VIC Offshore Windfarm Pty Ltd

VIC Offshore Windfarm Project

Project Specifications

Rev 0 | 26 May 2021

Job number 278441

Arup Pty Ltd ABN 18 000 966 165

Arup
Level 4, 108 Wickham Street
Fortitude Valley
QLD 4006
GPO Box 685 Brisbane QLD 4001
Australia
www.arup.com

ARUP

Document verification

ARUP

Job title	VIC Offshore Windfarm Project	**Job number** 278441
Document title	Project Specifications	**File reference**
Document ref		

Revision	**Date**	**Filename**			
Rev 0	26 March 2021	Filename	Appendix A VIC Project Specifications		
		Description	Prepared by	Approved by	
			Tess McGahan	Damon Sunderland	

Issue Document verification with document ✓

Contents

1 Project introduction

1.1 Project overview

VIC Offshore Windfarm Pty Ltd is proposing the construction, operation and decommissioning of the Victorian (VIC) Offshore Windfarm project (‘the Project’). The Project will be located approximately 5 km off the coast of Portland (see Figure 1). If constructed, it will have a generation capacity of up to 495 MW, enough to power 330,000[1] Victorian homes.

The Project will comprise up to 33 - 62 offshore wind turbine generators (WTGs) with supporting offshore and onshore electrical assets to transfer energy generated by the windfarm to the existing electricity network.

The size of individual WTG’s is yet to be determined, with an anticipated capacity ranging between 8MW and 15 MW. The preferred turbines are the larger (15 MW) WTGs, as fewer will be required (33), which will result in less construction and reduced visual impact

Offshore assets would be located in Victorian coastal waters[2] as defined in the *Seas and Submerged Lands Act 1973* (Cth) and the *Coastal Waters (State Powers) Act 1980*. However as seen in Figure 1, the Project area extends into Commonwealth waters. This is to account for (a) navigational aids that may be installed in Commonwealth waters, (b) ancillary construction equipment and vessels that may traverse into Commonwealth waters on occasion and (c) to identify broader environmental values of the area to inform impact assessments. As the Project progresses, the siting of key infrastructure and ancillary equipment will be refined within the Project area.

Site selection for the landfall site and onshore infrastructure is ongoing, with the existing 550 kV network substation at Heywood Terminal Station being investigated as one possible connection point to the National Electricity Market (NEM).

The selected location makes use of the good wind resources in the south western part of the State, with mean wind speeds greater than 8.5 m/s at 100 m elevation[3]. Other features that make this site potentially viable include shallow bathymetry with water depths < 45m and good access to the NEM that is unlikely to require reinforcement. In addition, the location is of preference due to the low population density within the surrounding area.

The Project would support the Victorian Government’s target of 50% renewables by 2030.

[1] Based on average household consumption of 6570kWh / year and 50% load factor for the 495MW OWF (www.arelectrical.com.au/average-electricity-usage-in-australia)
[2] Coastal waters are generally defined as being within 3 nautical miles seaward of the territorial sea baseline (TSB). Reference: http://www.ga.gov.au/scientific-topics/marine/jurisdiction/maritime-boundary-definitions#heading-3
[3] https://globalwindatlas.info

The Project site is located within the Glenelg local government area (LGA) and Project infrastructure would be located on Gunditjmara land and in Gunditjmara waters. Project infrastructure may also need to be located within the Discovery Bay State Marine Park.

The environmental impacts of the Project will be subject to assessment under the Victorian *Environment Effects Act 1978* (EE Act), and it's likely the Victorian Minister for Planning will determine that an Environment Effects Statement (EES) is required.

Planning approval under the Victorian *Planning and Environment Act 1987* (P&E Act), a Cultural Heritage Management Plan (CHMP) under the *Aboriginal Heritage Act 2006,* and consent under the *Marine and Coastal Act 2018* will also be required

The Project will also require approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for impacts to matters of national environmental significance (MNES), Threatened Ecological Communities and Threatened and Migratory Species.

Subject to planning and environmental approval, construction will likely commence in early 2025 to be generating electricity by the Summer 2026 peak period.

The design life of offshore wind turbines is approximately 30 years and the lease proposed with the VIC state would be for 60 years, with a break clause at 30 years, to provide an option to refurbish the project.

Operation and maintenance activities will include routine inspections, and repair and replacement of equipment as required. It is anticipated that the Project will employee up to 100 full-time personnel.

It is expected that offshore structures above the seabed will be removed as part of the decommissioning process, with onshore infrastructure most likely to remain. Requirements for decommissioning will be established through the planning approvals for the Project.

