



Forest Wind

Planning Report

Material Change of Use for a Wind Farm

19 December 2019



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Glossary of Acronyms, Abbreviations and Terms

ACMA	Australian Communications and Media Authority
AEMO	Australian Energy Market Operator
AGL	Above ground level
AHD	Australian Height Datum
AIA	Aviation Impact Assessment
ALA	Aircraft landing area
ALARP	acceptable without obstacle lighting
AMSL	above mean sea level
AO	Acceptable Outcome
BoM	Bureau of Meteorology
CASA	Civil Aviation Safety Authority
CEMP	Construction Environment Management Plan
CHMP	Cultural Heritage Management Plan
CleanSight	CleanSight Pty Ltd
CMP	Construction Management Plan
Code	State code 23: Wind farm development
Construction Compound	a compound providing facilities for construction, including personnel, storage and other facilities for equipment and machinery.
Construction Compound (Primary)	a Construction Compound at a central location within the Project Area (PLA)
Construction Compound (Secondary)	a Construction Compound to be located in the north and the south of the Project Area (PLA)
CPESC	Certified Professional in Erosion and Sediment Control
DA	Development Application
DAF	Department of Agriculture and Fisheries
DATSIP	Department of Aboriginal and Torres Strait Islander Partnerships
DEHP	Department of Environment and Heritage Protection
DES	Department of Environment and Science
Development Application	As defined in Schedule 2 of the <i>Planning Act (2019)</i> a development application means an application for a development approval.
Development Approval	As defined in Section 49(1) of the <i>Planning Act (2019)</i> 'a development approval is (a) a preliminary approval; or (b) a development permit; or (c) a combination of a preliminary approval and development permit'
Development Permit	As defined in Section 49(3) of the <i>Planning Act (2019)</i> 'a development permit is the part of a decision notice for a development application that authorises the carrying out of the assessable development to the extent stated in the decision notice'.
DILGP	Department of Infrastructure, Local Government and Planning
Distribution Line	a Medium Voltage distribution line
Distribution Substations	a substation connecting the wind turbines to the Transmission Substations
DNRME	Department of Natural Resources, Mines and Energy

DoEE	Department of Environment and Energy
DRO	desired regional outcomes
DSDMIP	Department of State Development, Manufacturing, Infrastructure and Planning
EA	Environmental Authority
EH	Essential habitat
EMI	Electromagnetic interference
EMP	Environment Management Plan
EPBC	Environment Protection and Biodiversity Conservation
ERSA	En Route supplement Australia
ESA	Environmentally sensitive areas
ESCP	Erosion and sediment control plan
ESD	Ecologically sensitive development
FCRC	Fraser Coast Regional Council
Forest Wind	the proposed wind farm called Forest Wind with up to 226 wind turbines and ancillary infrastructure including a Transmission Line to the existing substation at Woolooga
FWH	Forest Wind Holdings Pty Limited
GHFF	Grey-headed Flying Fox
GIS	geographic information system
GRC	Gympie Regional Council
Guidelines	State code 23: Wind farm development - Planning Guidelines (June 2018)
GWh	Gigawatt-hours
High Voltage	electricity voltage above 66kV
ICAO	International Civil Aviation Organisation
IEC	International Electrotechnical Commission
IECA	International Erosion Control Association
ILUA	Indigenous Land Use Agreements
KRA	Key Resource Area
kV	Kilovolt
LCEP	Local Community engagement plan
LCT	Landscape character type
LGA	Local Government Areas
LIDAR	a meteorological measurement device utilising light imaging, detection and ranging
LMR	Land mobile radio
LRET	Large-scale renewable energy target
LVIA	landscape and visual impact assessment
MCU	Material change of use
Medium Voltage	electricity voltage from 11kV to 66kV
MLP	Market-led Proposal
MNES	Matters of national environmental significance
MOS	Manual of standards
MRCCC	Mary River Catchment Co-ordinating Committee
MSA	minimum sector altitude
MSES	Matters of state environmental significance
MW	megawatt

National Electricity Market (NEM)	the national electricity market for trading in electricity operated by Australian Energy Market Operator under the National Electricity Rules established under the National Electricity Law.
NC Act	Nature Conservation Act
NRM	Natural resource management
OLS	obstacle limitation surface
Operations Compound	a compound that includes office facilities for all relevant personnel and visitors, an operational control room, car parking, welfare and amenity facilities, storage for plant, equipment and materials and maintenance, workshop and washdown facilities
OTC	Overhead Transmission Corridor
Overhead Transmission Corridor	the corridor of land required for the overhead Distribution Lines and Transmission Line
Overhead Transmission Corridor (non-Plantation Licence Area) (OTC (non-PLA))	That part of the Overhead Transmission Corridor outside of the Project Area (PLA), namely the area extending from the boundary of the Project Area (PLA) to the existing substation at Woolooga
Overhead Transmission Corridor (Plantation Licence Area) (OTC (PLA))	That part of the Overhead Transmission Corridor within the Project Area (PLA)
PANS OPS	Procedures for Air Navigation Services - Aircraft Operations
PEPA	Previous exclusive possession acts
PLA	Plantation Licence Area
Planning Guidelines	State code 23: Wind farm development - Planning Guidelines (June 2018)
Plantation Licence Area	the area subject to the Plantation Licence which incorporates the Plantation Project Area
Plantation Licensee	the recipient of a Plantation Licence granted under the <i>Forestry Act 1959</i> by the State
PO	Performance outcome
Powerlink	Powerlink Queensland
Primary Operations Compound	an Operations Compound to be located central to the Project Area (PLA)
Project	the development, construction, operation and decommissioning of Forest Wind
Project Area	land on which the Project is located comprising the Project Area (PLA) and Project Area (non-PLA).
Project Area (non-PLA)	land on which the Project is located outside the Plantation Licence Area
Project Area (PLA)	land on which the Project is located within the Plantation Licence Area as shown in Figures 2A and 2B
Proponent	Forest Wind Holdings Pty Limited
PTP	Point-to-point
QRET	Queensland State Government's Renewable Energy Target
QSNTS	Queensland South Native Title Service
RE	Regional ecosystems
RET	Renewable energy target
RFDS	Royal Flying Doctor Service
RPEQ	Registered Professional Engineer Queensland
SARA	State Assessment Referral Agency
SDAP	State Development Assessment Provisions

Secondary Operations Compound	Compound located in the north and south of the Project Area (PLA) with the main purpose of providing storage areas for plant, equipment and materials, maintenance and workshop areas, wash down facilities as well as parking and amenities to minimise travel to and from the operations compounds when on site undertaking routine maintenance activities.
Site	the Project Area
Site Entrance (Primary)	a primary Site Entrance located in the southwest corner of the plantation on Neerdie Road shown on Figure 2B
Site Entrance (Secondary)	a fixed Site Entrance at a location determined prior to construction commencing and subject to agreement with the State and Plantation Licensee shown on Figures 2A and 2B
SPP	State Planning Policy
SSMP	Site Safety Management Plan
State	the Queensland Government
State Forests	the Toolara, Tuan and Neerdie State Forests in the Wide Bay Region of Queensland
Substations	Transmission Substation (Primary), Transmission Substation (Secondary) and Distribution Substation
Timber Processors	a timber processing plant located to the south of the Project Area (PLA) on Tin Can Bay Road and a timber mill at Tuan
TLPI	Temporary local planning instruments
TMR	Transport and Main Roads
Transmission Line	a High Voltage transmission line
Transmission Substation (Primary)	a primary fixed substation connecting the Project Area (PLA) to the Transmission Line
Transmission Substation (Secondary)	a secondary fixed substation connecting the Distribution Substations to the Transmission Substation (Primary)
Transmission Substations	a Transmission Substation (Primary) and Transmission Substation (Secondary)
UK	United Kingdom
VM Act	Vegetation Management Act
Wind Turbine Area	refers to Project Area (PLA)
WTA	Wind Turbine Area
ZVI	Zone of visual influence

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1. Introduction

1.1 General

This Planning Report, prepared by CleanSight Pty Ltd on behalf of Forest Wind Holdings Pty Limited (FWH) (the Proponent), supports a Development Application (DA) for a Development Permit for a Material Change of Use (MCU) (wind farm) in accordance with the *Planning Act 2016* and *Planning Regulation 2017* for a proposed wind farm called Forest Wind (the Project) and a decision under Section 62 of the *Transport Infrastructure Act 1994* for vehicular access to a state-controlled road.

In accordance with Schedule 10, Part 21, Division 1, item 35 of the *Planning Regulation 2017* the application for material change of use for a wind farm is assessable development. The Project is code assessable as all wind turbines for the wind farm are at least 1,500 m from a sensitive land use on a non-host lot.

This DA has been developed to provide information to the State Assessment Referral Agency (SARA) on how the Project demonstrates compliance with State Development Assessment Provisions (SDAP) *State Code 23: Wind farm development* and supporting planning guidelines.

It also provides information to SARA on how the Project complies with the provisions of relevant SDAP *Code 1: Development in a State Controlled Road Environment*.

1.2 Context

1.2.1 The Project

FWH proposes to develop and construct a wind farm called Forest Wind (Forest Wind) to be located within an actively managed and operational exotic pine plantation in Queensland Government (the State) owned Toolara, Tuan and Neerdie State Forests, situated between Gympie and Maryborough in the Wide Bay Region of Queensland, as shown in **Figure 1** in Appendix A.1. Specifically, the Project comprises a wind farm with up to 226 wind turbines and related infrastructure including a 60m wide Overhead Transmission Corridor (OTC) in which a High Voltage transmission line (the Transmission Line) will be located to transfer the generated electricity to an existing Powerlink Queensland (Powerlink) substation located at Woolooga to the west of Gympie, which will be the transmission point of connection to the National Electricity Market. The Project will be located within the Gympie Regional Council (GRC) and Fraser Coast Regional Council (FCRC) Local Government Areas (LGAs).

The Project Area includes a Plantation Licence Area (PLA) in the State Forests referred to as the Project Area (PLA)¹ and other land referred to as the Project Area (non-PLA).

In addition to transmitting generated electricity to the Woolooga Substation, individual supplies may also be provided to a timber processing plant located to the south of the Project Area (PLA) near Tin Can Bay Road, and to a timber mill at Tuan (together the Timber Processors) located to the north on Maryborough Tuan Forest Road, Tuan Forest.

Within the Project Area (PLA), FWH has identified nominal locations for 226 wind turbines and alternative wind turbine locations every 100-200m as shown in **Figures 2A and 2B** in Appendix A.1. A development approval is sought for up to 226 wind turbines located within 100m of the nominal or alternative wind turbine locations. A final site selection will be undertaken prior to construction commencing to confirm the location of each wind turbine. Subsequent to this, micro-siting of each wind turbine will occur during the construction phase to allow for local conditions such as ecology, cultural heritage and existing drainage controls. The wind turbines will not be micro-sited more than 100m from a nominal or alternative wind turbine location.

¹ This area is also referred to as the Wind Turbine Area in the technical reports.

1.2.2 Project background

One of the Proponent's parent companies, CleanSight, commenced a targeted wind farm site identification process in 2013. After extensive assessments, it focussed on the Wide Bay region and in mid-2015 approached the Queensland Government and the Plantation Licensee of the exotic pine plantation on State-owned land, with a view to developing a wind farm project.

Wind monitoring activities commenced in October 2015, providing confidence of a viable energy resource for a wind power project which has resulted in significant investments in concept creation, development of unique intellectual property and development of a detailed design. The work has included extensive constraints mapping, wide-ranging technical, economic and impact assessments, project design work, energy yield and financial optimisation and consultation with relevant stakeholders including the First Nation people, local government and State government departments.

An initial layout of the Project was presented to SARA in April 2017 as part of an early pre-lodgement consultation process. Since this pre-lodgement, the design has undergone development and refinement to take account of the results of studies, the range of constraints and the advancement in technology in the wind energy sector, most notably the continued development of wind turbines.

1.2.3 The Site

The site for this Development Application is the Project Area defined as the land that includes the Project Area (PLA), as shown in **Figures 2A** and **2B**.

The wind farm also includes the OTC, approximately 65km in length of which approximately 37km is located within the Project Area (PLA) referred to as the Overhead Transmission Corridor (PLA) (OTC(PLA)). The remaining section of the OTC is within the Project Area (non-PLA) and extends from the boundary of the Project Area (PLA) to the Woolooga Substation, referred to as the Overhead Transmission Corridor (non-PLA) (OTC (non-PLA)).

Project overview

The Project has been designed to cause minimal impact to the environment, community, cultural heritage and existing land users. A detailed constraint assessment was undertaken as part the design of the Project to identify the nominal wind turbine locations.

Planning has included the following key considerations:

- The Project Area (PLA) is located within an existing and actively managed and operational pine plantation which is subject to a range of activities such as harvesting and transport of timber, weed control, quarry activities, and the maintenance and upgrade of forestry access tracks using earthmoving machinery.
- Access within the Project Area (PLA) will be provided using existing operational forestry tracks, some of which will be required to be widened to enable the delivery of the wind turbine blades, towers and other components.
- Electrical cabling will mostly be underground along existing forestry access tracks.
- The OTC will follow existing tracks as far as reasonably practical.
- Native vegetation will be avoided as far as reasonably practical and will only be cleared if necessary to widen existing access tracks, upgrade waterway crossings, to create access to the Project Area (PLA) from Neerdie Road (along existing tracks where possible), and to install the towers for the Transmission Line.
- The wind farm will include a range of ancillary activities including electrical infrastructure, operation and construction facilities, substations, site entrances and battery storage facilities.
- Construction of the Project will be staged as necessary with full consideration of the requirements of the State and the Plantation Licensee.

1.3 Summary of assessable development

A summary of the proposed development is provided in Table 1 below.

Table 1 Summary of the proposed development

Component	Description	Number
Material Change of Use for a wind farm		
Wind turbines	— Up to 295m height located along existing forestry tracks	Up to 226
	— Wind turbine foundations: Reinforced concrete slab to support the wind turbines	Up to 226
	— Crane hardstand with laydown areas: Concrete hardstand for use during construction and operation to store materials and place the crane	Up to 226
Transmission Substation (Primary)	— Connects the Transmission Substation (Secondary) to the Transmission Line.	1
Transmission Substation (Secondary)	— Connects the Distribution Substations to the Transmission Substation (Primary) via overhead transmission lines.	Up to 2
Distribution Substation	— Connects the wind turbines to the transmission substations via overhead Distribution Lines — All cabling from the wind turbines to the Distribution Substations will be underground along existing forestry tracks where possible, or overhead within the Overhead Line Corridor	Up to 10
Distribution Lines	— Medium Voltage distribution line	
Transmission Line	— High Voltage Transmission Line connecting the Transmission Substations (Primary) and Transmission Substations (Secondary) in the Project Area (PLA) to the Woolooga substation	
Main site access	— Via Neerdie Road to the plantation	
On-site access tracks	— Upgraded existing forestry tracks	
Operations Compound (Primary)	— Located in a central location within the Project Area (PLA) to provide office facilities for all relevant administrative and technical staff, an operational control room, car parking, welfare facilities, storage and maintenance capabilities.	1
Operations Compound (Secondary)	— Located to the north and south of the Project Area (PLA) providing storage areas for plant, equipment and materials, maintenance and workshop areas, wash down facilities as well as parking and amenities.	2
Battery storage	— Battery storage facilities	4
	— Relocatable offices, fencing	
Potable water supply	— Provision of water to site entrances and Operations Compounds	At each compound
Wastewater treatment	— On-site wastewater treatment and disposal or removal	At each compound
Power supply	— Power supply to the site entrance and operations compounds	At each compound
Chemical storage	— Chemical storage facility and Operations Compounds	At each compound

Meteorological masts	— Meteorological masts (or LIDAR) will be installed within the Project Area (PLA)	Up to 6
Section 62 Decision – vehicular access to a state-controlled road		
Site Entrance (Secondary) East	— Existing entrance located to the east of the site off Maryborough Cooloola Road at a location determined prior to construction commencing and subject to agreement with the State and Plantation Licensee	1
Site Entrance (Secondary) North	— Existing entrance located to the north of the site off Maryborough Tuan Forest Road off Maryborough Cooloola Road at a location determined prior to construction commencing and subject to agreement with the State and Plantation Licensee	1
Site Entrance (Secondary) South	— Existing entrance located to the south of the site off Tin Can Bay Road at a location determined prior to construction commencing and subject to agreement with the State and Plantation Licensee	1

1.4 Project objectives

The objectives of the Project are to:

- install up to 226 wind turbines (around 1200MW)
- contribute up to one quarter of the Queensland Government's commitment of 50% renewable energy by 2030
- deliver low cost energy below the conventional electricity market
- offset up to approximately 3 million tonnes of carbon dioxide equivalent each year, and
- deliver significant wider economic and social returns, including infrastructure investment, job creation and industry innovation.

1.5 The Applicant

Forest Wind Holdings Pty Limited, a joint venture between CleanSight FW Holdings Pty Ltd and Siemens Project Ventures GmbH, is the Proponent and Applicant for the Project

2. Planning assessment summary

2.1 Development application details

The summary development application details are provided within Table 2 and Table 3.

Table 2 Material Change of Use for a wind farm

Proposed development:	Wind farm with up to 226 wind turbines and related activities and infrastructure with all wind turbines located more than 1,500m from a sensitive land use
Type of approval sought:	Development Permit for a Material Change of Use (wind farm)
Site address:	Maryborough Cooloola Road, Tuan Forest QLD 4650
Real property description:	Lot 1004 on FTY1659 Lot 1419 on FTY1697 Lot 915 on FTY1775
Site area:	Approximately 500 ha
Assessment Manager:	SARA
Level of Assessment:	Code Assessment in accordance with Schedule 10, Part 21, Division 2, Table 1 of the <i>Planning Regulation 2017</i>
Referral Agencies:	Not Applicable in accordance with Schedule 10, Part 21 <i>Planning Regulation, 2017</i>
Owner details:	Queensland State Government, Department of Environment and Science
Applicant details:	Forest Wind Holdings Pty Limited

Table 3 Section 62 Decision – Vehicular access to a State-Controlled Road

Proposed activity:	Access from the Bruce Highway to Neerdie Road Access to the Site from Maryborough Cooloola Road Access to the Site from Tin Can Bay Road
Type of approval sought:	Section 62 Decision under the <i>Transport Infrastructure Act</i>
Site address:	Bruce Highway/ Neerdie Road Intersection Maryborough Cooloola Road (State-controlled Road) Tin Can Bay Road (State-controlled Road)
Assessment Manager:	SARA with TMR issuing the Section 62 decision
Level of Assessment:	Code Assessment
Referral Agencies:	Not Applicable
Owner details:	Queensland State Government, Department of Transport and Main Roads
Applicant details:	Forest Wind Holdings Pty Limited

2.2 Planning instrument details

The planning instruments relevant to the Project are identified in Table 4.

Table 4 Planning Instrument Details

Instrument	Details
State planning policy (SPP):	Required to comply with Part C and part D of the State Planning Policy (SPP)
Regional plan: Designation:	Wide Bay Burnett Regional Plan
Planning scheme:	Not applicable – not subject to assessment by local government
Applicable preliminary approval:	Not applicable
Strategic framework:	Not applicable
Zone:	Not applicable
Local plan:	Not applicable
Level of assessment:	Code Assessable
Applicable overlays:	Not applicable
Applicable codes:	State code 1: Development in a state-controlled road environment State code 23: Wind farm development

3. Site description

3.1 General

The Project Area (PLA) is located within existing actively managed and operational exotic pine plantations in the Toolara, Tuan and Neerdie State Forests which are used for the primary purpose of growing and extracting exotic pine from a major forestry plantation. This use will continue.

State-controlled roads bound the Site, including Maryborough Cooloola Road to the north and east and Tin Can Bay Road to the south. The wind turbines will be located adjacent to existing forestry tracks within the plantation.

The main entrance to the Project Area (PLA) will be from the Bruce Highway at Gunalda via Neerdie Road as shown in **Figure 1** –in Appendix A.1. Secondary entrances will be developed off the Maryborough Cooloola Road and Tin Can Bay Road. In addition, a temporary 'River Landing' site at Beaver Rock Boat Ramp on the Mary River may be established during the construction phase of the Project to facilitate the transportation and delivery of oversized component parts to the Project Area (PLA). If this option is progressed all relevant approvals will be sought prior to commencement of the use of the 'River Landing' site.

The Project is within two LGAs, Gympie Regional Council and the Fraser Coast Regional Council. Both LGAs fall within the broader Queensland region of Wide Bay Burnett.

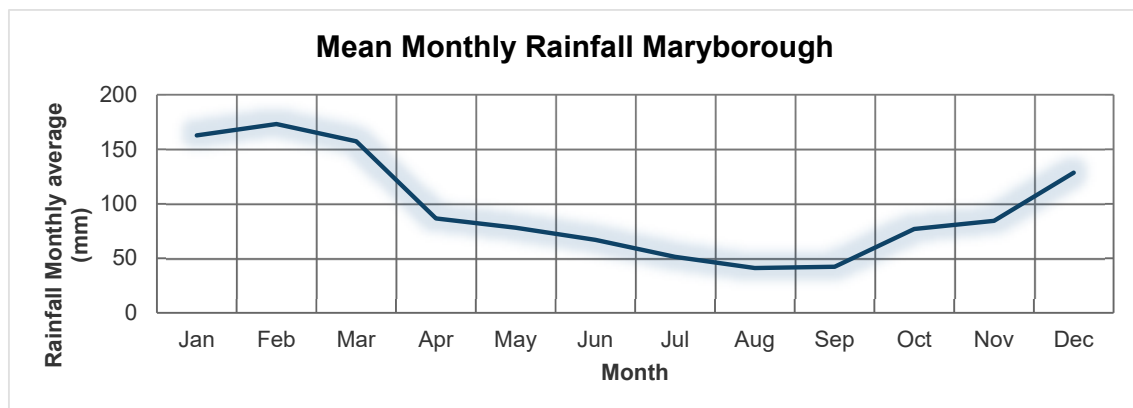
Communities within 5km of the Project Area (PLA) include, Maaroom, Boonooroo, Poona and Wallu. All wind turbines are located no less than 3km from sensitive land uses on non-host lots, exceeding the *State code 23: Wind farm development* separation distance of 1500m between wind turbine location and sensitive land use as shown in **Figure 3** in Appendix A.1.

