visual dominance and, therefore, the sensitivity of viewers and the magnitude of impact.

Previous studies have used viewing distances of 2-3 times the height of wind turbines as providing mitigation against visual dominance (in this case 460-690 metres for a 230m tower including the tips of the blades)³⁷.

A reduction in the visual dominance of towers in close proximity to the Highland Lakes Road can be achieved by increasing their distance from the highway, by a reduction in the height of the towers or their removal altogether.

Table 9.1 identifies recommendations for reducing the visual dominance of 5 towers.

Table 9.1 Recommendations for reduction of visual dominance (continues next page)

Removal		
Tower no.	Rationale	Recommendation
60	Tower 60 sits alone in an area with low VAC in close proximity to Highland Lakes Road (482m). The isolation of this tower from other towers reduces the visual legibility of the overall array. Construction impacts arising from the clearing of vegetation for the access road and laydown area will likely be visible, the former permanently.	Remove
5	Tower 5 is located in close proximity to Highland Lakes Road (408m) in an area with low VAC and isolated from other towers arrayed to the east. Construction impacts arising from the clearing of vegetation for the access road and laydown area will likely be visible, the former permanently.	Remove
10	Tower 10 is located in close proximity to Highland Lakes Road (353m) albeit with some positive level of VAC on approach from the south. The tower is seen in combination with the immediately adjacent high voltage transmission lines (180m offset) which reduces the visual legibility of the array.	Remove
71	Tower 71 is located in close proximity to Highland Lakes Road (280m) in an area of moderate to high VAC owing to the height and density of vegetation adjacent to the road and its immediacy to the road/viewer. Access is discrete (from the west) and construction impacts and set down are screened from the road.	Remove, relocate further from the viewer or reduce the overall height

³⁷ Inspiring Place 2002a. “Musselroe Wind Farm and Associated Transmission Line” unpublished report to Hydro Tasmania and Inspiring Place 2002b. “Heemskirk Wind Farm and Associated Transmission Line” unpublished report to Hydro Tasmania.

Removal		
Tower no.	Rationale	Recommendation
59	<p>Tower 59 is a moderate distance from the road (500m), slightly more than 2 times the recommended height from the viewer and in an area of high VAC owing to the height and density of vegetation and its immediacy to the road/viewer.</p> <p>Access is shared with multiple towers and construction impacts and set down are screened from the road.</p>	No change
58	<p>Tower 58 is a moderate distance from the road (602M), more than 2.5 times the recommended height from the viewer and in an area of moderate to high VAC owing to the density of vegetation adjacent to the road and in an area of high VAC owing to the height and density of vegetation and its immediacy to the road/viewer.</p> <p>Access is shared with multiple towers and construction impacts and set down are screened from the road.</p>	No change

Table 9.1 Recommendations for reduction of visual dominance (continued from previous page)

9.2.2 Visibility spill

Ideally, viewing would be contained to the landscape character sub-type (i.e. not viewed from the north of the Barren Tier) to reduce visibility and therefore the visual impact of the wind farm. Containment could be achieved by reducing the height of towers along the northern edge of the wind farm to ensure no tips or turbines are visible along the approach to the site when traveling south along the Great Lake on Highland Lakes Road.

Current seen view analysis (theoretical viewing) suggests this might need to be applied to up to 20+ turbines. Seen view mapping inclusive of existing vegetation would likely suggest the number of affected turbines would be much lower.

Reduction of visibility to locations in the 5 km vicinity of the wind farm, as is already the case for parts of the current seen views, would further reduce the magnitude of its impact albeit this would affect a large number of the turbines.

While a reduction in tower height is a means of reducing visual impact, the Proponent has determined that such a change is not in the interests of achieving their outcomes in terms of costs and efficient power generation and has not, therefore, been considered as an option herein.

9.3 RESIDUAL MAGNITUDE OF IMPACT POST MITIGATION MEASURES

Application of the measures proposed in Section 9.2.1³⁸ assist in reducing the overall assessment of the significance of the visual impact of the wind farm to a **moderate** level across all viewing opportunities (Table 10.2). These measures have been agreed by the Proponent.

Further mitigation could be gained by:

implementing the recommendations at Section 9.2.2; or

generally reducing the number of turbines and/or their overall height.

While these further measures have merit in reducing visual impact, the Proponent has determined that such a change would adversely affect the outcomes they desire in terms of costs and efficient power generation.

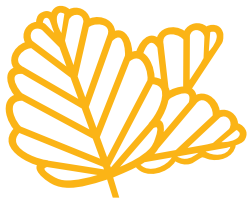
Table 9.2 Significance of impact following mitigation (continues following page)

Viewing Opportunities	Significance of Impact Prior to Mitigation	Significance of Impact Following Mitigation
Highland Lakes Road South (A5 South)	Low	Low
Highland Lakes Road North (A5 North)	Low	Low
Wind Farm South (A5) – general towers close to road	Moderate High	Moderate Moderate
Wind Farm North (A5) – general towers close to road	Moderate High	Moderate Moderate

³⁸ Assumes a minimum reduction in height of tower #71 of 10m.

Viewing Opportunities	Significance of Impact Prior to Mitigation	Significance of Impact Following Mitigation
Great Lake (A5)	Low	Low
Power Trail South (C178 South)	Low	Low
Power Trail North (Waddamana Road) (C178 North)	Moderate	Moderate
Arthurs Lake Road (C525)	Low	Low
Poatina Road (B51)	Low	Low
Interlaken Road (C527)	Low	Low
Miena, Tods Corner, Flintstone, Wilburville, Morass Bay	Low	Low
Shannon	Low	Low
Eastern shore of Penstock Lagoon	Moderate	Moderate
Steppes Historic Site/Steppes Sculpture	Moderate	Moderate
Steppes Hall (Tasmanian Heritage Register)	Moderate	Moderate
Swan Bay, Great Lake (boat ramp), Miena, Great Lake (boat ramp),	Low	Low
Tods Corner, Great Lake (boat ramp), Woods Lake (boat ramp and campground), Morass Bay, Arthurs Lake (boat ramp), Jonah Bay, Arthurs Lake (boat ramp and campground), Pumphouse, Arthurs Lake (camping only),	Low	Low
Penstock Lagoon (boat ramp and campground)		
Lake Echo, Woods Lake	Low	Low
Great Lake, Arthurs Lake	Low	Low
Penstock Lagoon	Moderate	Moderate

Table 9.2 Significance of impact following mitigation (continued from previous page)



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