3.2 Climate

The area experiences warm wet summers and cool dry winters. Summer rainfall can be influenced by storm events and tropical low depressions that result in significant short-term stream rises and saturated water tables on coastal lowlands.

The annual average rainfall for Maryborough is 1,138mm. Monthly average rainfall for Maryborough is detailed in Figure A.

Figure A - Average monthly rainfall Maryborough



3.3 Waterways

The Project is located within the Mary River Catchment (Drainage Basin 138) and the Great Sandy Strait Catchment (Part of Noosa Drainage Basin 140). The Project Area (PLA) includes a number of waterways that are mapped under the Water Act (2000) and the Fisheries Act (1994) as shown in the

Ecological Assessment Report in Appendix A.7. Impact to waterways will be minimised as part of the Project. Existing waterway crossings on forestry access tracks may be required to be upgraded to enable the delivery of oversize components. If upgrades are required, the relevant approvals will be sought prior to construction commencing. All proposed upgrades will be designed in accordance with the 'Accepted Development Requirements for operational work that is constructing or raising waterway barrier works'. If these cannot be met an approval will be obtained prior to construction commencing. FWH will be responsible for any offsets triggered under the *Environmental Offsets Act 2014* as part of these activities. Other approvals that may be required include:

- Operational Works Development Approval to Take or Interfere with Water under the *Water Act 2000*.
- Riverine Protection Permit under the *Water Act 2000*.
- Water License to take or interfere with water under the *Water Act* (2000) if modifying or diverting a waterway mapped under the *Water Act*.

3.4 Flora and fauna

The Project Area (PLA) is located in Tuan, Toolara and Neerdie State Forests, which are highly modified landscapes of exotic pine plantations. Remnant Eucalypt woodland and Melaleuca forest occurs throughout the plantation as a mosaic of small remnant patches. Often these are associated with waterways and drainage lines. Further details are provided in the Ecological Assessment Report in Appendix A.7.

3.5 Topography, geology and soils

The Project Area (PLA) is characterised by flat to undulating terrain with elevations of 10m to 140m AHD (Australian Height Datum) with elevations ranging between approximately 60m and 140m in the southern half of the Project Area (PLA) decreasing to around 20m at the northern end of the Project Area (PLA). A ridgeline runs roughly northwest-southeast through the Project Area (PLA), with high points located along this ridge. This ridge acts as a catchment divide, with creeks to the west of this draining towards the west and northwest into Tinana Creek and eventually into the Mary River. Creeks to the east, generally drain east and northeast to the coast.

The Project Area (PLA) lies within the Maryborough Basin, a sequence of thick (50m to 500m) fluvial quartzose sandstones (Myrtle Creek Sandstone) overlain by the Tiara Coal Measures deposits (up to 850m thick) during the later Triassic and Early Jurassic. This sequence of deposition was halted by a period of volcanic activity (Grahams Creek Formation) in the latest Jurassic and Early Cretaceous. The basin then underwent a major folding and faulting event in the Late Cretaceous, with the formation of tight isoclinal folds with a general northwest axis trend to the south of Maryborough and thrust faults and steep dips in coastal areas. This period also involved substantial erosion.

The Elliot Formation was deposited unconformably over the basin in the Eocene – Oligocene, comprising predominantly siliceous freshwater sandstone and siltstone. This has subsequently been iron cemented to form a ferricrete during the Miocene. Coastal plain deposits and alluvium has subsequently been deposited from the Tertiary period up to the present day.

To the north there are some areas of Quaternary Alluvium, associated with creeks. Coastal plain deposits are present in some areas along the eastern margin of the Site.

3.6 Existing sensitive receptors

Wind turbine locations have been carefully selected to avoid or mitigate potential community impacts from the wind farm, including impact on landscape and visual amenity.

The *State Code 23: Wind farm development* requires a minimum separation distance of 1,500m from residents (and other existing sensitive land uses) unless a deed is entered into with the receptor. Planning for the Project has, however, doubled this minimum separation distance from existing residences on non-host lots to wind turbines to 3,000m.

The pine forest with trees up to 30m tall will also act as a buffer from communities, acting as a screen to soften the visual impact from many local viewpoints and roads.

The minimal impact on surrounding residents and communities is confirmed by the studies assessing impacts on electromagnetic interference (Appendix A.5), shadow flicker (Appendix A.6), landscape and visual amenity (Appendix A.10), and acoustic amenity (Appendix A.11).

3.7 Aboriginal Cultural Heritage

Butchulla are represented in the northern section and the Kabi Kabi First Nation in the southern section of the Project Area as shown in **Figure 4** in Appendix A.1.

A desktop cultural heritage study for the Project was completed by David Cameron Consulting in April 2019. The desktop assessment did not identify any records of Aboriginal cultural heritage specifically associated with the Project Area. The report noted that the absence of recorded Aboriginal cultural heritage within or near the Project Area does not mean that there is no probability that cultural heritage might exist. The lack of records would simply be the result of there not having been any previous studies undertaken in the area. The report concluded that over areas of exotic pine plantation it is “moderately” likely that residual Aboriginal cultural heritage will be present both in areas of previous significant ground disturbance and areas of remnant vegetation and landforms where little or no significant ground disturbance has occurred. Furthermore, in areas where particular combinations of key environmental and cultural attributes are present, the probability of encountering cultural heritage will tend toward being a “high” likelihood. Cultural Heritage Management Plans (CHMPs) are being developed in consultation with Kabi Kabi and Butchulla representatives.

3.8 Native Title

Under the *Native Title Act 1993 (Cth)* (NT Act) and the *Native Title (Queensland) Act 1993 (Qld)*, the valid grants of certain interests prior to 23 December 1996 are confirmed as extinguishing any native title which might have existed at the date of the grants. The grants are known as “previous exclusive possession acts” (PEPAs). Large portions of the Project Area coincide with State lands where no PEPAs have been occurred and therefore Native Title has not been extinguished. The Site is subject to one determination of Native Title and one active Native Title Claim as listed in Table 5 below.

Table 5 Native Title Details

Claimant	Registration Date	Status	Native Title Tribunal Number	Federal Court Number
Butchulla Native Title Holders	30/06/2010	Determined 13/12/2019	QC2009/005	QUD460/2018
Kabi Kabi First Nation	08/02/2019	Active	QC2018/007	QUD20/2019

To comply with the Native Title Act 1993, Forest Wind Holdings is seeking an Indigenous Land Use Agreement (ILUA) with the native title claim Applicants to consent to the future acts associated with the Project. Consultation with both Applicant groups is ongoing following a resolution passed by each party in May 2019 to commence negotiations for an ILUA and CHMP.

3.9 Non-Aboriginal Heritage

A search of the Queensland Heritage Register and FCRC’s and GRC’s Local Heritage Registers was undertaken to identify any state and local heritage places within the Project Area (PLA). One heritage place was listed under the FCRC local heritage register as identified in Table 6. It will not be affected by the proposed development.

Table 6 – Heritage places

Heritage register	Place ID No.	Place name	Address details	GPS
FCRC Local Heritage Register	85	Tuan West Fire Tower No. 6	Tuan State Forest No. 915	474930/7157873

4. Proposed development details

4.1 General

On completion of construction, the Project will comprise wind turbines and related and ancillary uses and infrastructure which may include the following:

- up to 226 wind turbines with a power capacity of up to 1,200MW
- substations and battery storage facilities
- Transmission Line and Distribution Lines
- vehicular access from main access points to the wind turbines using existing forestry tracks
- site entrances
- Operations Compounds, and
- weather monitoring equipment.

4.2 Layout and design

4.2.1 Layout

FWH has identified nominal locations for up to 226 wind turbines within the Project Area (PLA) and alternative wind turbine locations every 100-200m as shown in **Figures 2A and 2B** in Appendix A.1. The final siting of each wind turbine (up to a total of 226) will be determined with consideration of a range of constraints and will not be located more than 100m from any of the nominal or alternative locations included in the application for the development approval.

The constraints to be considered include the following:

- stakeholder requirements, including the requirements of the Plantation Licensee
- ecology
- stormwater management
- cultural heritage
- proximity to waterways
- electromagnetic interference (EMI)
- aviation
- existing infrastructure such as gazetted roads and power lines
- wind resource data provided from ongoing monitoring of the Project Area (PLA), and
- location of sensitive land uses to achieve a 3km buffer from the wind turbines to the sensitive receptor.

A copy of the final layout plan will be provided to SARA prior to construction commencing.

4.2.2 Final design and micro-siting

Once on site, prior to construction, a final on-ground assessment shall be undertaken to ground truth and micro-site each wind turbine taking into consideration each of the following constraints:

- ecology - presence of protected flora (in particular, *Macrozamia pauli-guilelmi*), or individual habitat features such as hollow bearing trees
- cultural heritage - avoidance of high-risk areas or features
- drainage lines - presence of the Plantation Licensee's specific drainage infrastructure or other erosion and sediment control measures
- EMI constraints outlined in the Electromagnetic Interference Impact Assessment Report provided in Appendix A.5 as follows:
 - ensure wind turbines are not located within the second Fresnel zones of fixed point to point microwave links

- radio link services -- to avoid micro-siting wind turbines into radio link paths
- Location of sensitive land uses ensuring a minimum separation distance of 3km from the nearest wind turbine is achieved, and
- The Plantation Licensee's operational requirements.

During the micro-siting process the wind turbines will not be located more than 100m from any of the nominal or alternative locations included in the application for the development approval.

4.3 Project Description

4.3.1 Wind turbines

The Project Area (PLA) will accommodate up to 226 wind turbines, each with a capacity to generate up to 6MW (+/- 3MW) of electricity, with a maximum height to blade tip of up to 295 m above the base of the wind turbine tower. The wind turbines will be located along existing forestry tracks.

The wind turbines will be of the horizontal axis type, with a rotor consisting of three blades that will be designed, type certified and manufactured to comply with appropriate Australian Standards and the International Electrotechnical Commission (IEC 61400) requirements. The rotor blades will be mounted to the wind turbine hub at an appropriate height to allow for the maximum height to blade tip of 295m not to be exceeded. The rotor blades, nacelle and upper sections of the wind turbine tower will be coloured a shade of white with a semi-matte finish in order to minimise reflection and visual impact yet provide adequate contrast to background as specified in the Aviation Impact Assessment in Appendix A.4. Company logos will not be displayed.

A summary of the wind turbine specifications is provided in Table 7.

Table 7 - Key wind turbine specifications

Feature	Specification
Project generation capacity	Up to 1200MW
Wind turbine electrical output	6MW (+/-3MW)
Number of wind turbines	Up to 226
Blade tip height	Up to 295m

4.3.2 Wind turbine foundations

The construction of each wind turbine foundation will comprise a reinforced concrete slab that is constructed adjacent to the wind turbine crane hardstand. The actual amount of concrete will vary in size depending on imposed loadings, ground conditions, construction methodology and the drainage design.

Where possible, the excavated material for foundations will be reinstated following construction, however, construction of each wind turbine foundation is likely to result in surplus material, which will be reused on site for construction and maintenance of access tracks, wind turbine crane hardstands, laydown and compounds, landscaping and potentially by the Plantation Licensee to improve soil quality or backfill unused excavations from former forestry activities.

4.3.3 Crane hardstand and laydown areas

The wind turbines will require an area of hardstand adjacent to the wind turbine foundation to provide a stable base on which to place wind turbine components ready for assembly and erection, and to locate the cranes necessary to lift the wind turbine components into place.

The tower, nacelle, hubs and rotor blades will be installed with cranes (which may be a mobile tyred crane, crawler crane and/or tower cranes). The optimisation of lifting plans and crane requirements will at a minimum be a function of operational requirements, availability and cost of cranes, wind turbine make, model and configuration, tower type, terrain and earth moving costs, erecting times,

environmental and plantation related constraints and schedule. The hardstand and laydown areas will typically comprise:

- foundation area
- main crane hardstand
- assist crane hardstand
- component storage area
- boom assembly hardstand
- ballast lay down area
- working areas, and
- platforms – storage of materials and tools for installation and commissioning.

The hardstand and laydown area footprint will be up to 10,000m² in area, subject to site-specific constraints at each location, with dimensions in the order of 200x50m or 100x100m, requiring clearing of plantation forest to facilitate their construction. The hardstand and laydown areas will be left in place following construction for ongoing operational and maintenance requirements.

4.3.4 Substations and Distribution Lines

4.3.4.1 Overview

The wind turbines typically generate at around 690V electricity and have a step-up transformer either within the tower internally or externally on the wind turbine foundation. The stepped-up voltage at the wind turbine may be between 11kV and 66kV. The generated electricity will be distributed in conductors within the Project Area (PLA) via underground and overhead Distribution Lines to a series of substations as outlined below.

4.3.4.2 Substations

There are three types of Substations to be installed as part of the Project Area (PLA):

- Primary fixed substation (Transmission Substation (Primary)) - connects the Transmission Substation (Primary) to the Transmission Line.
- Secondary fixed substation (Transmission Substation (Secondary)) - connects Distribution Substations to the Transmission Substation (Primary) (together these two form the Transmission Substations)
- Distribution substation (Distribution Substation) – steps up the voltage of the wind turbines for connection to the Transmission Substations. (together these three form the Substations)

Nominal location of the Substations is provided in **Figures 2A and 2B - Layout**. Table 8 provides details of the Substations that will be installed within the Project Area (PLA). The final location will be subject to the staging program and agreement with the State as landowner and the Plantation Licensee as the primary land user. The perimeter of each substation will be secured with a security fence and lockable gate.

Table 8 - Substations

Substation name	Description	Number of substations	Specification	Footprint
Transmission Substation (Primary)	<ul style="list-style-type: none"> — Increases voltage and connects Distribution Substations and the Transmission Substations (Secondary) to a Transmission Line. — To include the main transformer, switchgear, protection, metering, associated electrical 	1	Transform up to 275kV	c. 6.25 ha

Substation name	Description	Number of substations	Specification	Footprint
	infrastructure, and the operation and maintenance buildings.			
Transmission Substations (Secondary)	— Increases voltage and connects the Distribution Substations to the Transmission Substations (Primary) via an overhead Transmission Line.	Up to 2	Transform up to 275kV	c. 4 ha
Distribution Substations	<ul style="list-style-type: none"> — Connects the wind turbines to the Transmission Substations via Distribution Lines — All cabling from the wind turbines to the Distribution Substations will be underground along existing forestry tracks where possible, or overhead within the OTC(PLA) — The location of the Distribution Substations will be confirmed prior to construction commencing. The final location will be subject to the final staging program and agreement with the Plantation Licensee. — Include substations to feed the Timber Processors and/or connect to the Energy Queensland (Ergon and Energex) networks (Dedicated Distribution Substations). 	Up to 10	Transform up to 66 kV	c. 1 ha

4.3.4.3 Battery storage facility

Up to four battery storage facilities for storage of electricity may be located adjacent to the Substations. Each battery storage facility would have a footprint of up to 4 ha and include transformers, switchgear, operations rooms, parking and facilitate the construction, operation, charging, discharging, exchanging and upgrading as battery technology develops, for use by the Project, local industry and connection to supply the NEM.

4.3.4.4 Distribution Lines

Distribution Lines will be installed within the Project Area (PLA) to connect wind turbines to Substations and will be underground along existing forestry tracks or overhead within the OTC.

Up to 450km of underground cables will be laid in cable trenches approximately 0.5m to 1.5m in width with a minimum depth of 800mm to enable forestry activities to continue after installation. The majority of the cable trenches will be located under or adjacent to the existing onsite access tracks to minimise forestry impacts, vegetation clearing and additional construction activities.

Where overhead, the Distribution Lines will be connected by a series of individual poles and be of sufficient height to allow for site vehicles to pass beneath in accordance with the requirements of the *Queensland Electricity Safety Regulation, 2013*.

4.3.5 Transmission Line

The Transmission Line will run from the northern Transmission Substation (Secondary) to the Transmission Substation (Primary) and from the Transmission Substation (Primary) to the southwest corner of the Project Area (PLA) within the OTC and then on to Powerlink Corporation's Woolooga Substation within an OTC(non-PLA).

The location of the OTC (non-PLA) is being finalised and details will be provided when available to enable inclusion in the development approval. The Transmission Line will comprise transmission towers, conductors, earth wires and insulators.

4.3.6 Vehicular access

4.3.6.1 Access roads

The main access to the Project Area (PLA) will be via a State-designated haulage route associated with the Mount Eaton Key Resource Area (KRA), entering the Neerdie State forest access tracks from Neerdie Road, a GRC controlled road between the Bruce Highway and the Project Area. Secondary access points will be provided to access the Operations Compounds from Tin Can Bay Road and Maryborough Cooloola Road, both State-controlled Roads, and Maryborough Tuan Forest Road, a FCRC controlled road.

4.3.6.2 On-site access tracks

The existing pine plantation has an extensive road and track network that will also be used by the Project. The tracks to be used for access will be determined through consultation with the Plantation Licensee and construction contractors prior to and during construction, in order to minimise impacts on plantation activities. Options will be available to modify the tracks being used when wet weather and ground conditions require.

A number of the existing tracks within the plantation will require upgrading and widening to enable the wind turbine components to be delivered and for the underground cables to be installed. Subject to resolution with the State and Plantation Licensee as to which forestry tracks will be used within the Project Area (PLA), there are currently anticipated to be approximately six small bridges located on existing access tracks that may need reinforcing or replacing, and approximately 15 culverts on tracks that may need to be replaced for use during construction. The upgrade to the bridge and culvert crossings will be undertaken in consultation with the Plantation Licensee and relevant regulators and the necessary approvals obtained prior to work commencing.

As far as reasonably practical, all access tracks shall be modified in accordance with the following design criteria and mitigation measures, and any additional design specifications will be agreed with the State and the Plantation Licensee:

- The forestry tracks may be upgraded to be typically 4-6m wide and may be expanded by 1m to accommodate crane and delivery vehicle requirements during construction, allow for the installation of underground cabling.
- Regular passing places and turning areas on existing forestry tracks will be established.
- Tracks will be constructed from locally sourced aggregate wherever possible.
- Sediment-laden run-off will be managed in accordance with the Stormwater and Erosion and Sediment Control Strategy in Appendix A.9.
- Once the Project has been commissioned, access tracks greater than 6m wide will be reduced with the edges dressed back in accordance with specifications to be agreed with the State and the Plantation Licensee.
- The number of water course crossings will be minimized and will be limited to existing crossings. The exact requirement and design of the water course crossings will be agreed during the detailed design phase and will be based on detailed site investigations and through discussions with the State and the Plantation Licensee. All necessary approvals for waterway crossings will be obtained prior to works commencing.

4.3.7 Operations compounds

The Project will include Operations Compounds. One Primary Operations Compound and two Secondary Operations Compounds will provide storage, administrative, maintenance, welfare and parking facilities for all employees and contractors working on site. The exact location of the compounds will be determined prior to construction commencing following consultation with all relevant stakeholders including the State and the Plantation Licensee. Notwithstanding, potential sites for the Operations Compounds have been identified as shown in **Figures 2A and 2B**. A description of the Primary and Secondary Operations Compounds is provided below.

4.3.7.1 Primary Operations Compound

The Primary Operations Compound will be located in a central location within the Project Area (PLA) within an area of approximately 16 hectares. The Compound will provide office facilities for all relevant administrative and technical staff, an operational control room, car parking, welfare facilities, storage and maintenance capabilities. The Primary Operations Compound may include a combination of the following facilities:

- permanent office buildings to accommodate up to 30 employees
- operational control room for monitoring of wind turbines, weather stations etc
- maintenance yard and warehouse with machinery such as a forklift
- equipment storage facilities
- workplace, health and safety room for site inductions, signing in, toolbox training etc
- chemical storage facility
- vehicle parking
- first aid room
- welfare facilities including change room, lunch room and amenities
- Distribution Substation
- battery storage facilities
- delivery access point
- security fence and lockable gate

4.3.7.2 Secondary Operations Compounds (north and south)

Two Secondary Operations Compounds will be located within the Project Area (PLA) with the main purpose of providing storage areas for plant, equipment and materials, maintenance and workshop areas, wash down facilities as well as parking and amenities to minimise travel to and from the Operations Compounds when on site undertaking routine maintenance activities. There will be a compound in the north and another in the south of the Project Area (PLA). The Secondary Operations Compounds may include a combination of the following facilities:

- maintenance yard and warehouse including bunded washdown
- office building
- equipment storage facilities
- workplace, health and safety room for site inductions, signing in, toolbox training etc
- chemical storage facility
- vehicle parking
- first aid room
- welfare facilities including change room, lunch room and amenities
- Distribution Substation
- battery storage facilities
- security fence and lockable gate

4.3.8 Utilities

All Operations Compounds will be serviced by relevant utilities as outlined below.

4.3.8.1 Water supply

Rainwater tanks will be installed at all Operations Compounds to provide water for amenities, washdown and maintenance purposes as required and supplemented by water tankers if necessary. Water will be treated to a potable standard where necessary.

A supply of water for firefighting purposes will be maintained in accordance with provisions agreed with the Plantation Licensee.

4.3.8.2 Wastewater treatment

On-site sewage treatment and effluent disposal or pump out facilities will be installed at all of the Operations Compounds as required, in accordance with the relevant local and State statutory requirements.

4.3.8.3 Power supply

An internal electrical supply will be provided to service the Operations Compounds by way of Distribution Lines, on routes to be agreed with the State and Plantation Licensee. Options for power supply from solar panels with battery storage and diesel generators may be utilised.

4.3.9 Chemical storage

Dedicated chemical storage facilities will be constructed at the relevant Operations Compounds. All chemical storage areas will be bunded and have a roof and will be constructed in accordance with *AS1940: The storage and handling of flammable and combustible liquids*.

4.3.10 Meteorological masts

Up to three temporary and six permanent meteorological masts (or LIDAR devices) will be installed within the Project Area (PLA), in accordance with the provisions detailed in the International Electrotechnical Commission (IEC) 61400-12-1 Guidelines for power performance testing.

4.3.11 Summary

Table 9 provides a summary of the key aspects that form part of the operations phase of the Project.

Table 9 - Summary of key infrastructure required during the operations phase

Component	Description	Number	Footprint	Specification
Wind turbines	— Up to 295m height located along existing forestry tracks	Up to 226		c. 6MW (+/- 3MW), to produce a total electricity generation of up to 1200 MW
	— Wind turbine foundations: Reinforced concrete slab to support the wind turbines	Up to 226	~900 m ²	
	— Crane hardstand with laydown areas: a mixture of concrete and gravel hardstand for use during construction and operation to store materials and place the crane	Up to 226	c. 1 ha	
Transmission Substation (Primary)	— Connects the Transmission Substation (Secondary) to the Transmission Line.	1	c. 6.25ha	Up to 275Kv

Transmission Substation (Secondary)	— Connects the Distribution Substations to the Transmission Substation (Primary) via an overhead Transmission Line.	Up to 2	c. 4ha	Up to 275KV
Distribution Substation	— Connects the wind turbines to the Transmission Substations All cabling from the wind turbines to the Distribution Substations will be underground along existing forestry tracks where possible, or overhead within the OTC.	Up to 10	c. 1ha	Up to 66 kV
Distribution Lines	— Cables connecting the wind turbines to the Distribution Substations			
High Voltage Transmission Line	— Connects the Transmission Substations (Primary) and Transmission Substations (Secondary) in the Project Area (PLA) to Woolooga Substation (Note: OTC(non-PLA) from the Project Area (PLA) to Woolooga Substation forms part of a subsequent submission)		Approx. 65km in length	
Site access	— Via Neerdie Road to the Project Area			
On-site access tracks	— Upgraded existing forestry tracks		Subject to agreement with the Plantation Licensee	
Operations Compound (Primary)	— Located in a central location within the Project Area (PLA) to provide office facilities for all relevant administrative and technical staff, an operational control room, car parking, welfare facilities, storage and maintenance capabilities.	1	16ha	
Operations Compound (Secondary)	— Located to the north and south of the Project Area (PLA) providing storage areas for plant, equipment and materials, maintenance and workshop areas, wash down facilities as well as parking and amenities.	2	Subject to design	
Battery storage	— Battery storage facilities — Portable buildings, fencing	4	Up to 4ha each	
Potable water supply	— Provision of water to site entrance and Operations Compounds	At each compound		Rainwater, bore options to be identified
Wastewater treatment	— On-site wastewater treatment and disposal or removal	At each compound		In accordance with local and state

				government requirements
Power supply	—	Power supply to the site entrance and Operations Compounds	At each compound	Combination of generator, solar and grid generated power
Chemical storage	—	Chemical storage facility at Operations Compounds	At each compound as required	Subject to design In accordance with <i>AS1940: The storage and handling of flammable and combustible liquids</i>
Meteorological masts	—	Meteorological masts (or LIDAR) will be installed within the Project Area (PLA)	Up to 6 permanent and 3 temporary	Subject to design In accordance with the IEC 61400-12-1 Guidelines for power performance testing.

4.4 Construction Phase

4.4.1 Staging and sequencing

The Project may be constructed in a series of stages, the timing of which will be dependent on the requirements of commercial and legal agreements with relevant stakeholders including the State, the Plantation Licensee, First Nations people, Powerlink and the buyers of the electricity. Each stakeholder has specific requirements that will determine the timing and location of the final staging which cannot be governed by the Proponent alone. The staging of the works will also be influenced by market need which will dictate the number of wind turbines and program of installation for installed in each stage.

An indicative potential staging program is as follows:

- Phase 1:
 - Stage 1 – up to 42 wind turbines (c. 252MW) to connect from the Transmission Substation (Primary) to Woolooga Substation on a double circuit Transmission Line. Installation of the Transmission Line and connection to the Woolooga Substation will occur in this stage.
 - Stage 2 – up to 29 additional wind turbines to bring the total wind farm capacity to 71 wind turbines (cumulative c. 426MW). connected to an existing Transmission Substation constructed in an earlier stage. Stage 1 and Stage 2 may be constructed together.
 - Stage 3 – up to 29 additional wind turbines to bring the total wind farm capacity to 100 wind turbines (cumulative c. 600MW) connected via a secondary Transmission Substation constructed for this stage, and
- Phase 2:
 - Stage 4 – up to 100 additional wind turbines to bring the total wind farm capacity to 200 wind turbines (cumulative c. 1200MW) connected to existing Transmission Substations constructed in an earlier stage.

4.4.2 Construction program

The overall duration of construction will depend on the stage approach and technology used. Approximate timeframes for each stage would include an equipment supply lead period of six to nine months plus a further period within which approximately six to eight wind turbines would be constructed per month. For example, a stage with 139 wind turbines would take nine months plus 139/6 (23 months), being a total of 32 months.

The likely maximum workforce on site at any one time will be hundreds of people. Construction facilities will be provided for the duration of the construction phase to support the workers and the Project. The construction facilities include Construction Compounds, utility services, concrete batching plants and a pre-cast concrete tower factory.

Stage 1 will include the establishment of key related and ancillary uses and infrastructure that will be required throughout the construction phase and include the following:

- main site entry compound off Neerdie Road
- Construction Compounds
- Substations
- Distribution Lines
- Transmission Line
- establishment of construction support facilities e.g. concrete batching plant, construction water supply, precast concrete tower factory, and
- meteorological masts.

4.4.3 Construction sequencing

The sequencing of construction activities in each stage will be determined by the construction contractor in consultation with the Plantation Licensee in order to minimise impacts on harvesting and haulage of timber products.

It is anticipated that the works will include the following:

- site survey
- cultural heritage survey and clearance (or mitigation) as necessary
- flora and fauna pre-clearing assessment as necessary
- vegetation clearing as required, where the Plantation Licensee will clear pine product and the contractor clears other vegetation as required
- de-stumping cleared pine by contractor
- site establishment, including Construction Compound and utilities
- installation of a High Voltage Transmission Line, including the following:
 - relevant civil works for transmission tower and surrounding construction pad
 - construction of the towers
 - line stringing
 - connect to substation(s)
- construction of wind turbine strings
 - installation of erosion and sediment control requirements
 - installation of Distribution Lines and upgrade of existing forestry access tracks as necessary (either parallel or in series)
 - excavation for hardstands and foundation construction
 - spoil from earthworks redistributed to hardstands or access track upgrades
 - preparation of foundations, installation of reinforcing bar and formwork and pouring concrete
 - delivery of components
 - erection of wind turbines
- installation of substation/s and overhead lines and commissioning, if required
- commissioning and reliability testing of wind turbines
- rehabilitation and restoration activities as necessary, and
- removal of temporary Construction Compounds and facilities.

Construction periods will be subject to any weather delays, availability of resources and performance of contractors.

4.4.4 Construction site entrances

During the construction phase there will be a number of site entrances as follows:

- Primary construction site entrance located in the southwest corner of the plantation off Neerdie Road. All large and oversized wind turbine components will enter the Site through this site entrance.
- Secondary construction site entrances located to the north, south and east of the Site at locations determined prior to construction commencing and subject to agreement with the Plantation Licensee

Nominal locations for the site entrances are shown on **Figures 2A and 2B**.

4.4.4.1 Site entrance (Primary)

The Site Entrance (Primary) during construction will be located off Neerdie Road and will include the following:

- office buildings
- first aid room(s), induction/training room(s)
- welfare facilities including change rooms, lunch rooms and restrooms
- vehicle parking and equipment storage.

The Project's oversize components, including the wind turbine's nacelle, blades, hub, towers and main transformers, may be delivered to the Port of Brisbane. From there they would be transported up the Port of Brisbane Motorway (M42), onto the Gateway Motorway (M1), merge with the Bruce Highway (M1) at South Pine and travel to Neerdie Road, then along a purpose-built 24/7 access track within Lot 1419 FTY1697, where they would then enter the Project Area (PLA) via the Site Entrance (Primary).

4.4.4.2 Other Site entrances

In order to minimise worker travel to relevant sections of the Project Area (PLA), construction site entrances will be located to the north, south and east using existing forestry access points. The location of the entrances will be determined prior to construction in accordance with the Plantation Licensee requirements. The secondary site construction entrances will be used for the delivery of equipment and materials and for employees to access the Project Area (PLA) and will not involve vehicles larger than the logging vehicles currently using the access points.

4.4.5 Possible river transport

The potential for large and oversize components to be delivered by barge on the Mary River to the Beaver Rock Boat Ramp area and then transported by truck to the Project Area (PLA) is being investigated.

4.4.6 Construction Compounds

There will be three types of fenced Construction Compounds within the Project Area (PLA) during the construction phase, as follows:

- Construction Compound (Primary) – at a central location within the Project Area (PLA)
- Construction Compound (Secondary) – located generally to the north and south to service each stage
- Construction Compound (Tertiary) – to service each string of wind turbines.

Nominal locations of the Construction Compounds are shown on **Figures 2A and 2B** and will be confirmed in consultation with the Construction Contractor and the Plantation Licensee.

Each of the compounds are described below.

4.4.6.1 Construction Compound (Primary)

The Construction Compound (Primary) will be constructed at a central location within the Project Area (PLA) and will be subject to final approval by the Plantation Licensee prior to construction commencing. The compound may include the following within a fenced compound:

- up to 15 portable buildings for administrative and technical staff
- car parking
- equipment and machinery storage
- workplace health and safety and welfare facilities
- induction room, and
- utilities.

The Principal's site office will be co-located at this compound.

4.4.6.2 Construction Compounds (Secondary)

The Construction Compounds (Secondary) will be for the use of construction staff within each stage of the works and may include the following within a fenced compound:

- up to four portable buildings for office and workplace health and safety purposes
- car parking
- welfare facilities
- concrete batching plant
- parts assembly
- equipment and machinery storage
- storage of spare parts
- machinery maintenance facilities
- chemical storage, and
- utilities.

4.4.6.3 Construction Compound (Tertiary)

The Construction Compounds (Tertiary) will be temporary and will support the construction of each string of wind turbines. They will comprise up to two portable buildings and provide basic office capabilities, utilities, welfare facilities and a first aid room for use by the construction staff and contractors.

4.4.7 Construction resources

4.4.7.1 Construction water supply

Construction water will be used in the concrete batching process, for dust suppression and bulk earthworks as necessary. Potable water will be required for amenities and drinking water supply for the construction workforce. The provision of construction and potable water will be the responsibility of the construction contractors and a water supply strategy will be required to be provided as part of the Construction Management Plan prior to works commencing. A range of options are available to secure water including the following:

- extract water from the Teddington Weir and pipe or truck it to the Construction Compounds or to batch plants within the facility compounds
- bore water – subject to consultation with the relevant regulatory authorities and terms agreed with the Plantation Licensee
- provision of rainwater tanks at the Construction Compounds for potable water use, and
- purchasing water from the mains supply network.

Other options not yet assessed include purchasing water from an existing water allocation from the Mary River or treated wastewater effluent from Gympie or Maryborough municipal sewage treatment plants.

The total water demand required for the construction of the Project Area (PLA) is currently under assessment.

4.4.7.2 Concrete batching plants

Concrete batching plants will be required to manufacture concrete for the construction of wind turbine footings and hardstands. It is anticipated that up to six concrete batch plants will be required to produce approximately 300,000 cubic meters of concrete per year. The batching plants will likely be located at the Construction Compounds, with the final location confirmed prior to construction commencing. The concrete batching plants will be bunded and, where possible, located on cleared, elevated land away from drainage lines.

The footprint of each batching plant will be approximately 2.5 ha and will support the following:

- concrete truck loading hardstands
- loading bays
- hoppers
- cement and admixture silos
- water tank
- stockpiles for aggregate and sands, and
- in-ground water recycling/first flush pit.

Sand and aggregate to produce concrete will be sourced either from on-site or from local suppliers off-site. The area where the batching plants are located will be rehabilitated following the completion of the construction program and returned to the Plantation Licensee for forestry if not required for subsequent wind farm stages.

4.4.7.3 Precast Concrete Tower Factory and Storage

A factory may be located on site to make precast concrete tower sections. Sand and coarse aggregates would be mixed with cement and other additives and poured into moulds with reinforcing bar inside. Once set, the precast concrete segments will be stored at a neighbouring area awaiting just-in-time delivery to a crane at the wind turbine site for installation.

The precast concrete factory would be approximately 4ha in area and would be a temporary structure, possibly tent like, and include:

- truck loading hardstands
- loading bays
- hoppers
- cement and admixture silos
- water tank
- stockpiles for aggregate and sands
- in-ground water recycling/first flush pit
- overhead lifting equipment
- concrete mixing equipment
- reinforcing bar bending and positioning equipment
- computer numerical controlled grinding machines
- moulds
- offices
- diesel generators of up to 4MW
- communications mast, and
- precast segment storage hardstand.

The factory would be bunded. It would be rehabilitated following the completion of the construction program and returned to the Plantation Licensee for forestry if no longer required for subsequent wind farm stages.

4.4.8 Transmission Line construction method

The following are key aspects to be undertaken during the construction of the Transmission Line.

4.4.8.1 Phase 3 conductor and earth wire stringing

Conductors and earth wires will be erected using the 'tension stringing' method in which conductors and earth wires are installed under sufficient tension to be kept clear of ground and mid-span obstacles within the easement. A small diameter steel lead rope threaded onto specially designed pulleys located on each pole will be used. This rope can be strung either by a small helicopter and placed in the pulleys or by a vehicle dragging it along the corridor or easement and subsequently lifting it into place. Once in place, high strength, non-rotating steel winch ropes are threaded through the pulleys using a winch and a special braking device tensioner to keep the cable off the ground. The conductors and earth wires are then threaded through the pulleys and connected to the insulators on the poles.

4.4.8.2 Transmission tower foundations

Transmission tower (steel lattice towers) foundations are grouped into three main types, broadly described as bored, mass concrete and special. Bored or mass concrete foundations are normally used whereas special foundations such as driven or screw piles are used where ground conditions do not permit installation of the normal types.

Construction of tower foundations usually consists of the following steps:

- setting out
- excavation or boring
- leg stub or base set up
- placement of reinforcing steel and concrete, and
- backfilling of excavated foundations.

Setting out involves the placement of temporary pegs on site to mark the location of the excavation. Dimensions of foundations are determined by the tower type, height and soil conditions at the site. The soil and slope conditions are analysed as part of the geotechnical investigations and foundation design undertaken by the geotechnical engineers prior to work commencing.

Excavation of bored foundation may be by truck mounted auger, backhoe or track mounted excavator for mass concrete foundations. The excavation is bored at the same inclination as the tower leg. In unstable ground conditions, the excavation may be stabilized by the insertion of a steel 'liner' in a bored foundation, shoring or timbering for a mass concrete foundation. Although dependent upon the geology of the surrounding soil, foundation may typically be excavated to a depth of approximately 8m.

Screw pile foundations are a single process installation that requires no pre-drilling, boring and limited pile cap excavation. Driven foundation piles may also be adapted where swampy or unstable ground conditions are encountered and where there is an environmental concern about the excavated spoil.

Reinforcing steel is normally required in tower foundations with the amount varying with tower and foundation type. Temporary formwork is also used for the foundation column above the ground (bored foundations) and above the base (mass concrete foundations). Concrete is placed in accordance with normal construction procedures and formwork removed after an appropriate curing time.

Backfilling of mass concrete foundations is completed using the excavated material if suitable or imported fill. Surplus material is spread evenly about the site or removed, depending on quantity and suitability.

4.4.9 Summary of construction facilities

A summary of facilities required during the construction phase of the Project has been provided in Table 10.

Table 10 - Summary of construction facilities

Component	Description	Number	Footprint
Site Entrance (Primary)	<ul style="list-style-type: none"> — Located at southwest corner of Site, entrance from Neerdie Road within the plantation — Will include <ul style="list-style-type: none"> — Office buildings — First aid room(s), induction/training room(s) — Welfare facilities including change rooms, lunch rooms and restrooms — Vehicle parking and equipment storage 	1	Subject to design (c. 1Ha)
Site Entrance (Secondary)	<ul style="list-style-type: none"> — One each in the north, south and east of the Project Area (PLA) — Component and materials delivery — Access for employees and contractors 	3	Subject to design (c. 1Ha)
Construction Compound (Primary)	<ul style="list-style-type: none"> — Central location within the Project Area (PLA) — Will include: <ul style="list-style-type: none"> — Portable buildings for administrative and technical staff — Car parking — Equipment and machinery storage — Workplace health, safety and welfare facilities — Induction room — Utilities — Principal's site office will be co-located at this compound. 	1	Subject to design (c. 4Ha)
Construction Compound (Secondary)	<ul style="list-style-type: none"> — For the use of construction staff within each stage of the works — Will include: <ul style="list-style-type: none"> — Portable buildings for office and workplace health and safety purposes — Car parking — Welfare facilities — Concrete batching plant — Parts assembly — Equipment and machinery storage — Storage of spare parts — Machinery maintenance facilities — Chemical storage — Utilities 	Up to 4	Subject to design (c. 2Ha)
Construction Compound (Tertiary)	<ul style="list-style-type: none"> — Temporary compound to support the construction of each string of wind turbines. — Will comprise portable buildings and provide basic office capabilities, utilities, welfare facilities and a first aid room for use by the construction staff and contractors. 	Mobile compounds established as required	Subject to design
Construction water supply	<ul style="list-style-type: none"> — For concrete batching process, for dust suppression and bulk earthworks 	Source is subject to assessment	Subject to design

Concrete batching plants	<ul style="list-style-type: none"> — To manufacture concrete for the construction of wind turbine footings and hardstands. — 120,000 tonnes concrete per year 	Subject to review	c. 2.5Ha
Pre-cast concrete factory	<ul style="list-style-type: none"> — To manufacture precast concrete tower sections 	1	c. 4Ha

4.4.10 Construction workforce

The Project will create hundreds of direct local jobs during the construction phase, subject to the scale of the stage and timing of construction. A range of professional, skilled and unskilled labour will be the responsibility of the construction contractors during construction including earthmovers, concreters, electrical and mechanical fitters, crane operators, engineers, project managers and administrative staff.

It is expected that the workforce required to undertake the necessary Transmission Line construction activities will be up to 30 personnel for the earlier bulk earthworks and tower construction. A similar number of personnel will undertake specialised electrical fit-off and commissioning in the latter portions of the construction phase.

4.4.11 Equipment and machinery

The construction activities at the Project Area (PLA) will include vegetation clearing where required (clearing of pine plantation will be undertaken by the Plantation Licensee), removal of stumps, earthworks and excavation, rock hammering, crushing and screening, concrete batching, hauling material, transporting equipment, parts assembly, concrete formwork and associated activities, building of permanent structures, maintenance, refuelling and others. The equipment likely to be on site for these activities include the following:

- site establishment – delivery trucks, earthmoving equipment, generators, concrete trucks
- upgrade of access tracks - earthmoving equipment, loaders, trucks, water carts, crushers
- construction of hardstands – earthmoving equipment, loaders, trucks, water carts, crushers, screening equipment, concrete trucks
- concrete batching plants – concrete mixing plant, batching equipment, conveyors, stackers, storage bins, silos
- wind turbines – concrete trucks, delivery trucks, cranes, elevated work platforms, generators
- electrical reticulation – cable laying trenchers, backhoes, graders
- site services – option for vans or buses to transport staff around site and water delivery and effluent removal trucks
- Transmission Line and towers - earthmoving equipment, elevated work platforms, concrete trucks, and other heavy machinery.

A personnel logistics strategy will be developed with the contractors, providing for a temporary car parking facility and transport services within the Site.

4.4.12 Construction management

4.4.12.1 Construction management plan

A preliminary Construction Management Plan (CMP) for the Project Area (PLA) has been prepared for the Project (refer to Appendix A.12) that outlines the proposed management and mitigation measures to be adopted. A CMP will be required to be prepared by the Construction Contractor prior to works commencing. Furthermore, the detailed construction methodology will be the responsibility of the successful construction contractor.

4.4.12.2 Clearing native vegetation

Clearing of native vegetation will be minimised as far as reasonably practical with all wind turbines and compounds planned within the exotic pine plantation area. Notwithstanding, some clearing of native vegetation may be required for the upgrade of the access tracks. Clearing will not be permitted in no-go zone areas to ensure the protection of remnant vegetation. A procedure for vegetation clearing including preclearing inspections and the requirement of a fauna spotter to be on site will be included within the Construction Contractor's Construction Environment Management Plan (CEMP).

It is noted that works associated with the Project located within any land declared as State forest are exempt from the *Vegetation Management Act* (VM Act). Clause 7 of the VM Act states that the 'Act applies to all clearing of vegetation other than vegetation on(c) an area declared as a State forest or timber reserve under the *Forestry Act 1959*'. Operational works in relation to the clearing of native vegetation for the Project are exempt from the provisions of the VM Act and any approvals that would be otherwise triggered by this Act are not required.

4.4.12.3 Air quality

The following activities could potentially give rise to impacts on air quality:

- mobilisation, including construction of laydown areas for off-loading materials and components and to accommodate site offices and welfare facilities
- upgrade of access tracks by civil engineering plant and other vehicles
- excavation of cable trenches and laying of electricity and communications cables
- construction of wind turbine foundations
- the delivery and erection of wind turbine towers and installation of nacelles and blades
- construction of the compounds, and
- vehicle movements within the Project Area (PLA).

The impact to sensitive land uses is likely to be negligible due to the distance of the works from the nearest residents. Notwithstanding, the CEMP will include mitigation measures to reduce air quality impacts from construction operations.

4.4.12.4 Erosion and sediment control

An assessment of soil types and slopes has been undertaken of the Project Area (PLA) to determine the low, medium high-risk areas regarding erosion and to inform the erosion and sediment control requirements during the construction phase and is provided in the Stormwater and Erosion and Sediment Control Strategy in Appendix A.9.

The construction contractor will be required to prepare an overarching or standard erosion and sediment control plans (ESCP) for the Project, as well as specific ESCPs for the transmission towers on the Transmission Line, wind turbine sites and associated hardstand areas and access tracks as necessary. The ESCPs will be required to be prepared in accordance with the current International Erosion Control Association (IECA) Best Practice Erosion and Sediment Control manual and the Plantation Licensee requirements and certified by a suitably qualified person. The ESCPs will be updated as required for each individual location to include site specific controls.

4.4.12.5 Waste management

Prior to construction commencing, the Contractor will prepare a Waste Management Plan which addresses the collection, handling and disposal of all wastes. The Waste Management Plan will identify the opportunities to avoid, reduce, reuse and recycle waste material together with their use in the construction of the Project. Where practical, wastes will be segregated and reused/recycled (e.g. scrap metal and cable off cuts). The Waste Management Plan is also to establish a preferred waste management hierarchy and develop principles for achieving good waste management in accordance with the *Environment Protection (Waste Management) Policy 2000*. The plan will identify waste removal service providers for the removal of waste produced as part of the construction process.

4.4.12.6 Hours of work

Given the remote nature of the Project Area (PLA) within a pine plantation, the hours of construction activities are not proposed to be limited.

4.4.12.7 Safety

The construction contractor will implement a Site Safety Management Plan (SSMP) during all construction works as required in the Preliminary Construction Management Plan (Appendix A.12). The SSMP will outline methods and procedures to ensure safe practices for workers and the public. The SSMP will conform to the *Workplace Health and Safety Act 1995* and all relevant construction practice standards.

4.5 Operational considerations

4.5.1 Wind farm operations

Existing plantation forestry land management practices will remain unaffected by the operating wind farm, with the Plantation Licensee operations continuing to use the land for agricultural, harvesting, trucking and haulage of timber products. Approximately 500ha of land will be used for the Project within the PLA following the construction phase. The total area proposed to be cleared is less than one percent of the PLA. FWH will be required to offset any lost plantation productivity under their agreement with HQPlantations resulting in “no net loss” of plantation resources to the timber industry. The Proponent will be required to offset any lost plantation productivity under their agreement with the Plantation Licensee resulting in no net loss of plantation resources to the timber industry.

4.5.2 Operational workforce

The Project will be managed by both on-site and off-site personnel in an asset management capacity. Across the scope of activities of asset management and operations and maintenance, a range of mechanical, electrical and administrative roles will be filled. On-site personnel will be largely responsible for:

- land access management with the State, Butchulla and Kabi Kabi representatives and the Plantation Licensee
- local community, forestry industry and stakeholder liaisons
- health and safety management
- environmental protection and compliance
- security and surveillance
- routine maintenance inspections of wind turbines and substations
- scheduled maintenance of wind turbines and associated infrastructure
- unscheduled maintenance of wind turbines and associated infrastructure
- scheduled maintenance of access tracks, and
- planned inspections of electrical network.

Off-site personnel will be largely responsible for:

- commercial arrangements
- financing
- Australian Energy Market Operator (AEMO) coordination
- wind farm performance monitoring and reporting
- remote resetting of wind turbines, electrical and communication systems
- Indigenous Land-Use Agreement management
- landowner and State liaisons
- community partnerships management, and
- ongoing community and stakeholder engagement.

4.5.3 Maintenance

Scheduled and unscheduled maintenance will be undertaken by a dedicated operational workforce in accordance with the manufacturer's requirements.

The maintenance of the access tracks will remain the responsibility of the Plantation Licensee.

4.6 Decommissioning and rehabilitation

At any time up until the end of the operational life of the Project, the Proponent may choose to replace or upgrade any of the wind turbine components (blades, gearboxes, motors), and/or fully repower and replace an entire wind turbine.

At the end of a wind turbine's life, it will be decommissioned, with the wind turbine disconnected, dismantled and all components above ground removed from the Site. When a whole stage or phase of Forest Wind is being decommissioned, all the corresponding associated electrical and communications reticulation forming part of the stage or phase above ground, will be removed. The wind turbine structure will be removed to a depth to allow ongoing forestry operations without material impediment on the Plantation Licensee, with topsoil being placed over the area to rehabilitate growing conditions.

The access tracks will be upgraded as required to undertake the decommissioning process and remain in place for future forestry operations. The underground cables installed below the depth of forestry earthwork activities (typically more than half a metre below ground) and will not contain contaminating substances will remain in place. These could also be recovered if economically viable.

In the event that the Transmission Line is fully decommissioned, it is envisaged that the infrastructure would be recovered and the site rehabilitated to an acceptable condition with regard to the existing surrounding land use. Typically, recovery of redundant infrastructure involves the removal of all structures and building materials to a depth of at least half a metre below ground. Materials recovered through this process are recycled if possible or disposed of in an appropriate manner.

Decommissioning activities would also be applied with regard to the impacts of the construction phase, and in accordance with an Environment Management Plan.

5. Planning assessment

5.1 Statutory Requirements

The Project is subject to assessment under the SDAP under the *Planning Act 2016*.

The Project has been designed to comply with the *State code 23: Wind farm development* (the Code) and the accompanying *State code 23: Wind farm development - Planning Guidelines* (June 2018) (Planning Guidelines). Technical studies have been undertaken in accordance with the requirements of the Planning Guidelines to confirm compliance and include mitigation and management measures to meet the Code's performance outcomes.

Applications for other approvals and permits will be made as required, with more details available when the design of the layout is complete, as is standard industry practice.

The Project has also been assessed against the SPP, the Wide Bay Burnett Regional Plan and the local government planning schemes. The wind farm's location, characteristics, outcomes and impacts are considered to be consistent with these policies and plans. Further detail on this assessment is provided in Appendix A.2.

5.2 Regional Plan

The Wide Bay Burnett region consists of Bundaberg, Fraser Coast, Gympie and North Burnett Regional Councils, as well as Cherbourg Aboriginal Shire Council. The Project is situated within the Fraser Coast and Gympie Regional Council areas.

The 20-year Wide Bay Burnett Regional Plan 2011 seeks to manage regional growth and change in the most sustainable way to protect and enhance quality of life in the region. The plan does this by:

- addressing regional economic, social and environmental issues
- identifying key infrastructure and service needs
- strengthening economic prosperity and employment opportunities
- highlighting and responding to climate change concerns
- identifying environmental areas for protection and enhancement
- supporting growth in established regional centres and townships
- mobilising public, private and community sectors to respond to key regional issues' and
- aligning efforts across agencies and all levels of government.

The Regional Plan identifies the regional framework and desired regional outcomes for the Wide Bay Burnett region.

The desired regional outcomes articulate the preferred direction for the development and land-use outcomes for the region and include specific policies and programs to manage the growth of the region over the next two decades. Desired regional outcomes within the Wide Bay Burnett Regional Plan that are relevant to the Project are identified in Appendix A.2.

The Project is consistent with the Wide Bay Burnett Regional Plan.

5.3 State assessment

5.3.1 State Planning Policy

The SPP outlines the guiding principles and State interests that underpin the delivery of local and regional plans, and development that will advance the social, economic and environmental needs of all Queenslanders.

The purpose of the SPP and the state interest policies is to secure a liveable, sustainable and prosperous Queensland. It requires that state interests are integrated in local planning instruments,

regional plans and development decisions in order to strengthen the Queensland economy, promote strong communities, protect the environment, wisely manage resources and inform and respond to investment in infrastructure.

The SPP recognises that mitigating and adapting to climate change is also an important consideration for planning at all levels. All state interests should be applied and considered in the context of a changing climate to support Queensland’s people, economy and the environment.

As per the *Planning Regulation 2017* and as outlined in Part B of the SPP, the Policy applies to the extent where relevant, when an assessment manager or referral agency other than local government is assessing a development application.

The application for development approval for Forest Wind will be assessed by the State Government and in this regard Part C Purpose and Guiding Principles and Part D State Interest Statements of the SPP apply. An assessment of how the Project complies with the applicable State Interest Statements is provided in Table 11 below.

Table 11 - SPP State Interest Statements

State interest	State interest statement	Response
Economic Growth		
Agriculture	The resources that agriculture depends on are protected to support the long-term viability and growth of the agriculture sector	<p>Agricultural land will not be fragmented as part of the Project as the Site is located within an existing and operating exotic pine plantation.</p> <p>Any clearing within the Project Area (PLA) will be restricted to clearing for the wind turbines, permanent and temporary infrastructure and widening of existing forestry tracks. The final locations of all infrastructure will be determined in consultation with the Plantation Licensee. Any areas cleared for temporary uses such as Construction Compounds will be restored and returned to plantation where relevant.</p> <p>There will be no disruption or impact to the ongoing operation of the plantation area as a result of Forest Wind.</p>
Mining and extractive resources	Extractive resources are protected, and gas resources are appropriately considered to support the productive use of resources, a strong mining and resources, a strong mining and resource industry, economical supply of construction materials, and avoid land use conflicts where possible.	<p>Access to the Project Area (PLA) will be along Neerdie Road, a designated transport route and associated transport route separation area to Mt Eaton KRA. The route was proposed so as to minimise impacts on surrounding communities.</p> <p>Mt Eaton KRA has not yet been developed. In this regard the use of the KRA transport route for the Project will not impact the undertaking of the future extractive industry development. Furthermore, it is anticipated that should the KRA commence operation the use of the transport route will not impact the activity.</p> <p>The development of a wind farm and use of the transport route for delivery of equipment and material to the Project Area (PLA) is not a sensitive land use and is consistent with the purpose of the KRA.</p>
Environment and heritage		
Biodiversity	Matters of environmental significance are valued and protected, and the health and resilience of biodiversity is maintained or enhanced to support ecological processes.	The Project has been designed to have minimal impact on the environment. Matters of Federal, State and local environmental significance have been considered and are included in the Ecological Assessment Report provided in Appendix A.7

State interest	State interest statement	Response
		The Project Area (PLA) is located within an existing operational exotic pine plantation. Native vegetation will not be cleared for the construction of the wind turbines. Clearing of native vegetation within the plantation will be limited to widening of existing forestry access tracks to enable the delivery of oversized components.
Cultural heritage	The cultural heritage significance of heritage places and heritage areas, including places of Aboriginal and Torres Strait Islander cultural heritage, is conserved for the benefit of the community and future generations.	Butchulla are represented in the northern section and the Kabi Kabi First Nation in the southern section of the Project Area. CHMPs are being developed in consultation with Kabi Kabi and Butchulla representatives.
Water Quality	The environmental values and quality of Queensland waters are protected and enhanced.	Impacts to waterways as a result of the Project will be minimal due to the following management and mitigation measures: — All wind turbines will be located no less than 50m from a major waterway. Erosion and sediment control measures will be installed during the construction phase as outlined in the Stormwater and Erosion and Sediment Control Management Strategy Management Plan in Appendix A.9.
Safety and resilience to hazards		
Natural hazards, risk and resilience	The risks associated with natural hazards, including the project impacts of climate change, are avoided or mitigated to protect people and property and enhance the community's resilience to natural hazards.	A preliminary Bushfire Management Plan has been included in the Preliminary Construction Management Plan in Appendix A 12. A detailed Bushfire Management Plan will be developed by the Construction Contractor in consultation with the Plantation Licensee to manage the risk of fire within the plantation during the construction, operation and decommissioning phases of the Project.
Emissions and hazardous activities	Community health and safety and the natural and built environment, are protected from potential adverse impacts of emissions and hazardous activities. The operation of appropriately established industrial development, major infrastructure, and sport and recreation activities is ensured.	The Project complies with the noise criteria within the Code as outlined in the Noise Impact Assessment in Appendix A.11.
Infrastructure		
Energy and Water Supply	The timely, safe, affordable and reliable provision and operation of electricity and water supply infrastructure is supported and renewable energy development is enabled.	The Project will not impact an existing water or energy supply at the Site. The Project will generate renewable energy for use in the National Electricity Market and other private entities as outlined in Section 1.2.1 of this Report.
Infrastructure integration	The benefits of past and ongoing investment in infrastructure and facilities are maximised through integrated land use planning.	The Project is located within an existing exotic pine plantation, developed by the State and will utilise and upgrade existing forestry access tracks, offering a compatible integration of land uses.

State interest	State interest statement	Response
Transport infrastructure	The safe and efficient movement of people and goods is enabled, and land use patterns that encourage sustainable transport are supported.	<p>The main access to the Project Area (PLA) will be via a KRA State-designated haulage route on Neerdie Road, a GRC controlled road between the Bruce Highway and the Project Area. Secondary access points will be provided to access the Operations Compounds from Tin Can Bay Road and Maryborough Cooloola Road, both State-controlled Roads, and Maryborough Tuan Forest Road, a FCRC controlled road.</p> <p>A Traffic Impact Assessment has been completed for the Project and is provided in Appendix A.8.</p>

5.3.2 Planning Act 2016

5.3.2.1 Material Change of Use for a wind farm

The *Planning Act 2016* establishes the framework for Queensland's planning system. It replaced the *Sustainable Planning Act 2009* on 3 July 2017.

As per Schedule 24 of the *Planning Act*, a 'wind farm'-

(a) means the use of premises for generating electricity by wind force, other than electricity that is to be used mainly on the premises for a domestic or rural use; and

(b) includes the use of premises for any of the following, if the use relates, or is ancillary, to the use stated in paragraph (a) –

i. a wind turbine, wind monitoring tower or anemometer;

ii. a building or structure, including, for example, a site office or temporary workers' accommodation;

iii. a storage area or maintenance facility, including, for example, a lay down area;

iv. infrastructure or works, including, for example, site access, foundations, electrical works, substation or landscaping.

In accordance with the above definition of a wind farm, the Project will comprise wind turbines and related activities and infrastructure as described in Section 4 of this Planning Report.

Schedule 10, Part 21, Division 1, Item 35 of the *Planning Regulation 2017* prescribes that a material change of use for a wind farm is assessable development requiring either code or impact assessment by the chief executive administering the *Planning Act*.

An application for material change of use for a wind farm is code assessable if—

(a) all wind turbines for the wind farm are at least 1,500m from a sensitive land use on a non-host lot; or

(b) 1 or more wind turbines for the wind farm are less than 1,500m from a sensitive land use on a non-host lot and the owner of the non-host lot has, by deed, agreed to the turbines being less than 1,500m from the sensitive land use.

All wind turbines for the Project proposed in this application are more than 1,500m from a sensitive land use on a non-host lot (refer **Figure 3** in Appendix A.1). The Project is therefore code assessable, under *State Code 23: Wind farm development*.

Schedule 10, Part 21, Division 2, Table 1, Item 2 of the *Planning Regulation* prescribes that the applicable assessment benchmarks are the SDAP. In accordance with Part 4, Division 2, Section 21 of the *Planning Regulation* the assessment manager for a material change of use for wind farms where there is no other assessable development is the chief executive of the Department of State Development, Manufacturing, Infrastructure and Planning (DSDMIP).

The Project has been assessed against the SDAP Version 2.5 State code 23, date of commencement 1 July 2019. The assessment has been provided in Section 6 of this Planning Report.

5.3.3 Transport Infrastructure Act

5.3.3.1 Section 62 Decision

In accordance with Section 62 of the *Transport Infrastructure Act 1994* approval is sought for vehicular access to the wind farm from Maryborough Cooloola Road and Tin Can Bay Road which are State-controlled roads. The intention is to use existing forestry access tracks and access points. Vehicles using the access points in relation to the wind farm will not be larger than the forestry vehicles currently in operation.

A preliminary assessment against the requirements of Section 62 of the *Transport Infrastructure Act (1994)* has been undertaken to determine the standard of access works required to maintain access for the wind farm and existing forestry activities off State Controlled Roads. The assessment is provided in Section 6.6 of the Traffic Impact Assessment in Appendix A.8 of this Planning Report.

Section 62 applications are assessed against the assessment criteria contained in State code 1: Development in a state-controlled road environment. To demonstrate compliance with the Planning Regulation, the Project has been assessed against the SDAP Version 2.5 State code 1, date of commencement 1 July 2019 (refer Appendix A.3 of this Planning Report).

5.3.4 Pre-Lodgement advice

Several pre-lodgement meetings have been held with SARA with the initial meeting held in April 2017 attended by SARA, Department of Infrastructure, Local Government and Planning, Department of Transport and Main Roads (TMR), Department of Environment and Heritage Protection. At this time, it was confirmed by DSDMIP that SARA would be the assessment manager for the MCU application. In addition to consulting with DSDMIP discussions have been held with other relevant State government departments including TMR, the Department of National Parks Sport and Racing (DNPSR) and the Department of Agriculture and Fisheries (DAF).

The most recent pre-lodgement meeting was held on 28 August 2019 and attended by SARA, TMR, Department of Environment and Science (DES), DNRME, DSDMIP and DAF.

5.4 Local Government Planning Schemes

5.4.1 General

The Project is located within the GRC and FCRC LGAs as shown in **Figure 1**. Whilst not a mandatory requirement, an assessment of the proposed development has been undertaken against relevant sections of both planning schemes to ensure that Council issues and requirements have been appropriately addressed in project planning. The assessment is provided in Appendix A.2 and summarised below.

5.4.2 Gympie Regional Council

5.4.2.1 Planning Scheme Assessment

The southern half of the Project Area (PLA) is located within the GRC LGA as shown in **Figure 1**. The land parcels within the GRC LGA are Lot 1004 FTY1659, Lot 1419 FTY1697 and Lot 915 FTY1775. The Project Area is zoned Rural under the Planning Scheme. There are a number of planning scheme overlays that relate to the site including flood hazard, conservation significant area, bushfire and mining leases. The Project has been assessed against the Rural Zone Code and is able to comply with all performance outcomes and provide management and mitigation measures to address matters where appropriate. as outlined in Appendix A.2.

5.4.2.2 Pre-lodgement meetings

Meetings have been held with the Mayor of GRC and the Director of Planning most recently in February 2019 and the Council has been supportive of the Project. Since February 2019, ongoing consultation has been undertaken with Council with regard to a range of technical issues including environment matters and permitting requirements.

5.4.3 Fraser Coast Regional Council

5.4.3.1 Planning Scheme Assessment

The northern half of the Project Area (PLA) is located within the FCRC LGA as shown in **Figure 1**. The land parcels within the FCRC LGA are Lot 1004 FTY1659 and Lot 915 FTY1775. The area is zoned Rural under the Planning Scheme. The following overlays are within the Project Area, flood hazard, biodiversity areas, bushfire, heritage, coastal protection and water resource catchment. In accordance with the assessment provided in Appendix A.2, the Project is able to comply with all performance outcomes of the Rural Zone Code and provide management and mitigation measures to address matters where appropriate.

Fraser Coast Planning Scheme 2014 incorporates an Airport Environs Overlay Code. The purpose of this code is:

to protect and maintain the operational efficiency and safety of Hervey Bay Airport and Maryborough Airport and avoid land use conflicts.

This code has been considered in the Aviation Impact Assessment completed by Aviation Projects provided in Appendix A.4 and summarised in Section 7.2.

5.4.3.2 Pre-lodgement meetings

Meetings have been held with the Mayor, Chief Executive Officer, Councillors and technical officers of FCRC, most recently on 12 August 2019. Council was supportive of the Project. Since the meeting consultation has been ongoing with regard to a number of technical issues including the aviation impact assessment and permitting requirements.

5.5 Other approvals

5.5.1 Commonwealth and State approvals

A review of potential legislative requirements has been undertaken for the Project and a number of permits and approvals have been identified as outlined in Table 12 below.

Table 12 - Other State approvals, permits and licenses

Legislation	Approval, permit, license	Regulator	Trigger	Status
Commonwealth				
<i>EPBC Act 1999</i>	Environment Protection and Biodiversity Conservation (EPBC) Act Approval	Department of Environment and Energy (DoEE)	Impacts to Matters of National Environmental Significance (MNES)	A pre-lodgement meeting was held with DoEE on 26 July 2019. The Project will be referred to DoEE in accordance with the requirements of the EBBC Act to determine if it is a controlled action.
<i>Native Title Act 1993</i>	Indigenous Land Use Agreement	Department of the Prime Minister and Cabinet - Indigenous Affairs	Future acts that affect native title.	Consultation with the Kabi Kabi First Nation Applicant group and the Butchulla Land and Sea Claim #2 Applicant group is ongoing following independent resolutions from both groups to enter into negotiations for an ILUA with FWH.
State				
<i>Nature Conservation Act 1992</i>	Clearing permit	DES	Clearing within a flora survey trigger area.	Protected plant survey to be undertaken within the required timeframe
<i>Nature Conservation Act 1992</i>	Species Management Plan	DES	Tampering with a protected animal breeding place	Surveys are complete. Impacted species have been identified. A Species Management Plan will be prepared and submitted for approval prior to construction commencing if required.
<i>Planning Act 2016</i>	Development Permit for Operational Work (Clearing Native Vegetation)	DES/ SARA	Clearing native vegetation in areas outside of State Forest	To be determined once design is finalised.
<i>Planning Act 2016</i>	Development Permit for Operational Work (Waterway Barrier Works)	DAF/ SARA	Works in a mapped waterway that does not apply with the relevant self-assessable code.	To be determined once design is finalised.
<i>Planning Act 2016</i>	Development Permit for Operational Work (Taking or	DAF/ SARA	Taking or interfering with water.	To be determined once design is finalised.

Legislation	Approval, permit, license	Regulator	Trigger	Status
	interfering with water)			
<i>Transport Infrastructure Act 1994</i>	Decision under Section 62	Department of Transport and Main Roads (TMR)	Works within or adjacent to a state-controlled road.	To be confirmed with TMR.
<i>Environmental Protection Act</i>	Environmental Authority (EA)	DES/SARA	Individual permits as required for environmentally relevant activities including: <ul style="list-style-type: none"> - Crushing, milling grinding or screening - Sewage treatment - Water treatment - Extraction activities 	Temporary activities required during the construction phase. An EA is required if the threshold triggers are met. To be confirmed during the final design stage
<i>Environmental Offsets Act 2014</i>	Environmental Offsets Policy	Assessing regulator	Schedule 2 of the Environmental Offset Regulation 2014 prescribes the matters of state environmental significant (MSES) which trigger an offsetting requirement for a Development Application.	A Significant Residual Impact Assessment is being undertaken
<i>Queensland Cultural Heritage Act 2003</i>	CHMP	Department of Aboriginal and Torres Strait Islander Partnerships	Impact to sites and/or items of cultural significance	CHMPs are being developed in consultation with Kabi Kabi and Butchulla representatives
Local				
<i>Gympie Regional Council Planning Scheme</i>	Development Permit for relevant activities	GRC Planning Scheme	Construction related activities	To be confirmed during the final design stage
<i>Fraser Coast Regional Council Planning Scheme</i>	Development Permit for relevant activities	FCRC Planning Scheme	Construction related activities	To be confirmed during the final design stage

The Project will comply with all other relevant legislation as necessary.

5.6 International policy

The Project is consistent with key international policy addressing climate change, specifically the Kyoto Protocol and the Paris Agreement. The Project will make an important contribution to meeting these commitments made by the Australian government.

6. State code 23: Wind farm development

The relevant assessment benchmarks for material change of use for wind farm are described in *State code 23: Wind farm development*.

The purpose of the code is to protect individuals, communities and the environment from adverse impacts as a result of the construction, operation and decommissioning of wind farm development.

Wind farms should be appropriately located, sited, designed and operated to ensure:

- *the safety, operational integrity and efficiency of air services and aircraft operations*
- *risks to human health, wellbeing and quality of life are minimised by ensuring acceptable levels of amenity and acoustic emissions at sensitive land uses*
- *development avoids, or minimises and mitigates, adverse impacts on the natural environment (fauna and flora) and associated ecological processes*
- *development does not unreasonably impact on the character, scenic amenity and landscape values of the locality*
- *the safe and efficient operation of local transport networks and road infrastructure.*

This DA has been developed to be consistent with the Code and supporting Planning Guideline.

Compliance with the Code's performance outcomes code is presented in Table 13 below, with further information provided in the relevant technical studies provided as appendices to this Planning Report.

Table 13 - State Code 23: Wind farm development response

Performance outcomes	Acceptable outcomes	Response
Aviation safety, integrity and efficiency		
PO1 The safety, operational integrity and efficiency of air services and aircraft operations are not adversely affected by the location, siting, design and operation of the development.	AO1.1 Wind turbines or wind monitoring towers are 150 metres or less in height and do not infringe on the obstacle limitation surfaces (OLS), procedures for air navigation services – aircraft operations (PANS-OPS) surface, restricted airspace and low flying areas of a certified aerodrome, registered aerodrome or military aerodrome.	Not applicable as wind turbines will be greater than 150m in height.
	OR	
	AO1.2 For development involving wind turbines or wind monitoring towers more than 150 metres in height: written endorsement by the Civil Aviation Safety Authority (CASA), Airservices Australia and the district aerodrome supervisor is provided stating they have no objection to the proposed development; or where within 30 kilometres of a military aerodrome, or a certified aerodrome or registered aerodrome jointly used as a military aerodrome, written endorsement by the federal Department of Defence, Civil Aviation Safety Authority (CASA), Airservices Australia and the district aerodrome supervisor is provided stating they have no objection to the proposed development.	<p>All wind turbines and wind monitoring towers are greater than 150m in height.</p> <p>The Project includes up to six permanent meteorological masts and three temporary masts within the Project Area (PLA). All masts will be greater than 150m in height and will be installed in accordance with the provisions detailed in the IEC 61400-12-1 Guidelines for power performance testing. The exact location of the masts will be determined during the detailed siting phase prior to construction commencing in consultation with the Plantation Licensee to ensure there is no impact on their operations.</p> <p>The Project Area (PLA) is located approximately 14.5 km from Maryborough Airport, approximately 33.2 km from Hervey Bay Airport and west of and adjacent to the Department of Defence Wide Bay Training Area (WBTA).</p> <p>An Aviation Impact Assessment was completed by Aviation Projects in August 2019 and is provided in Appendix A.4. A copy of the AIA was submitted to Airservices Australia, FCRC, the Department of Defence, the Royal Flying Doctor Service (RFDS), Qantas Link and Virgin Australia on 2 August 2019 for review and comment. The results of the consultation have been documented in the AIA report provided and summarised below:</p> <ul style="list-style-type: none"> — Airservices Australia provided the following response: <p><i>With respect to procedures designed by Airservices in accordance with ICAO PANS-OPS and Document 9905, at a maximum height of 408.7 m (1341 ft) AHD, the wind farm will affect the 25 NM and 10 NM minimum sector altitude (MSA) of Maryborough Airport and the 25 NM minimum sector altitude (MSA) of Hervey Bay Airport.</i></p>

Performance outcomes**Acceptable outcomes****Response**

In order to accommodate the proposal, the MSA is required to be amended for Hervey Bay and Maryborough as follows:

- *The existing Maryborough 3100 ft 25 NM MSA sector will need to be expanded to cover B-260° to B-110°. The Maryborough 10 nm MSA will need to be raised by 500 ft from 1700 ft to 2200 ft.*
- *The Hervey Bay 25NM MSA will need to be revised to include a new 2300 ft sector between B-340° and B-025°.*
- *The missed approach termination altitude of the YMYB RNAV-Z (GNSS) RWY 17 procedure will need to be increased to 3100 ft.*

Airservices requires that the operator of Hervey Bay and Maryborough Airport to be consulted and confirm that the proposed permanent change to MSA will not adversely impact on their operations before any change (temporary or permanent) can be supported by Airservices.

- FCRC advised that as operator of Airports in both Maryborough and Hervey Bay, they had no objection to the Project subject to ongoing compliance with all CASA, Airservices Australia and relevant aviation regulatory requirements. FCRC also required that Forest Wind would not inhibit or be an impediment to the future growth of aviation activities and services at the Maryborough Airport.
- RFDS – the proposed wind farm will have no effect on RFDS operations at Maryborough or Hervey Bay airports.
- Qantas Link - Qantas Link advised that they had no issues with the proposed wind farm.
- Virgin Australia - Virgin Australia advised that their flying operations to Hervey Bay airport will not be significantly impacted by the proposed 200ft increase change to the minimum sector altitude. Virgin Australia do not operate to Maryborough Airport.
- Department of Defence - Defence conducted an assessment of the proposed Project layout for potential impacts on the safety of Defence flying operations. Defence has no objection to the proposed wind farm provided that the project complies with the conditions outlined in the letter response provided in Annexure 2 of the Aviation Impact Assessment. Defence advised that should the proposed wind farm have an adverse impact on Defence training capabilities, the operators of the

Performance outcomes	Acceptable outcomes	Response
PO2 Development includes lighting and marking measures to ensure the safety, operational integrity and efficiency of air services and aircraft operations.	AO2.1 Marking of wind turbines is provided so that rotor blades, the nacelle and the upper two thirds of the supporting mast of the wind turbines are painted white. AND	<p>wind farm would need to work with Defence to resolve the issue by introducing measures to reduce levels of interference to acceptable levels. The proposed 295 metres AGL wind turbines meet the requirements for reporting of tall structures. Defence therefore requests that the applicant provide Airservices Australia with “as constructed” details.</p> <ul style="list-style-type: none"> — The Civil Aviation Safety Authority (CASA) no longer provides written endorsement to the developer until the application for the development approval is submitted. It is understood that SARA will undertake this consultation on FWH’s behalf. <p>The Project complies with AO2.1.</p> <p>The rotor blades, nacelle and upper two thirds of the supporting tower of the wind turbines will be painted a shade of white in accordance with Annex 14 Volume 1 Section 6.2.4.2 of the International Civil Aviation Organisation (ICAO) Standard and Recommended Practices. Further details are provided in Section 8 of the AIA.</p>
	AO2.2 The top one third of wind monitoring towers is painted in alternating bands of contrasting colour. AND	<p>The Project complies with AO2.1.</p> <p>The following marking and lighting solutions will be adopted for the wind monitoring towers:</p> <ul style="list-style-type: none"> — ICAO compliant medium intensity flashing lights will be installed with white for day, low intensity steady red for night until such time as a wind turbine is constructed within close proximity to the wind monitoring tower (nominally 900 m) — Aviation marker balls will be installed on the outside guy wires — The top one third of the mast structure will be painted in red and white alternating bands — The guy wire ground attachment points will have contrasting colours to the surrounding ground/vegetation, and — The fencing around the anchor points will be painted in high contrasting colour.
	AO2.3 For development involving the lighting of wind turbines or wind monitoring towers more than 150 metres in height or within 30 kilometres of a certified aerodrome or registered aerodrome, written endorsement by the	<p>The Project complies with AO2.2.</p> <p>Aviation Projects have determined that the Project will not require obstacle lighting to maintain an acceptable level of safety to aircraft based on the following:</p>

Performance outcomes**Acceptable outcomes**

Civil Aviation Safety Authority (CASA) and Airservices Australia is provided stating they have no objection to the proposed development and lighting measures.
AND

Response

- Outcomes of the Aeronautical Impact Statement (once the MSAs of the 10 nm and 25 nm of Maryborough Airport and the 25 nm of Hervey Airport are increased) provided in Section 6 of the AIA; and
- Conclusions of the risk assessment in Section 10 of the AIA.

The following measures will be adopted:

- The wind turbines will be marked with a shade of white to provide sufficient contrast with the surrounding environment and maintain an acceptable level of safety while lowering the visual impact to the neighbouring residents.
- The details of the Project will be communicated with local and regional operators and recorded as relevant.

The wind monitoring towers will be lit with ICAO compliant medium intensity flashing lights will be installed with white for day, low intensity steady red for night.

The AIA was submitted to Airservices Australia for consideration and the response received did not include any requirement for lighting.

CASA no longer provides written endorsement to the developer until the application for the development approval is submitted. It is understood that SARA will undertake this consultation on FWH's behalf.

The Project complies with AO2.3.

Performance outcomes	Acceptable outcomes	Response
	<p>AO2.4 In areas where low flying aircraft occur:</p> <ul style="list-style-type: none"> — marker balls or high visibility sleeves are placed on the outside guy wires of wind monitoring towers — the guy wire ground attachment points have contrasting colours to the surrounding ground/vegetation — a flashing strobe light is installed to operate on wind monitoring towers during daylight hours. <p>AND</p>	<p>As outlined in Section 3.5 of the AIA, Civil Aviation Regulation (1988) 157 (Low flying) prescribes the minimum height for flight. Generally speaking aircraft are restricted to a minimum height of 500 ft AGL above the highest point of the terrain and any object on it within a radius of 600 m (or 300 m for helicopters) in visual flight during the day when not in the vicinity of built up areas, and 1000 ft AGL over built up areas.</p> <p>Section 7 of the AIA identified a range of aircraft operator characteristics. Whilst most of these remain above the low flying threshold of 500ft there may be some instances when aircraft will be lower than this.</p> <p>The proposed wind monitoring towers will be marked as follows:</p> <ul style="list-style-type: none"> — Aviation marker balls will be installed on the outside guy wires — The guy wire ground attachment points will have contrasting colours to the surrounding ground/vegetation — The top one third of the mast structure will be painted in red and white alternating bands; — ICAO compliant medium intensity flashing lights will be installed with white for day, low intensity steady red for night until such time as a wind turbine is constructed within close proximity to the wind monitoring tower (nominally 900 m), and — The fencing around the anchor points will be painted in high contrasting colour. <p>The Project complies with AO2.4.</p>
	<p>AO2.5 Where LED obstruction lighting is proposed, the frequency range of the LED light emitted falls within the range of wavelengths 655 to 930 nanometres.</p>	<p>LED lighting is not proposed for the Project.</p> <p>AO2.5 is not applicable.</p>
Electromagnetic interference		
<p>PO3 Development is designed, located and sited to avoid, or minimise and mitigate, electromagnetic interference to pre-existing television, radar and radio transmission and reception.</p>	<p>No acceptable outcome is prescribed.</p>	<p>An Electromagnetic Interference Impact Assessment was undertaken by suitably qualified consultant, GHD Pty Ltd, in October 2017 and updated in August 2019 following amendments to the layout of the Project Area (PLA). The report is provided in Appendix A.5 of this Planning Report. The assessment was completed in accordance with the requirements of Appendix 1 of DSDMIP's <i>State Code 23: Wind farm development, Planning Guidelines (June 2018)</i>. A summary of the impacts, management and mitigation measures are provided in Section 7.3 of this report. The assessment identified that the nearest wind turbine is 19.7km from the Bureau of</p>

Performance outcomes	Acceptable outcomes	Response
Shadow Flicker	AO4.1 The modelled blade shadow flicker impact on any existing or approved sensitive land use(s) does not exceed 30 hours per annum and 30 minutes per day. AND	<p>Meteorology (BoM) S-band radar facility at Gympie (Mt. Kanigan). Consultation with the BoM is ongoing to determine the effects and mitigations measures. Further details on this impact are provided in Section 14 of the EMI Impact Assessment Report in Appendix A.5.</p> <p>The Project complies with PO3.</p>
PO4 Development avoids or minimises shadow flicker impacts on existing or approved sensitive land uses.		<p>A Shadow Flicker Assessment has been completed by CleanSight Pty Ltd in accordance with Appendix 2 of the Planning Guidelines and is provided in Appendix A.6 of this Report.</p> <p>The zone of influence for the Project was determined to be 1,192.5m based on a 4.5m blade chord. However, a conservative approach was adopted and 1,325m (5m blade chord) was considered in the model. Sensitive receptors were selected based on being the closest sensitive uses to the zone of influence of shadows boundary and are detailed in the Report in Appendix A.6. The assessment identified that regardless of the conservative approach taken for the determination of the zone of influence of shadows, there are no sensitive receptors within the zone on non-host lots and only one sensitive receptor within the zone on a host lot, being a caretaker's accommodation, labelled SR09.</p> <p>The worst-case shadow flicker was modelled as described in Section 3.2 of the Shadow Flicker Assessment Report. The sensitive receptor, SR09, is located to the south of the wind turbine locations and it was determined that there will be no impact from shadow flicker. A 50m buffer was allowed for and the model indicated that there is more than 400m separation between the 50m buffer around SR09 and the area of potential worst-case shadow flicker impact.</p> <p>There is no impact from shadow flicker as a result of the Project.</p> <p>The Project complies with AO4.1</p>
Flora and Fauna	AO4.2 Wind turbine blades have a low reflectivity finish/treatment.	<p>The wind turbine blades will have a low reflective finish.</p> <p>The proposed development complies with AO4.2.</p>
PO5 Development ensures that impacts on flora, fauna and associated ecological	No acceptable outcome is prescribed.	Preliminary ecological assessments were undertaken by O2 Ecology (2016) and Premise (2017-2019). The initial assessments

Performance outcomes

processes are avoided, or minimised and mitigated, through effective siting, design and operation of the development.

Acceptable outcomes**Response**

informed further survey design and assessments were undertaken by Premise between 2017 and 2019. Additional surveys and targeted assessments were undertaken by Fox & Co Environmental Pty Ltd. All surveys have been undertaken in accordance with Appendix 3 of the Planning Guideline as well as species specific guidelines and relevant legislation.

The ecological assessments include a review of:

- On site fauna, fauna habitats and corridors
- On site flora and corridors
- Bird and bat populations and impacts

Surveys have been undertaken over a three-year period and include the following:

- Fixed-point bird utilisation surveys across the Project Area (PLA) (including reference sites) between December 2016 and April 2019
- Grey-headed Flying Fox (GHFF) surveys in December 2016, and a total of 34 nights between October 2018 and April 2019 at 12 sites using acoustic recorders
- Total of 80 nights of surveys for microbats across 12 sites between October 2018 and April 2019 with a targeted survey undertaken between 14th February and 26th March 2019 using ultrasonic recorders to record echolocation
- Total of 80 nights of surveys for frogs across 12 sites between October 2018 and April 2019 using acoustic recorders.

The surveys identified that the Project is ideally situated as the exotic pine plantations are considered of low ecological value and any remaining native vegetation within the plantation area will be avoided. The assessment determined the following risk to birds and bats:

- Although the risk of collision of some bird species (White-throated needletail and Fork-tailed swift) may occur, the likelihood of impacting the International and/or National population of these species is considered low. This is due to the widespread distribution of the species and the highly variable occurrence and abundance of this species across the Project Area (PLA).
- The assessment of impact to the GHFF determined that given the distance to the site, relatively small amount of remnant vegetation (foraging habitat) on site (0-4% within foraging ranges) and significant widespread foraging areas between

Performance outcomes	Acceptable outcomes	Response
		<p>these camps and the site (96-100% outside Project Area (PLA)), significant impacts to these populations are considered unlikely. In addition, the assessment concluded that given the large areas of intact native vegetation outside of the Project Area (PLA) and relatively small amount of native foraging vegetation within the wind turbine area, and local flight behaviour, the risk of collision-based impacts on other GHFF colonies within 50km of the wind turbine area was low.</p> <p>A summary of the findings of the surveys are provided in Section 7.5.2 of this Report with all results included in the Ecological Assessment report in Appendix A.7.</p> <p>The following plans have been prepared and are included in respective appendices in the Ecological Assessment Report:</p> <ul style="list-style-type: none"> — Bird and Bat Utilisation Survey (Appendix G) — Preliminary Brid Management Plan (Appendix H) — Preliminary Vegetation Management Plan (Appendix J) — Preliminary Fauna Management Plan (Appendix J) <p>The Project has been designed to avoid impacts to flora and fauna by being located in an existing pine plantation and avoiding native vegetation and waterways. Specific avoidance measures are summarised in Section 7.5.3 of this Planning Report and documented in the Ecological Assessment.</p> <p>Management and mitigation measures have been determined for the Project and are summarised in Section 7.5.3 of this Planning Report and documented in the Ecological Assessment.</p> <p>The Project complies with PO5.</p>
Traffic and access	No acceptable outcome is prescribed.	<p>A Traffic Management Plan has been prepared for the Project by icubed consulting Pty Ltd and includes a Traffic Impact Assessment in Appendix B and Transport Route Study in Appendix C. The Traffic Management Plan is provided in Appendix A.8 of this Planning Report.</p> <p>The reports detail the following:</p> <ul style="list-style-type: none"> — Traffic Management Plan - details the overarching vehicle movement planning requirements in accordance with the project requirements and relevant standards. An evaluation of public vehicular and pedestrian traffic, and construction worker hazard exposure was undertaken.

Performance outcomes**Acceptable outcomes****Response**

- Traffic Impact Assessment – assessment of the existing conditions, the proposed access arrangements, the proposed development traffic requirements; and the impact of the proposed development on the surrounding road network.
- Transport Route Study – assessment of the transport route for the Project and includes an evaluation of the following:
 - Existing conditions of the proposed transport route from the Port of Brisbane to the site
 - Identifying the key intersections and turning movements the truck will undertake
 - Investigating the most appropriate turning path for the truck to undertake at the key locations
 - Vehicle Swept path analysis of intersections along the proposed transport route
 - Identification of any road or intersection upgrades required to enable transportation of vehicles to site

Neerdie Road borders the site along the south western side and is a Council controlled road. The transport route heading from the site to the Bruce Highway is along Neerdie Road. Bruce Highway is a designated State-controlled Road (Department of Transport and Main Roads).

The Transport Route Study demonstrated that the largest horizontal component of the wind farm infrastructure, being a wind blade, is capable of being transported from the Port of Brisbane to the subject site with minimal disruption to the road network and infrastructure aligning the road reserve. A separate assessment to determine what the largest height component that could be transported to site was also completed in the Transport Route Study.

Access to the operations and maintenance facility for the proposed development shall be from a new internal access road which will connect to Neerdie Road adjacent to the south eastern corner of the subject site. Site access will also be provided from existing forestry accesses at Maryborough Tuan Forest Road (northern access), Maryborough-Cooloola Road (eastern access) and Tin Can Bay Road (southern access). Internal existing site forestry tracks will be used to service the site facilities and the wind turbines within the development.

A preliminary Construction Phase Traffic Management Plan has been prepared to implement appropriate signage and controls and

Performance outcomes**Acceptable outcomes****Response**

ensure an appropriate level of awareness of increased vehicle movements in the area.

There will be sufficient areas set aside for parking during the construction stages of this project to accommodate the anticipated number of construction and employee vehicles (assumed to be approximately 200 workers for the Traffic Impact Assessment, excluding vehicle drivers, are expected during construction of the development).

The site layout will consist of a series of existing forestry tracks, upgraded where necessary, which will be assessed and designed to safely and efficiently allow for the movement of construction vehicles to the Construction Compounds.

The Operations Compounds will be provided with car parking spaces for staff likely to be employed at the wind farm.

The reports identified the following:

- There will be sufficient areas set aside for parking during the construction stages of this project to accommodate the anticipated number of construction and employee vehicles.
- The assessment on the existing and proposed construction traffic and pavement loadings show that there will be no road sections with traffic or pavement impacts greater than the required 5% impact value.
- An oversize vehicle of size 84m can navigate to the development site with some minor intersection upgrades, including temporarily removing above ground infrastructure or gravel widening.
- A maximum vehicle height of 6.2m can travel to site along the Transport Route with available detours.
- Without available detours, a maximum vehicle height of 4.25m can be achieved.
- There are 20 locations along the 225km transportation route from the Port of Brisbane to site that have potential to cause clashes between an oversize length blade trailer vehicle and existing infrastructure or potentially requires road widening works to cater for the expected transport vehicle. The 20 identified locations were checked using vehicle tracking software and it was found that 11 required some level of upgrade.

Performance outcomes	Acceptable outcomes	Response
		<p>Existing forestry access tracks will be used within the Project Area (PLA) and will be upgraded as required in consultation with the Plantation Licensee.</p> <p>The management and mitigation measures are summarised in Section 7.6.3 of this Planning Report.</p> <p>The Project complies with PO6.</p>
Stormwater management		
<p>PO7 Development avoids, or minimises and mitigates, adverse impacts on water quality objectives to achieve no worsening to receiving waters during the operation of the wind farm.</p>	<p>No acceptable outcome is prescribed.</p>	<p>A Stormwater Management and Erosion and Sediment Control Management Strategy has been prepared for the Project and is provided in Appendix A.9 of this Planning Report. The Strategy has been prepared in accordance with the Queensland Urban Drainage Manual (2017) and the IECA Best practice erosion and sediment control – for construction and building sites.</p> <p>All wind turbine pads will be located no less than 50m from any stream or major watercourse.</p> <p>A stormwater hazard impact assessment has been undertaken which identifies the stormwater risk, erosion hazard and provides control measures to minimise impacts during the construction and operational phases of Forest Wind.</p> <p>Erosion and sediment control measures have been documented in the Strategy. The relevant measures will be implemented so as to avoid and minimise any adverse impacts to surrounding waterways during the construction and operation of the wind farm.</p> <p>An ESCP will be developed and certified by a Certified Professional in Erosion and Sediment Control (CPESC) or Registered Professional Engineer of Queensland (RPEQ) prior to construction commencing.</p> <p>The Strategy identified that the potential impacts associated with the construction and operation of Forest Wind can be managed with the development of an ESCP and the installation and maintenance of appropriate controls.</p> <p>The Project complies with PO7.</p>
Watercourses and drainage features		
<p>PO8 Development avoids or minimises the clearing of vegetation within any watercourse or drainage feature to protect:</p>	<p>No acceptable outcome is prescribed.</p>	<p>Clearing of vegetation within waterways will be avoided. The only clearing required will be for the upgrade of waterway crossings on existing forestry access tracks. Ecological surveys will be undertaken prior to any works commencing. No works will</p>

Performance outcomes	Acceptable outcomes	Response
<p>bank stability by protecting against bank erosion water quality objectives by filtering sediments, nutrients and other pollutants aquatic habitat terrestrial habitat.</p>		<p>commence without the granting of all relevant approvals and permits. Where banks are disturbed and exposed to storm water, works will be stabilised against overland flows by implementing the following as necessary:</p> <ul style="list-style-type: none"> — Temporarily installing cross drains and earth blocks in high bank drainage points. — Placing geo fabric liners and cover over all disturbed banks. — Installing sumps above the high bank and pumping any overland flows back to the plantation compartment to reticulate through litter layers. — Re-vegetating exposed areas not required for infrastructure to the Regional Ecosystem Type species of trees and ground cover. — Maintain until the average tree height is 3m. <p>All infrastructure within the wind farm will:</p> <ul style="list-style-type: none"> — Be located within an existing exotic pine plantation. — Be at least 50m from any waterway. — Be drained into existing internal drainage systems. — Have an approved ESCP for each asset that complies with IECA best practice. — Adopt the strategies outlined in the Stormwater Management and Erosion and Sediment Control Management Strategy to minimise erosion hazard risk and maintain riparian vegetation.
<p>Character, scenic amenity and landscape values</p>	<p>No acceptable outcome is prescribed.</p>	<p>The Project complies with PO8.</p>
<p>PO9 Development avoids, or minimises and mitigates, adverse impacts on the character, scenic amenity and landscape values of the locality and region through effective siting and design.</p>		<p>A Landscape and Visual Impact Assessment has been completed for the Project and is included in Appendix A.10 of this Planning Report. The assessment concentrated on a study area determined by applying a 30km radial buffer to the wind turbines, which is considered sufficient to identify all likely significant effects on landscape and visual amenity. The assessment was produced in accordance with the Planning Guidelines, State Development Assessment Provisions (Department of State Development, Manufacturing, Infrastructure and Planning, July 2019), the Draft National Wind Farm Development Guidelines (Commonwealth Government, 2010) and Queensland Government Implementation</p>

Performance outcomes**Acceptable outcomes****Response**

Guideline No 8 - Identifying and Protecting Scenic Amenity Values (2007), and the methodology used in this study broadly conforms to the UK Guidelines for Landscape and Visual Impact Assessment, Third edition (GLVIA3).

The wind turbines have been sited to minimise any impact to landscape and visual amenity including the following:

- Wind turbines are located no less than 3,000m from sensitive land uses
- The wind farm is located within an existing exotic pine plantation
- Potential landscape and visual effects have been a key factor in the evolution of the site design. For instance, the arrangement and distance of the wind farm in views from surrounding settlements were examined for various layouts, in order to minimise the potential visibility of the development as far as possible from key views

A number of other mitigation measures are provided in the Landscape and Visual Impact Assessment in Appendix A.10.

The assessment identified the following:

- The visibility of the proposed wind farm would be extremely limited.
- There would be no significant effects on the vast majority of residents, tourists, recreational users, motorists, or rail users within the study area. Due to the carefully considered location and design of the proposed wind farm, the proposed wind turbines would be at least partially screened in many views, limiting the potential effects on both visual receptors and on landscape character.
- By siting the proposal wholly within plantation forestry, the impacts on landscape character and landscape fabric have been limited; the plantation continually works on a rotation felling basis where the wind turbines will utilise existing plantation tracks and will result in no loss of distinctive landscape features. Furthermore, the forestry itself provides a natural visual buffer in many views.

The assessment considered that the significant effects on landscape and visual amenity as a result of the proposed wind farm would be extremely limited and contained in this location

The Project complies with PO9.

Performance outcomes	Acceptable outcomes	Response
Separation distances		
PO10 Wind turbines are adequately separated from existing or approved sensitive land uses on non-host lots.	AO10.1 Wind turbines are setback at least 1 500 metres from existing or approved sensitive land uses on non-host lots. OR	There are no sensitive land uses on non-host and host lots within 1500m of the corridors within which wind turbines will be located. There will be a 3000m separation distance between wind turbine locations and sensitive land uses to avoid and or minimise impacts on residents within proximity to the wind farm. This is illustrated in Figure 3 provided in Appendix A.1.
	AO10.2 Where wind turbines are proposed within 1500 metres of existing or approved sensitive land uses on non-host lots, written agreements (deeds of release) from all affected non-host lot owners are provided accepting the reduced setback.	The Project complies with AO10.1. Not applicable.
Acoustic amenity – host lots		
PO11 The predicted acoustic level at all noise affected existing or approved sensitive land uses does not exceed the criteria stated in table 23.3.1 (Reference table).	No acceptable outcome is prescribed.	A Noise Assessment has been completed by GHD Pty Ltd and is provided in Appendix A.11 of this Planning Report. The noise assessment methodology as specified in the Planning Guidelines requires that all sensitive land use receptors should be identified for a minimum distance of three kilometres from the nearest potential wind turbine location in the area surrounding the proposed wind farm. One sensitive receptor is located on a host lot within this three-kilometre investigation area. The results of the noise model for the host lot demonstrate that the Project complies with the Code with a predicted noise level of 38dBA, below the 45dBA criterion.
		The Project complies with PO11.
Acoustic amenity – non-host lots		
PO12 The predicted acoustic level at all noise affected existing or approved sensitive land uses: does not exceed the criteria stated in table 23.3.2 (Reference table); or where the acoustic levels stated in table 23.3.2 cannot be achieved at noise affected existing or approved sensitive land uses: individual written agreements (deeds of release) from non-host lot owners are provided	No acceptable outcome is prescribed.	A Noise Assessment has been completed by GHD Pty Ltd and is provided in Appendix A.11 of this Planning Report. There are no sensitive land use receptors located within three kilometres from the nearest potential wind turbine location in the area surrounding the proposed wind farm. Noise levels at all sensitive land use receptors are predicted to meet the acoustic criteria for a wind turbine operating at a wind speed of 12 m/s both during the day and night. Individual deeds of release are therefore not required.

Performance outcomes	Acceptable outcomes	Response
the predicted acoustic level at all noise affected existing or approved sensitive land uses does not exceed the criteria stated in table 23.3.1.		The Project complies with PO12.
Construction management		
PO13 Construction activities associated with the development avoid, or minimise and mitigate, adverse impacts on environmental values, water quality objectives, amenity, local transport networks and road infrastructure.	No acceptable outcome is prescribed.	<p>Issues relating to construction activities have been assessed by Premise Pty Ltd, Fox and Co Environmental Pty Ltd, icubed consulting Pty Ltd and Forest Wind Holdings. A Preliminary Construction Management Plan (Planning) has been prepared and is provided in Appendix A.12 of this Planning Report. The Plan outlines management measures to avoid, minimise or mitigate adverse impacts on environmental values, water quality objectives, amenity, local transport networks and road infrastructure.</p> <p>The Construction Contractor will be required to prepare a detailed Construction Management Plan prior to construction activities commencing on Site.</p>
The Project complies with PO13.		

7. Key issues, potential impacts and mitigation measures

7.1 General

Detailed technical studies have been completed for the Project to inform the design and the development approval to identify any impacts and associated management and mitigation measures that will be required in accordance with the performance outcomes of State code 23. Preliminary technical studies were completed in 2017 and were updated in August 2019 to take consideration of the updated layout. This Section provides a summary of the technical studies completed, the impacts identified, and the management and mitigation measures. Table 14 summarises the technical studies that have been completed to support the development approval.

Table 14 - Summary of technical studies

Performance Outcome	Technical study	Consultant	Appendix in Planning Report
Aviation safety, integrity and efficiency PO1 – Location, siting and design PO2 – Lighting and marking	Aviation Impact Assessment	Aviation Projects	Appendix A.4
Electromagnetic interference and shadow flicker PO3 - Electromagnetic interference	Electromagnetic Interference Impact Assessment	GHD Pty Ltd	Appendix A.5
Electromagnetic interference and shadow flicker PO4 – Shadow flicker	Shadow flicker Impact Assessment	CleanSight Pty Ltd	Appendix A.6
Flora and Fauna PO5 – Flora and fauna	Ecological Assessment	Fox and Co Environmental Pty Ltd	Appendix A.7
Traffic and access PO6 – Access, manoeuvring areas and parking	Traffic Management Plan	icubed consulting Pty Ltd	Appendix A.8
Stormwater management PO7 - Stormwater management	Stormwater Management and Erosion and Sediment Control Management Plan	CleanSight Pty Ltd	Appendix A.9
Stormwater management PO8 – Watercourses and drainage features	Stormwater Management and Erosion and Sediment Control Management Strategy	CleanSight Pty Ltd	Appendix A.9
Character, scenic amenity and landscape values PO9 - Character, scenic amenity and landscape values	Landscape and Visual Impact Assessment	Viento Environmental	Appendix A.10
Separation distances PO10 – Separation distances	Figure 3 – Separation distances	CleanSight Pty Ltd	Appendix A.1
Acoustic amenity PO11 and PO12 – Audible acoustic emissions	Noise Assessment	GHD Pty Ltd	Appendix A.11
Construction PO13 – Construction management	Preliminary Construction Management Plan	CleanSight Pty Ltd	Appendix A.12

7.2 PO1 and PO2 Aviation safety, integrity and efficiency

7.2.1 Aspect

The Project Area (PLA) is located approximately 14.5 km from Maryborough Airport, approximately 33.2 km from Hervey Bay Airport and west of and adjacent to the Department of Defence WBTA. During the design of the Project, a number of aviation assessments have been completed to assist in the development of the proposed layout, as follows:

- August 2015 – preliminary aviation assessment to assist in the site selection process
- September 2016 – specific preliminary aviation assessment
- August 2017 – Aviation Impact Assessment (AIA)
- August 2019 – Updated Aviation Impact Assessment based on the current proposed layout for the application for the MCU, provided in Appendix A.4 of this report.

The purpose of the AIA was to undertake an aviation risk assessment in accordance with State Code 23 and to review the potential impacts of the proposed Project on aviation safety in respect of relevant requirements of air safety regulations and procedures. The AIA report was submitted for consideration by Airservices Australia the Department of Defence and other applicable stakeholders.

The AIA identified the following:

- the highest wind turbine is WTG 2_199 with a blade tip elevation of 408.7 m AHD
- the lowest wind turbine is WTG 1A_1 with a blade tip elevation of 309 m AHD
- wind turbine WTG 2_1 will be the closest to Maryborough runway centreline, at approximately 14.4 km from the southern runway threshold
- wind turbine WTG 2_85 will be closest to WBTA
- there are two registered/certified aerodromes with Instrument Approach Procedures or Obstacle Limitation Surfaces 55.6 km of the boundary of the proposed Project Area (PLA) as listed in Table 15.

Table 15 - Nearby registered/ certified aerodromes

Aerodrome	Operator	Location from the Project
Maryborough (YMYB) (Registered)	Fraser Coast Regional Council	North west of proposed Project. Closest proposed wind turbine is WTG 2_1 located approximately 14.4 km (7.8 nm) from Maryborough Aerodrome Reference Point
Hervey Bay (YHBA) (Certified)	Fraser Coast Regional Council	North east of the proposed Project. Closest proposed wind turbine is WTG 2_1 located approximately 33 km (17.8 nm) from Hervey Bay Airport.

There are also a number of privately-owned aircraft landing areas which are listed in Section 6.9 of the Aviation Impact Assessment Report.

7.2.2 Impact

The design of the Project within the Project Area (PLA) has been undertaken with consideration of aviation impacts and the results of consultation with relevant stakeholders including CASA, Airservices Australia, Department of Defence, Royal Flying Doctor Service and aircraft operators. The AIA determined that the Project:

- will not penetrate any obstacle limitation surfaces
- will penetrate the following:
 - Maryborough Airport 10 nm minimum sector altitude (MSA) minimum obstacle clearance (MOC) 1700 ft above mean sea level (AMSL) by approximately 468.3 ft (142.7 m);
 - Maryborough Airport 25 nm MSA MOC 2000 ft AMSL in the sector between bearings 110° and 340° by approximately 341.1 ft (104 m), and
 - Hervey Bay Airport 25 nm MSA MOC 2100 ft AMSL by approximately 147 ft (44.8 m).

Therefore, the following is required:

- the 10 nm MSA for Maryborough Airport will need to be increased by 500 ft to 2200 ft;

- the 25 nm MSA for Maryborough Airport in the sector between bearings 110° and 340° will need to be increased by 400 ft to 2400 ft; and
- the 25 nm MSA for Hervey Bay Airport will need to be increased by 200 ft to 2300 ft.

Consultation with Airservices Australia and FCRC has identified that this is not an issue as it does not impact on flight instrument procedures and the MLA will be increased to take account of the Project Area (PLA).

- will not impact Maryborough Airport circling areas;
- will likely restrict circuit operations at the Unnamed Aircraft Landing Area (to the west of the Project Area (PLA)). Consultation will be undertaken with the owner to determine control measures that can be implemented;
- will partially impact Danger Area D688 of Maryborough Airport, consultation with FCRC has identified that this is not an issue;
- will not have an impact on nearby designated air routes;
- is wholly contained within Class G airspace; and
- is outside the clearance zones associated with aviation navigation aids and communication facilities.

The assessment did not identify any other impacts as a result of the Project.

Furthermore, the AIA concluded that there will be an acceptable level of aviation safety risk associated with the potential for an aircraft collision with a wind turbine, without obstacle lighting on the wind turbines of the Project.

The assessment concluded that if all the recommendations included in the report are implemented the Project will not adversely affect the safety, operational integrity and efficiency of air services.

7.2.3 Management and mitigation measures

Table 16 outlines the control measures to be implemented at the relevant stages of the Project to manage and mitigate any aviation related risk and impact.

Table 16 Aviation management and mitigation measures

Aspect	Control measure	Project phase
Wind turbine design	Rotor blades, nacelle and upper 2/3 of the supporting mast of the wind turbines should be painted a shade of white.	Design
Wind monitoring towers	Wind monitoring towers (WMT) are to be marked according to the requirements set out in the Manual of Standards 139 Section 8.10 (as modified by the guidance in NASF Guideline D). Any WMT that exceeds a height of 150 m AGL should be lit with a high intensity white flashing obstacle light during the day and a low intensity steady red light at night, until such time as a wind turbine is constructed within close proximity to the WMT (nominally 900 m).	Design
Transmission Line	Overhead transmission lines and/or supporting poles that are located where they could adversely affect aerial application operations should be identified in consultation with local aerial agriculture operators and marked in accordance with MOS 139 Section 8.10, specifically: <i>8.10.2.8 Wires or cable obstacles must be marked using three-dimensional coloured objects such as spheres and pyramids, etc; of a size equivalent to a cube with 600 mm sides, spaced 30 m apart.</i>	Design
Review risk assessment triggers	Triggers for review of this risk assessment are provided for consideration: a. prior to construction to ensure the regulatory framework has not changed; b. following any significant changes to the context in which the assessment was prepared, including the regulatory framework; and c. following any near miss, incident or accident associated with operations considered in this risk assessment.	Prior to construction commencing

Aspect	Control measure	Project phase
Micro-siting	Alteration to the siting of a wind turbine will not be more than 150 m from the centreline of the proposed corridors and micrositing will address any consequential changes to access tracks and internal power cable routes	Prior to construction commencing
Notification and reporting	Department of Defence should be consulted with if there is any subsequent modification in the wind turbine height or scale of development.	Prior to construction commencing
Notification and reporting	As some of the proposed wind turbines will be located within 30 km of an aerodrome (registered or certified) and will be higher than 45 m AGL, they must be reported to RAAF AIS (Airservices Australia). This action should occur once the final layout after micrositing is confirmed and prior to construction.	Prior to construction commencing
Notification and reporting	The proposed wind turbines and wind monitoring towers must be reported to CASA.	Prior to construction commencing
Notification and reporting	Communicate details of wind monitoring towers to local and regional operators and make arrangements to publish details in ERSA for surrounding aerodromes following construction.	
Notification and reporting	Any obstacles above 110 m AGL (including temporary construction equipment) should be reported to Airservices Australia NOTAM office until they are incorporated in published operational documents. With respect to crane operations during the construction of the Project, a notification to the NOTAM office may include, for example, the following details: a. The planned operational timeframe and maximum height of the crane; and b. Either the general area within which the crane will operate and/or the planned route with timelines that crane operations will follow	Prior to construction commencing
Notification and reporting	Details of the wind farm should be provided to local and regional aircraft operators prior to construction in order for them to consider the potential impact of the wind farm on their operations. Specifically, details should be provided to the South Queensland Regional Airspace and Procedures Advisory Committee for consideration by its members in relation to VFR transit routes in the vicinity of the wind farm.	Prior to construction commencing
Notification and reporting	Consult with local aerial agricultural operators and aerial firefighting operators prior to construction commencing to develop procedures for aircraft operations in the vicinity of the Project. Procedures may include stopping the rotation of the wind turbine rotor blades prior to the commencement of the subject aircraft operations within the Project area.	Prior to construction commencing
Notification and reporting	'As constructed' details of wind turbine and wind monitoring tower coordinates and elevations should be provided to Airservices Australia, using the following email address: vod@airservicesaustralia.com.	Post construction of each stage

7.3 PO3 Electromagnetic interference

7.3.1 Aspect

An EMI Impact Assessment was completed by GHD in October 2017 and updated in August 2019, provided in Appendix A.5 of this Report. The purpose of the report was to assess the potential for radio interference effects to be caused by the proposed wind turbines. The assessment identified a number of services within a 50km radius of the Project Area (PLA) including fixed point-to-point microwave radio systems, digital television broadcast, aircraft telecommunications systems, maritime radio systems, Defence radio systems, Meteorological Radar, AM/FM radio broadcast, and cellular mobile phone systems.

Electromagnetic fields are a combination of electric fields associated with a voltage source and magnetic fields associated with current flowing through a conductor. These fields increase in strength with voltage and current. Radio system interference may occur when a wind turbine is located in such a way as to induce an unwanted disturbance to radio waves propagated between a signal source and signal receiver. This may

occur by way of radiation of electromagnetic energy by the wind turbine within the operating band of the radio system, diffraction or partial reflection of the radio system signal by the wind turbine tower and rotor. Details of these different types of interference are provided in Section 2 of the EMI Impact Assessment Report.

EMI was one of the constraints considered in the design of the Project Area (PLA) and included a range of sources including those provided by the Plantation Licensee and others that are publicly available in relevant databases including the Australian Communications and Media Authority radio communications database. There are sixteen microwave radio systems of interest that operate within the vicinity of the proposed wind farm, as outlined in Section 3 of the EMI Impact Assessment Report.

7.3.2 Impact

The EMI impact assessment identified that the Project will have a low impact on radio system technologies based on the following conclusions:

- The wind turbine layout has been developed during the design process to avoid any infringements into the second Fresnel Zone of any of the identified radio links.
- No point-to-multipoint sites of concern were identified during the radio services search.
- Interference to land mobile radio (LMR) coverage by the proposed wind farm development is anticipated to be minimal, as the LMR transmitters within range of the wind farm are localised services and operating on frequencies that are more resilient to interference. The LMR transmitter closest to a wind turbine is located at the Hyne & Son facility in Tuan. The nearest wind turbine is located approximately 870m from the transmitter location; well exceeding the suggested 20 m exclusion zone from the Code for this type of transmitter.
- Both transmitter sites, Big Angle and Mt Kelly within the Tuan State forest within the Project Area (PLA) are located more than 1 km away from the nearest wind turbine, avoiding any issues from near-field effects.
- Transmitting from Big Angle and Mt Kelly for use within the Tuan Forest area may experience minor service degradation when the receiving unit is close to a wind turbine. The Plantation Licensee has three sites either within, or in close proximity to, the Project Area (PLA). Their services in this area include a series of 450 MHz point-to-point links and an LMR system based around 80 MHz. As this system uses a low frequency, it is expected that the system will be fairly resilient to the effects of the wind turbines. It would be expected that any effect on the system would be noticed in situations where the receiver is very close to a wind turbine and therefore subject to strong multi-pathing / reflections.
- A small amount of digital television reception degradation may occur due to the Project Area (PLA), but it is likely to have minimal impact. There is the potential for signal degradation to those properties between the Project Area (PLA) and the coastline. These properties are already in an area of marginal reception.
- Interference to cellular phone coverage is anticipated to be minimal except for those users operating in close proximity to the Project Area (PLA) such as maintenance staff, where existing coverage is already poor according to the carrier's publicly available coverage maps.
- Fixed wireless broadband internet transmitters, including NBN, are focused on the town areas around the Project Area (PLA). With minimal properties around the forest area, impact is expected to be minimal.
- The only listed service at any of the four Maryborough Airport sites listed in the ACMA database is an Aeronautical Mobile type service owned / operated by Fraser Coast Regional Council, operating at 133.55 MHz. This transmitter is located a sufficient distance from the Project Area (PLA) to avoid any significant impact from the wind turbines.
- McDermott Aviation, who perform various forestry activities utilising helicopters in the region, advised that their communications are a combination of UHF CB radio for communications with Forestry, and a combination of low-band and high-band VHF. The choice of channel is dictated by who they need to contact, which changes depending if they are engaged to assist with firefighting or herbicide application activities. This service will not be impacted, unless the ground receiver is next to a wind turbine, which is blocking line of site to the helicopter. In this case, there may be some reduction in signal quality.
- The main sources of electromagnetic fields associated with wind farms are the substations and transmission lines. The Transmission Line and Transmission and Distribution Substations, while not specifically included in this study, will be equivalent to others in the electricity transmission network, with comparable electromagnetic field levels. Designing to the standards utilised by the local transmission and distribution authorities will ensure safe levels of electromagnetic radiation are achieved.

The assessment identified that the nearest wind turbine is 19.7km from the BoM S-band radar facility at Gympie (Mt. Kanigan). Consultation with the BoM is ongoing to determine the effects and mitigations measures. Further details on this impact are provided in Section 14 of the EMI Impact Assessment Report in Appendix A.5.

7.3.3 Management and mitigation measures

A number of aspects were not finalised in the EMI Report and further consultation is required as follows:

- Ongoing consultation with BoM to address impact of the Project Area (PLA) on the radar
- Consultation with the Department of Defence to determine the impact of the Project Area (PLA) on their operations at WBTA has determined that the impact will be minimal as the wind farm conforms to AS/NZS 61000.6.4:2012, the wind farm will reduce, as much as is practicable, the emission of high frequency noise from the wind turbines, substation(s) and electronic control equipment.

Table 17 provides the measures identified in the EMI Impact Assessment to mitigate the impact from the Project on surrounding stakeholders.

Table 17 EMI management and mitigation measures

Aspect	Impact	Service Mitigation Strategy	Management measure
Creation of electromagnetic barrier	Barrier between a TV transmitter and households serviced by that transmitter.	Space the wind turbines to mitigate the effect of creating an electromagnetic barrier	
Interfere with radio communication signals	Excessive noise at frequencies that interfere with radio communication signals	Utilise (wherever practical) equipment complying with the Electromagnetic Emission Standard, AS/NZS 61000.6.4:2012. Electrical insulation and shielding should be considered in the wind turbine design, to reduce the RF noise emitted from the electronic control systems located in the nacelle.	
Fixed point to point microwave links	Minor to no impact anticipated to services.	Nil	Due to proximity to existing radio link services, continue to review any amendments to the wind farm layout to avoid micro-siting wind turbines into radio link paths' second Fresnel zone.
Fixed point to point UHF voice/telemetry systems and UHF voice/private networks	Minor to no impact anticipated to services.	Nil	Due to proximity to existing radio link services, continue to review any amendments to the Project Area (PLA) layout to avoid micro-siting wind turbines into radio link paths.
LMR and Point to Multipoint Services	Potential impact anticipated to Hyne & Son mobile radio service.	Avoid micro-siting to within 20m of the transmitter location; ideally avoiding moving any closer than the current location (100m away).	Record signal levels in the affected areas of LMR operations prior to the construction of the wind turbines to establish a baseline.
Digital TV	Potential minor service degradation to local community, i.e. TV reception within 10 km of wind farm may be affected.	Mitigation options for affected dwellings in the townships of Maaroom, Boonooroo, Tuan, Poona and Tinnanbar, are identical: Realign antennas on affected dwellings in a more direct path to Mt. Goonaneman Realign antennas on affected dwellings to another television transmitter, such as Hervey Bay. Replace antennas on affected dwellings with a higher gain antenna	Forest Wind Holdings will undertake a pre- and post-construction assessment of the television and radio reception strength at the location of any existing or approved dwellings as at the date of development approval that are within 5 kilometres of any wind turbine. The assessments will be undertaken by an independent

Aspect	Impact	Service Mitigation Strategy	Management measure
		Relocate antennas on affected dwellings to another position on the property that is less affected. Install satellite television on affected dwellings Install a television relay station in or near the townships	television and radio monitoring specialist, and include testing at locations to be determined by the television and radio monitoring specialist to enable the average television and radio reception strength to be determined. If the post-construction assessment establishes an unacceptable increase in interference to reception as a result of the wind farm, as determined by the independent television and radio monitoring specialist, measures to restore the affected reception to preconstruction quality will be undertaken.
AM/ FM Services	Minor to no impact anticipated to services.	Nil	Measure signal levels in wind farm vicinity to establish a baseline.
Meteorological Radar	Possible impact anticipated to weather-watch radar systems.	Nil	Liaise closely with BoM and provide sufficient information to allow them to re-configure their radar systems.
Defence Radio Systems	Possible impact on systems due to HF noise introduced by wind farm equipment.	Construction materials and conformance to AS/NZS IEC 61000.6.4:2012.	Nil

7.4 PO4 Shadow flicker

7.4.1 Aspect

Shadow flicker can be described as intermittent shadows cast due to the rotating blades of wind turbines which appear to flicker to an observer at a fixed ground position. The occurrence and duration of shadow flicker depends on many factors which combine to produce a 'strobing' shadow effect as the sun passes behind the rotating blades of a wind turbine. CleanSight Pty Ltd created a shadow flicker model for the Project using the Openwind Enterprise version 01.08.00.2886i software as outlined in the Shadow Flicker Assessment Report in Appendix A.6. The parameter settings used in the CleanSight Model are in line or more conservative than those specified in the Planning Guidelines.

The zone of influence for the Project was determined to be 1,192.5m based on a 4.5m blade chord. However, a conservative approach was adopted and 1,325m (5m blade chord) was considered in the model. Sensitive receptors were selected based on being the closest sensitive uses to the zone of influence of shadows boundary and are detailed in the Report in Appendix A.6. The assessment identified that regardless of the conservative approach taken for the determination of the zone of influence of shadows, there are no sensitive receptors within the zone on non-host lots and only one sensitive receptor within the zone on a host lot, being a caretaker's accommodation, labelled SR09.

The worst-case shadow flicker was modelled as described in Section 3.2 of the Shadow Flicker Assessment Report. The sensitive receptor, SR09, is located to the south of the wind turbine locations and it was determined that there will be no impact from shadow flicker. A 50m buffer was allowed for and the model indicated that there is more than 400m separation between the 50m buffer around SR09 and the area of potential worst-case shadow flicker impact.

7.4.2 Impact

There will not be an impact from shadow flicker as a result of the Project.

7.5 PO5 Flora and fauna

7.5.1 Aspect

The Project is located in Tuan, Toolara and Neerdie State Forests, which are highly modified landscapes of exotic pine plantations. The Project is ideally situated as the exotic pine plantations are considered of low ecological value. The Project Area (PLA) is dominated by exotic pine plantation. Remnant Eucalypt woodland and Melaleuca forest occurs throughout the plantation as a mosaic of small remnant patches. Often these are associated with waterways and drainage lines and can easily be seen on the RE mapping.

There are no world heritage properties, national heritage places, wetlands of international importance or Commonwealth marine areas and the study area is not within the Great Barrier Reef Marine Park.

There are several watercourses across the study area which are mapped as Matters of State Environmental Significance (MSES) wetlands. Some of these watercourses were observed during the field surveys and some observed within the pine plantations were degraded with limited riparian vegetation. Although the study area is predominantly exotic pine, there is a network of remnant RE throughout the Project Area (PLA). Often it is associated with creek and drainage lines which historical and ongoing pine plantation practices have avoided. This has created a network of often disconnected remnant vegetation patches throughout the pine plantation. Within these areas twelve REs are mapped on DES RE mapping. Most REs are avoided on the Project Area (PLA) due to specific site selection of the wind turbines and associated infrastructure. There will be no clearing of RE for construction of the wind turbines or hardstand areas as they are all located within pine plantation areas. Clearing in riparian areas is expected to be negligible during upgrades of existing waterway crossings.

Areas of Essential Habitat (EH) for Wallum froglet (*Crinia tinnula*) and Wallum rocketfrog (*Litoria freycineti*) which are listed as vulnerable under the *Nature Conservation Act* (1992) (NC Act) are mapped within remnant vegetation in the study area. No wind turbines, Operations and Construction Compounds or access tracks are within mapped EH. The Transmission Line where it passes through the Project Area (PLA) passes over some mapped EH. These areas are proposed to be avoided.

Some portions of the Transmission Line within the Project Area (PLA) may be within the flora survey trigger area. Any infrastructure within a mapped 'flora survey trigger' area will be surveyed in accordance with the Flora Survey Guidelines – Protected Plants v2.01 (Wildlife and Threatened Species Operations, Department of Environment and Science (DES) 31 May 2019).

There are seven GHFF camps within 50km of the Project Area (PLA) that have been occupied by GHFF within the past two years.

- Glenwood Varley Road (53)
- Maaroom, Esplanade (209)
- Goomborian, Anderleigh Rd Ginger Creek (55)
- Maryborough, Kent Street (88)
- Maryborough, Albion Rd Wetlands (Island Plantation) (87)
- Gympie (53)
- Woocoo (171)

A Nationally Important GHFF Camp is defined for the management of GHFF and Spectacled Flying-fox camps, specifically relating to in-situ camp management, as a camp that has contained $\geq 10,000$ GHFF in more than one year in the last 10 years or has been occupied by more than 2,500 GHFF permanently or seasonally every year for the last 10 years (EPBC Policy Statement, September 2015). As such, the closest Nationally Important GHFF camps are Maaroom, Glenwood Varley Road, Gympie and Woocoo, which are 4km, 14km, 30km and 40km away from the nearest wind turbine location, respectively.

The field surveys identified the following within the Project Area (PLA):

- *Macrozamia pauli-guilielmi* (Pineapple Zamia) which is endangered under the EPBC Act and NC Act. Plants were identified growing in remnant RE patches, while some were also recorded in the pine plantations. Refer to Figure 2 for locations of Pineapple Zamia currently identified. No other threatened flora were recorded during vegetation surveys.
- twenty-one weed species
- one threatened aquatic species was recorded (*Tenuibranchiurus glypticus*, Swamp crayfish) which is listed as endangered under Queensland's NC Act. It is not listed under the EPBC Act.
- no threatened microbat species were recorded.
- 64 bird species across the Project Area (PLA), noting the following:
 - four species of conservation significance were recorded:
 - White-throated needletail (*Hirundapus caudacutus*) – Vulnerable (V), Migratory Terrestrial (MT) and Listed Marine (LM) (EPBC Act)
 - Fork-tailed swift (*Apus pacificus*) – MT (EPBC Act)
 - Rainbow bee-eater (*Merops ornatus*) – MT (EPBC Act)
 - Cicadabird (*Coracina tenuirostris*) – LM (EPBC Act)
 - no migratory shorebirds were observed within the Project Area (PLA) or flying over the Project Area (PLA) on any of the bird surveys
 - six raptor species were recorded on site. None of the raptors are listed species under the EPBC Act or NC Act
 - one large water bird (white-necked heron (*Ardea pacifica*) was observed flying over the site. White-necked herons are not listed under the EPBC Act or NC Act
 - the most common birds observed were Torresian crows (*Corvus orru*) and noisy friarbirds (*Philemon corniculatus*), being recorded on all surveys across the Project Area (PLA).

7.5.2 Impact

Preliminary ecological assessments were undertaken by O2 Ecology (2016) and Premise (2017-2019). The initial assessments informed further survey design and assessments undertaken by Premise between 2017 and 2019. Additional surveys and targeted assessments have been undertaken by Fox & Co Environmental Pty Ltd. The results of the surveys are provided in the Ecological Assessment report in Appendix A.7.

The results of the ecological assessment determined that:

- The Project is ideally situated as the exotic pine plantations are considered of low ecological value and any remaining native vegetation within the plantation area will be avoided.
- The mosaic of native remnant vegetation within the Project Area (PLA) provides the most valuable habitat for native species within the Project Area (PLA) and these areas, including waterways, will be avoided with all infrastructure within the Project Area (PLA) sited within existing exotic pine plantations.
- One flora species of conservation significance was identified
 - Pineapple Zamia (*Macrozamia pauli-guilielmi*) - Endangered (EPBC Act and NC Act).
- Seven fauna species of conservation significance were identified:
 - White-throated needletail (*Hirundapus caudacutus*) – V, MT, LM (EPBC Act)
 - Fork-tailed swift (*Apus pacificus*) – MT (EPBC Act)
 - Rainbow bee-eater (*Merops ornatus*) – MT (EPBC Act)
 - Cicadabird (*Coracina tenuirostris*) – LM (EPBC Act)
 - Koala (*Phascolarctos cinereus*) - (V (EPBC Act and NC Act)
 - Grey-headed Flying-fox (*Pteropus poliocephalus*) – V (EPBC Act)
 - Swamp crayfish (*Tenuibranchiurus glypticus*) - Endangered (NC Act). It is not listed under the EPBC Act
- Additional conservation significant flora and fauna species are considered to have a least a moderate potential to occur based on previous records in the region and potential habitat on or adjacent to the Project area.

It was determined that although the risk of collision of some bird species (White-throated needletail and Fork-tailed swift) may occur, the likelihood of impacting the International and/or National population of these species is considered low. This is due to the widespread distribution of the species and the highly variable occurrence and abundance of this species across the Project Area (PLA).

The assessment of impact to the GHFF determined that given the distance to the site, relatively small amount of remnant vegetation (foraging habitat) on site (0-4% within foraging ranges) and significant widespread foraging areas between these camps and the site (96-100% outside Project Area (PLA)), significant impacts to these populations are considered unlikely. In addition, it concluded that given the large areas of intact native vegetation outside of the Project Area (PLA) and relatively small amount of native foraging vegetation within the wind turbine area, and local flight behaviour, the risk of collision-based impacts on other grey-headed flying-fox colonies within 50km of the wind turbine area is considered low.

7.5.3 Management and mitigation measures

Mitigation measures to minimise potential impacts to conservation significant species have been documented in the Ecological Assessment in Appendix A.7.

Avoidance is the guiding principle to avoiding impacts on MNES and MSES. Avoidance measures utilised in the Project include:

- The Project is set back a minimum of 4km from the Great Sandy Strait which is a known significant non-breeding area for EPBC listed migratory shorebirds.
- The Project Area (PLA) is located within an existing exotic pine plantation and avoids native vegetation and waterways.
- Only marginal clearing of remnant vegetation may occur for upgrades to existing waterway crossings.
- Electrical cabling will mostly be underground along existing access tracks which will further reduce the likelihood of collision and/ or electrocution of birds and bats.
- Other infrastructure such as Construction compounds avoid native vegetation and waterways and therefore avoid damage to remnant areas of natural habitat.
- Existing forestry tracks will be used to provide access within the Project Area (PLA) and therefore avoid disturbance to native vegetation and habitat.
- The Transmission Line spans waterways and significant vegetation such as known populations of Pineapple Zamia.

- Pre-clearance/pre-construction surveys to determine if site -specific micro-siting of wind turbines is required to further minimise impacts
- No-go areas to be clearly and accurately designated prior to detailed design of Transmission Line to ensure sensitive areas are spanned (eg. Pineapple Zamias, confirmed essential habitat, waterways)
- Avoid hollow bearing trees within the OTC where possible. Preclearance surveys to determine density and number of hollows lost during construction within the Corridor. Replace any loss of hollows at a previously agreed replacement ratio.
- Comply with existing site-specific management plans currently implemented for the operating forestry practices
- ESCP developed by a CPESC or RPEQ.
- Storage of fuels, chemicals, wastes and other potentially contaminating substances in appropriately bounded areas and away from waterways.

Additional mitigation measures to reduce collision-based impacts during operation are associated with adaptive management and reducing the risk of attracting birds and bats into the rotor swept area (RSA) of the wind farm. These measures include the following:

- An adaptive management bird and bat monitoring program has been prepared and commenced implementation. Should the monitoring program's results demonstrate that further mitigation is required, further assessment will be undertaken to determine appropriate mitigation or management measures. Additional measures may include deploying a radar detection and deterrent technology system.
- Spatially and temporarily replicated carcass monitoring undertaken by suitably qualified ecologists and/or trained detector dogs.
- Monitoring storm fronts, low pressure systems and bushfire alerts which may be precursors to White-throated Needletail and Fork-tailed Swift presence.
- A Project specific Bird and Bat Management Plan has been prepared which outlines the objectives and monitoring program and is provided in the Ecological Assessment Report in Appendix A.7.

Measures to reduce impacts to flora and fauna include:

- utilise existing tracks wherever possible
- pre-clearance/pre-construction surveys to determine if site -specific micro-siting of wind turbines is required to further minimise impacts
- clearly and accurately designate no-go areas prior to detailed design of Transmission Line to ensure sensitive areas are spanned (eg. Pineapple Zamias, confirmed essential habitat, waterways)
- span waterways as much as reasonably practical, and
- clearly and accurately designate no-go areas prior to any vegetation clearing.

It is noted that works associated with the Project located within any land declared as State forest are exempt from the VM Act. Clause 7 of the VM Act states that the '*Act applies to all clearing of vegetation other than vegetation on(c) an area declared as a State forest or timber reserve under the Forestry Act 1959*'. Operational works in relation to the clearing of native vegetation for the Project are exempt from the provisions of the VM Act and any approvals that would be otherwise triggered by this Act are not required.

7.6 PO6 Traffic and access

7.6.1 Aspect (off the Bruce Highway)

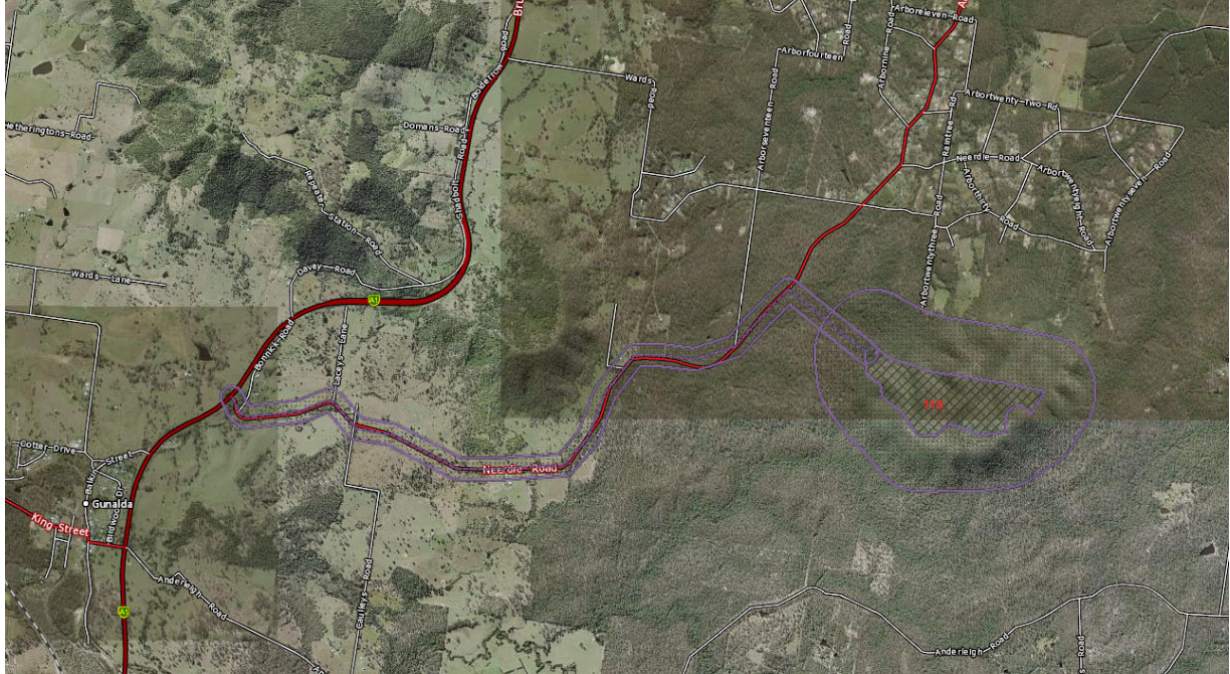
7.6.1.1 Access to Project Area (PLA)

The main access to the Project Area (PLA) will be via a State-designated haulage route associated with the Mount Eaton Key Resource Area (KRA), entering the Neerdie State forest access tracks from the exiting Neerdie Road, a GRC controlled road between the Bruce Highway and the Project Area. Secondary access points will be provided to access the Operations Compounds from Tin Can Bay Road and Maryborough Cooloola Road, both State-controlled Roads, and Maryborough Tuan Forest Road, a FCRC controlled road.

Component parts will be required to be transported from the Port of Brisbane to the Project Area (PLA) via the Bruce Highway to Neerdie Road north of Gunalda, and then along Neerdie Road to the Construction

Compound (Primary). Neerdie Road is a designated haulage route for Key Resource Area 115 Mt Eaton as shown in Figure B.

Figure B Mt Eaton Key Resource Area 115



7.6.1.2 Access within the Project Area (PLA)

Section 4.3.6 of this Planning Report outlines the proposed vehicular access within the Site.

7.6.2 Impact

A Traffic Management Plan has been prepared for the Project by icubed consulting Pty Ltd and includes a Traffic Impact Assessment in Appendix B and Transport Route Study in Appendix C. The Traffic Management Plan is provided in Appendix A.8 of this Planning Report.

The reports identified the following:

- The assessment of the existing and proposed construction traffic and pavement loadings shows that there will be no road sections with traffic or pavement impacts greater than the required 5% impact value.
- An oversize vehicle of size 84m length can navigate to the development site with some minor intersection upgrades, including temporarily removing above ground infrastructure or gravel widening.
- A maximum vehicle height of 6.2m can travel to site along the Transport Route with available detours.
- Without available detours, a maximum vehicle height of 4.25m can be achieved.
- There are 20 locations along the 225km transportation route from the Port of Brisbane to site have potential to cause clashes between an oversize length blade trailer vehicle and existing infrastructure or potentially requires road widening works to cater for the expected transport vehicle. The 20 identified locations were checked using vehicle tracking software and it was found that 11 required some level of modification.

7.6.3 Management and mitigation measures

The Traffic Impact Assessment identified the following to mitigate the long and short traffic impacts from the Project:

- Conduct Pre and Post Construction Visual Dilapidation Survey and report from the Bruce Highway / Neerdie Road intersection through to the project site entrance.
- Develop and implement a Traffic Management Plan with appropriate controls and signage for Neerdie Road through to the project site entrance. This is to be completed once a Contractor has been chosen for the works.
- Repair damage to the surface of Neerdie Road, if damage has been caused from construction traffic.
- All unsealed authority roads along the Transport Route, if any, are to be constructed to a standard required by construction of this project. If any roads are unsealed, dust control measures are to be implemented to the project site entrance.

The Transport Route Study identified the following management and mitigation measures for the Project:

- Temporary upgrade works at a number of locations, listed in Table 5 of the Transport Route Study. The works typically require minor works such as temporary removal of street signs or gravel pavement widening. By carrying out these road upgrades, the oversize wind turbine generator blade transportation vehicles are expected to negotiate the transportation route successfully. The modifications will need to be confirmed prior to transportation to ensure that no further amendments to the intersections are needed.
- Traffic control measures will need to be installed to enable road upgrades works to commence. These will be determined prior to construction commencing by the appointed Civil Contractors Traffic Management subcontractor.
- Prior to delivery to site, the transport contractor will need to conduct a survey of vertical height clearances at confined locations such as bridges, overhead electrical or telecommunication wires or infrastructure or other infrastructure and adequate clearances be checked to be suitable.
- National Heavy Vehicle Regulator permits shall be applied for and obtained by the appointed transportation contractor prior to deliveries to site.
- The load capacities of sections identified along the transportation route (such as but not limited to culverts, bridges, unsealed or sealed pavements in poor condition) shall be checked and approved for use by the relevant authority.

7.7 PO7 Stormwater management

7.7.1 Aspect

The Project Area (PLA) is located within an operating plantation that includes a network of constructed stormwater drainage features as well as natural waterways. As outlined in Section 3.5, the Project is located within the Mary River and Great Sandy Strait catchments for which the Department of Environment and Science (DES) sets environmental values and water quality objectives in the following:

- *Mary River Environmental Values and Water Quality Objectives*, DES July 2010 (MREVQ)
- *Great Sandy Straits Environmental Values and Water Quality Objectives*, DES July 2010. (GSSEVQ)

The MREVQ and GSSEVQ classify the waterways into different water types and ascribe environmental values or water quality objectives to each. Within the both catchments all waterways within the Project Area (PLA) are a lowland freshwater wallum/tannin stained water type and within the OLC the waterways are classified as lowland freshwater. Table 18 provides the environmental values for the Mary River and Great Sandy Lowland Freshwater tannin stained streams.

Table 18 - Acceptable environmental values

Analyte	Mary River environmental value lowland freshwater wallum/ tannin stained	Great Sandy environmental value lowland freshwater tannin stained	Units
Turbidity	<50	<50	NTU
Total Suspended solids (TSS)	<6	<6	mg/l
Chlorophyll a	<0.005	<0.005	mg/l
Total Nitrogen (TN)	<0.5	<0.5	mg/l
Oxidised N	<0.06	<0.06	mg/l

Analyte	Mary River	Great Sandy	Units
	environmental value lowland freshwater wallum/ tannin stained	environmental value lowland freshwater tannin stained	
Ammonia N	<0.02	<0.02	mg/l
Organic N	<0.42	<0.42	mg/l
Total Phosphorous (TP)	<0.05	<0.05	mg/l
Filterable Reactive Phosphorous (FRP)	<0.02	<0.02	mg/l
Dissolved Oxygen (DO)	85%-110%	85%-110%	%
pH	6.0-8.0	6.0-8.0	#
Secchi depth	NA	2.5	m

Extract from: Table 2 Mary River EV and WQ objectives 2010; Table 2 Great Sandy EV and WQ objectives 2010

Background water quality monitoring is not available for the waterways within the Project Area (PLA) and OTC but a review of publicly available water quality data collected by the Mary River Catchment Co-ordinating Committee (MRCCC) (MRCCC, 2018) of waterways in close proximity to the Project area indicates the following:

- Dissolved oxygen within the waterways adjacent to the Project Area (PLA) is low to very low (23% at Ulirrah Creek, Toolara) and does not comply with the MREVQ which has been determined to be as a result of natural conditions.
- pH of the waterways adjacent to the Project Area (PLA) is naturally low and is below the MREVQ, which is considered to be consistent with the catchment at this location.
- The creeks are ephemeral, and this can affect dissolved oxygen levels.

7.7.2 Impact

An assessment of the erosion risk and sediment control requirements has been completed and has been used to support the preparation of erosion and sediment control concepts for the Project as outlined in the Stormwater Management and Erosion and Sediment Control Management Strategy in Appendix A.9.

7.7.3 Management and mitigation measures

In order to manage drainage and minimise any impacts on adjacent waterways during the Construction Phase of the Project a Stormwater Management and Erosion and Sediment Control Management Strategy in Appendix A.9 has been developed that outlines the management and mitigation measures required to be adopted during the construction and operational phases of the Project. The Plan also demonstrates that all stormwater, wastewater, discharges and overland flows leaving the site are of the same quality and quantity of receiving waters prior to development. A detailed ESCP will be developed by the Construction Contractor for approval by the Principal prior to construction commencing.

7.8 PO8 Watercourses and drainage features

7.8.1 Aspect

The Project Site includes a number of waterways, some of which are mapped as MSES wetlands, Vegetation Management wetlands, Regulated Vegetation (intersecting a watercourse) and High Ecological Value Waters. The watercourses intersected by the Project have been surveyed as part of the ecological assessment and most within the pine plantations were of low habitat value.

7.8.2 Impact

All mapped waterways have been included as a constraint in the design of the Project Area (PLA) in order to minimise any impacts. Within the Project Area (PLA), a number of existing waterway crossings on the forestry tracks may be required to be upgraded in order to enable the safe movement of heavy vehicles to the construction areas. The load limit of each culvert, bridge and bed level crossing will be assessed prior to construction commencing and any upgrades requirements will be identified and confirmed with the Plantation

Licensee. The upgrade works may require minor clearing of riparian vegetation and will be assessed in accordance with the relevant legislative requirements including the *Water Act 2000*, *Fisheries Act 1994*, *Nature Conservation Act 1992* and the *Environmental Offsets Act 2014*. Any approvals required for the proposed upgrades will be obtained prior to construction commencing.

7.8.3 Management and mitigation measures

Management and mitigation measures have been developed to manage any impact to waterways during the construction of the Project Area (PLA) and have been included in the Stormwater Management and Erosion and Sediment Control Management Strategy in Appendix A.9.

7.9 PO9 Character, scenic amenity and landscape values

7.9.1 Aspect

The Project Area (PLA) is located within an existing exotic pine plantation and will be no less than 3,000m from the nearest sensitive receptors. Within 30km of the proposed wind farm extent there are eight Landscape Character Types subdivided into various Landscape Character Areas, identified within the Fraser Coast Landscape Strategy (Aecom 2011) covering the northern half of the study area. The nearest national park is Poona National Park, which is directly adjacent to the northern site boundary. Fraser Island is also a World Heritage Site (WHS) as well as part of Great Sandy National Park and is located approximately 12km east of the nearest proposed wind turbine at its closest point. At 122km long, it is the longest sand island in the world and only a small part of Fraser Island is located within the 30km radius study area. Visual receptor locations within the study area include the towns of Maryborough, Gympie and Hervey Bay, and a number of smaller settlements including the coastal settlements of Cooloola Cove, Tin Can Bay, Tinnanbar, Poona, Tuan, Boonooroo, Maaroom and River Heads, as well as a number of inland settlements including Wallu, Kia Ora, Neerdie, Gunalda, Glenwood, Gundiah, Bauple, Tiaro, Magnolia and Owanyilla.

7.9.2 Impact

Forest Wind Holdings engaged Viento Environmental to undertake a Landscape and Visual Impact Assessment (LVIA) of the Project in accordance with the *State code 23: Wind farm development – Planning guidelines*. To support this assessment Forest Wind Holdings undertook a zone of visual influence (ZVI) assessment. The LVIA and associated figures in Appendix A.10. The assessment used a study area determined by applying a 30km radial buffer to the wind turbines and considered the ancillary infrastructure including the meteorological masts, Transmission Line and substations.

The LVIA has described and illustrated that, in general terms, the visibility of the proposed Project would be extremely limited. This has been indicated by the viewpoints used in the assessment, which have been located at some of the most open, well used and publicly accessible locations within the study area.

The assessment determined that there would be no significant effects on the vast majority of residents, tourists, recreational users, motorists, or rail users within the study area. Due to the carefully considered location and design of the proposed wind farm, the proposed wind turbines would be at least partially screened in many views, limiting the potential effects on both visual receptors and on landscape character.

By siting the Project wholly within plantation forestry, the impacts on landscape character and landscape fabric have been limited; the plantation continually works on a rotation felling basis where the wind turbines will utilise existing plantation tracks and will result in no loss of distinctive landscape features. Furthermore, as the proximate viewpoints indicate, the forestry itself provides a natural visual buffer in many views.

Furthermore, whilst a number of national parks, recreation areas and the Fraser Island World Heritage Site are all located within the study area, the LVIA has provided information to confirm that the proposed wind farm would not fundamentally alter the reasons for which any of these assets were designated.

Therefore, to summarise, it is considered that the significant effects on landscape and visual amenity as a result of the proposed wind farm would be extremely limited and contained in this location.

7.9.3 Management and mitigation measures

A number of mitigation measures have been incorporated into the design and construction of this wind farm to limit the effects of the development, including the following:

- The wind farm is sited in a relatively sparsely settled area such that appropriate separation distances of 1500m from sensitive land uses, as set out within the Code, are doubled to 3000m.
- Forest Wind is located in an exotic pine plantation, mitigating impacts on sensitive land uses and other receptors in the area.
- Potential landscape and visual effects have been a key factor in the evolution of the site design. For instance, the arrangement and distance of the wind farm in views from surrounding settlements were examined for various layouts, in order to minimise the potential visibility of the development as far as possible from key views.
- The Project layout is confined within the main forested area so as to maximise the containment of near views of the wind turbines by the forestry blocks.
- Existing forestry access tracks will be utilised to minimise the need for new on-site tracks.
- The towers, nacelle and blades of the wind turbines will be finished in a low reflectivity finish/treatment with a shade of white colour which would minimise the contrast and, therefore, visibility of the wind turbines when seen against the sky, particularly on overcast days.
- Construction and Operations Compounds, battery storage facilities, substations and other infrastructure are located within the pine plantation which will limit views of the buildings.

7.10 PO10 Separation distances

7.10.1 Aspect

The wind turbines are located more than 3,000m from the nearest sensitive receptor as identified in **Figure 3** in Appendix A.1.

7.11 PO11 and PO12 Acoustic Amenity

7.11.1 Aspect

There are two main noise sources originating from a wind turbine; mechanical and aerodynamic. Sources of mechanical noise include the following:

- Gearbox
- Generator
- Yaw drives
- Cooling fans
- Auxiliary equipment
- Application of brakes

Sources of mechanical noise tend to be both tonal and broadband in nature since the emitted sound is associated with the rotation of mechanical and electrical equipment. However, in modern wind turbines, mechanical noise is not usually audible above aerodynamic noise. Mechanical noise can be effectively reduced through standard noise control practices such as vibration isolation, damping and noise enclosures. Aerodynamic noise is associated with the passage of air over the wind turbine blades and is considered the most dominant source of wind turbine noise emissions. Aerodynamic noise levels typically increase with rotor speed.

A noise impact assessment was completed by GHD in accordance with *State Code 23: Wind Farm Development – Planning Guideline* in October 2017 and was subsequently updated in August 2019 to consider the updated Project Area (PLA) layout. A copy of the report is provided in Appendix A.11.

Only one sensitive receptor is located within the three-kilometre investigation area, a caretaker's cottage adjacent to the Toolara forestry office on a host lot on Tin Can Bay Road. All other sensitive receptors are more than 3km from the nearest wind turbine.

7.11.2 Impact

The operation noise impact assessment report identifies acoustic criteria that are to be complied with at sensitive land uses located on non-host lots. In the Guidelines, non-host lots are classified as a parcel of land that does not accommodate any part of a wind farm development. Sensitive land uses (herein referred to as sensitive receptors) are defined as areas including childcare centre, residential dwellings, educational establishments, healthcare services, short-term accommodation and tourist parks.

At this stage of the Project the make and model of the wind turbine has not been confirmed, but as noted in the Noise Impact Assessment report in Appendix A.11, wind turbines typically have a relatively similar noise profile between models. The acoustic modelling assessment was based on a wind farm layout that includes 226 Siemens SG 6.0-170, Rev. 0 Wind turbines with a hub height of 160 m and 180 m. The technical specifications for this model have a maximum sound power level (LwA) of 106 dBA, however, to be conservative, FWH requested this model be assessed assuming a worst case of LwA 109 dBA, or 3 dB above standard technical specifications.

The assessment identified that, based on the noise results presented in Table 5-1 of the report, the worst case noise for a wind turbine operating at 12 m/s the wind farm is predicted to comply with the required criteria at all host and non-host lots during both day and night periods. This has been illustrated in Figure C (reproduced on next page) and compared to standard emissions from other sources.

As the assessment has been conducted with the most stringent criterion, the requirement for adjustment based on measured background noise levels was not required, and as such background noise monitoring was not necessary for the Project. The results of this noise assessment demonstrate that the Forest Wind project will comply with the acoustic amenity criteria provided in Performance Outcomes 11 and 12 of the Code, when assessed in line with requirements of the Planning Guidelines.

7.11.3 Management and mitigation measures

The report concluded that it is not anticipated that any noise mitigation or management measures are required for the Project.

The ultimate location of the wind turbines may change within the Project Area (PLA) prior to construction. Whilst the results of the noise monitoring are not expected to vary materially as a result of any minor changes, an updated noise assessment will be completed once the final wind turbine models have been selected and final wind turbine locations are determined to ensure compliance with the code and development conditions.

7.12 PO13 Construction management

7.12.1 Aspect

Details of the construction of the wind farm have been provided in Section 4.4 of this report.

7.12.2 Impact

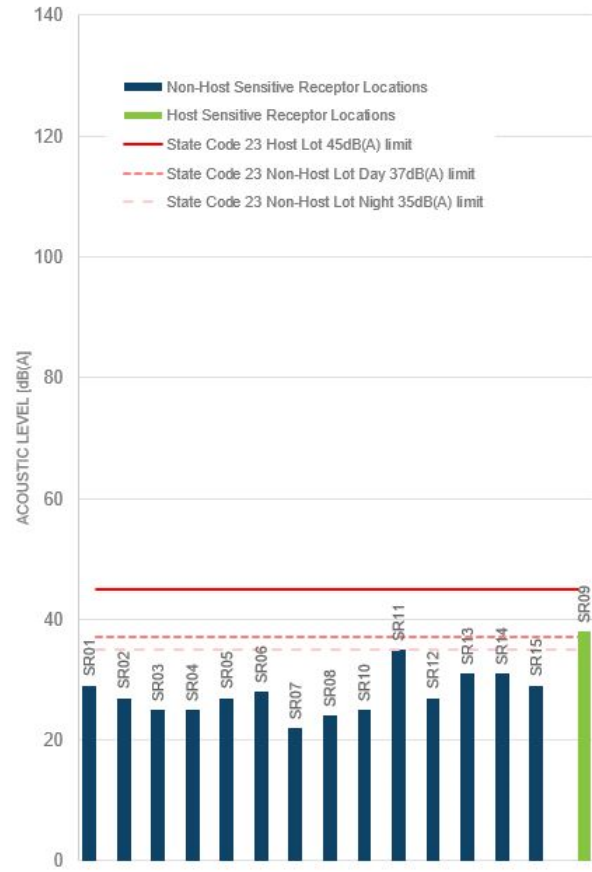
A number of aspects have been identified that may cause impacts during the construction phase if not properly managed, these include the following:

- air quality from construction traffic and construction activities
- impact to riparian vegetation and habitats
- use of fuel and chemicals
- impact to water quality

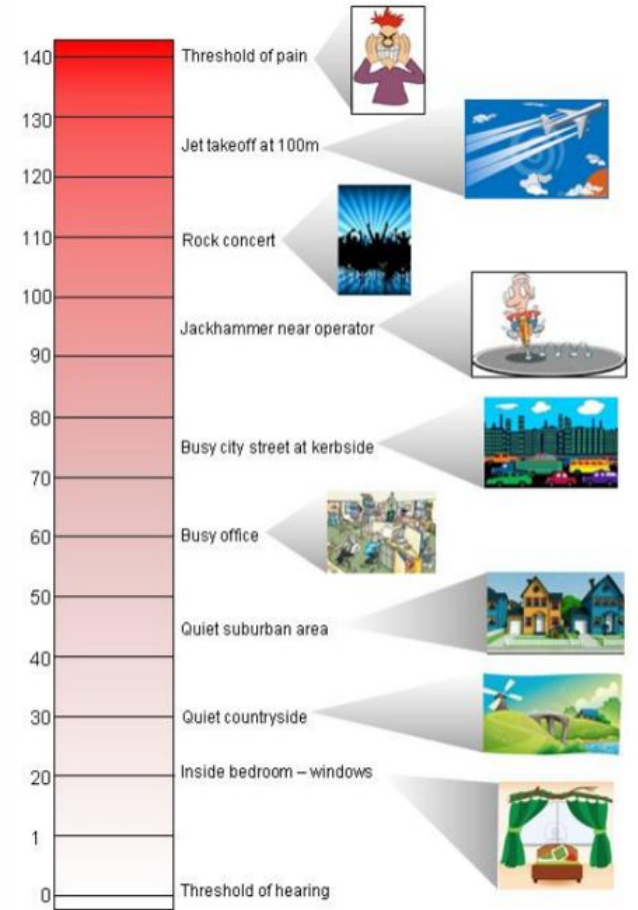
7.12.3 Management and mitigation measures

A Preliminary Construction Management Plan has been prepared to outline the proposed control measures to manage impacts during the construction phase of the Project and has been included in Appendix A.12 of this Planning Report. The Plan includes a Construction Environment and Management Plan (CEMP) and a preliminary Bushfire Management Plan.

Figure C – Project noise emission compared to standard examples



Source: GHD Forest Wind Noise Assessment, September 2019



Source: Noise Measurement Manual, ESR/2016/2195 (formerly EM1107), Department of Environment and Science, © The State of Queensland 2013
<https://environment.des.qld.gov.au/licences-permits/pdf/noise-measurement-manual-em1107.pdf>

8. Conclusion

8.1 Statement of Sufficient Grounds

This Planning Report and accompanying technical assessments have been prepared to support an application for a Development Permit for a Material Change of Use for a wind farm and ancillary and related activities including electrical infrastructure, concrete batching plants, Construction and Operations Compounds in accordance with the *Planning Act 2016* for Forest Wind.

The Project has been assessed against the relevant requirements of the *Planning Act 2016*, the *Planning Regulation 2017*, the SDAP, SPP and the Wide Bay Burnett Regional Plan and all relevant State and Commonwealth legislative requirements. The assessment has demonstrated that the Forest Wind Project is compliant with all relevant requirements. It is considered that SARA should approve the Project with reasonable and relevant conditions based on the following aspects:

- The Project has been sited and designed to have minimal impact on local residents, visual amenity, noise, EMI and ecology.
- The proposed location of Forest Wind within an existing, continuing exotic pine plantation minimises social and environmental related impacts.
- The Project will deliver significant wider economic and social returns, including infrastructure investment, job creation and industry innovation. The Project will provide hundreds of jobs during the construction phase and up to 50 long term roles during operations.
- The Project has potential to contribute up to one quarter of the Queensland Government's commitment of 50% renewable energy by 2030.
- The Project is compliant with the State Code 23 and all relevant legislation.

Appendices

All appendices are provided as individual documents accompanying this Planning Report.

- A.1 Figures One to Four
- A.2 Regional and Local Government Planning Assessment
- A.3 Assessment against SDAP State Code 1
- A.4 Aviation Impact Assessment
- A.5 Electromagnetic Interference Impact Assessment
- A.6 Shadow Flicker Assessment
- A.7 Ecological Assessment
- A.8 Traffic Management Plan and Impact Assessment
- A.9 Stormwater and Erosion and Sediment Control Management Strategy

A.10 Landscape and visual impact assessment, ZVI Report Figures and Photomontages

A.11 Noise Assessment

A.12 Preliminary Construction Management Plan