Legend

- Substations
- Indicative Offshore Substation Location
- Indicative Turbine Locations
- Electricity Transmission Lines
- Coastal Waters Limit (3nm)
- Territorial Sea
- Project Area
- Major Roads
- Main Watercourses
- Watercourses
- Waterbodies
- Airports
- Parks and Conservation Reserves

Client: VIC Offshore Windfarm Pty Ltd

Job Title: Victoria Offshore Windfarm Project

Figure Title: Overview

Kilometers: 0 1.75 3.5 7

Issue	Date	By	Chkd	Appd
A	13/04/2021	VG	JG	LH

ARUP

Level 14 Exchange Tower
2 The Esplanade, Perth, WA 6000
Tel +61 (8) 9327 8300 Fax +61 (8) 9221 5262
www.arup.com

Scale at A3: 1 cm = 2 km

Figure Status: Issued for Review

Coordinate System: GDA 1994 MGA Zone 54

Job No: 278441-05

Figure No: Planning - Overview

\\global.arup.com\australasia\PER\Projects\278000\278441-00 Australis Energy OWF\Work\Internal\Design\GIS\05 Land based ecology assessment\VIC\02 Workspace\Planning - Overview.mxd

1.2 The proponent

VIC Offshore Windfarm Pty Ltd is a wholly owned subsidiary of UK based Australis Energy Ltd (Australis).

Australis is an offshore windfarm developer / origination company, its team having project delivery experience in the UK. The company is focused on opportunities offshore Australia where three projects are being pursued offshore Victoria, South Australia and Western Australia. Australis is led by Chairman Mark Petterson who played major roles in the liberalisation of the UK energy markets before becoming a leading pioneer in the offshore wind in the UK sector. At Warwick Energy he led the development of three successful offshore wind projects, totalling around 10% (c. 800MW) of the UK's capacity, including the Thanet project, the world's largest offshore windfarm when it was commissioned in 2010.

1.3 Project objectives

VIC Offshore Windfarm Pty Ltd is committed to responsible and sustainable development. As such the objectives of the project are:

- Develop an offshore windfarm that supports the Australian and Victorian governments' strategic goals and targets around increasing renewable energy supply
- Develop and implement a project that is commercially viable
- To work in collaboration with all stakeholders, in particular local Council and the community
- Select a site that will maintain social and environmental values during construction, operation and decommissioning
- Investigate design solutions that maximise energy generation and supply to the NEM during peak periods
- Determine opportunities to provide local and regional social and environmental benefits during construction and operation.

1.4 Project outcomes

The outcomes of the project will include:

- Downward pressure on energy prices through increased competition
- Maintaining the existing economic benefits and environmental and social values of the region
- Direct economic expenditure and benefit to the local and State economies during construction and operational phases

- Indirect economic benefits associated with the flow on effect on both the local community and wider economy during construction and operation
- Long term renewable (green) energy supply to reduce Victoria's carbon footprint.

1.5 Project background and rationale

There is widespread agreement that energy systems need to be decarbonised as quickly as possible as part of the international effort to fight global warming.

There are several factors encouraging the development of offshore wind energy industries around the world. The wind resource offshore is extremely large and more stable than onshore, the costs are falling fast, and the technologies are proven.

The offshore wind energy industry in Australia is still in its formative stages but has the potential to play a key role in the energy transition, supporting renewable energy targets and the development of clean tech industries. Australia is in a position, particularly in the southern half of the country, to create a significant new offshore industry. Conventional energy generation companies are already diversifying their operations into renewable energy sectors and the offshore oil and gas industry is in a unique position to exploit its highly skilled offshore workforce.

Offshore windfarms are currently being built in areas of favourable wind conditions and shallow water where construction costs are lower. The density of wind energy offshore in southern Australia represents an attractive location for offshore windfarms, and when combined with the relatively shallow waters, and small tidal range, the proposed State waters location represents an ideal location for an initial offshore windfarm construction to kickstart the industry.

Some of the advantages of construction of offshore windfarms are shown in Figure 2 and include:

1. Offshore wind speeds tend to be higher than on land. Small increases in wind speed yield large increases in energy production: a turbine in a 6.7 m/s wind can generate twice as much energy as a turbine in a 5.4 m/s wind. Higher wind speeds offshore mean much more energy can be generated.
2. Offshore wind speeds tend to be steadier than on land as there is nothing around to produce turbulence unlike onshore where hills, trees and buildings can interfere with wind flow. A steadier supply of wind means a more reliable source of energy.
3. Many coastal areas have very high energy needs. Over 90% of Australia's population lives in coastal areas, with concentrations in major coastal cities. Building offshore windfarms in these areas can help to meet those energy needs from nearby sources, reduce losses in electrical transmission systems.

4. Offshore windfarms have many of the same advantages as land-based windfarms – they provide renewable energy; they do not consume water; they provide a domestic energy source; they create jobs; and they do not emit environmental pollutants or greenhouse gases. They are also generally much larger than onshore farms, with improved economies of scale.

5. Turbines used offshore are generally much taller than those onshore which pushes them up into the naturally higher wind flows at higher altitude.

Australis plans to develop offshore wind energy in the Southern Hemisphere, with the goal of having its first windfarm operational by 2026. Australis has been conducting desktop investigations for the potential for offshore wind development in Victoria from mid-2020. If constructed, the Project will support the Victorian Government’s target of 50% renewables by 2030.

The offshore environment in Victoria offers an opportunity to tap into a more powerful and consistent wind resource, with the potential to generate more electricity at a steadier rate than most other renewable energy sources. The consistent, strong wind patterns along the coastline in the south-western part of the State, in proximity to AEMO’s 2020 ISP South West Victoria Renewable Energy Zone (REZ), provides tremendous opportunity to develop high capacity (and high-capacity factor) offshore wind in close proximity to critical transmission nodes.

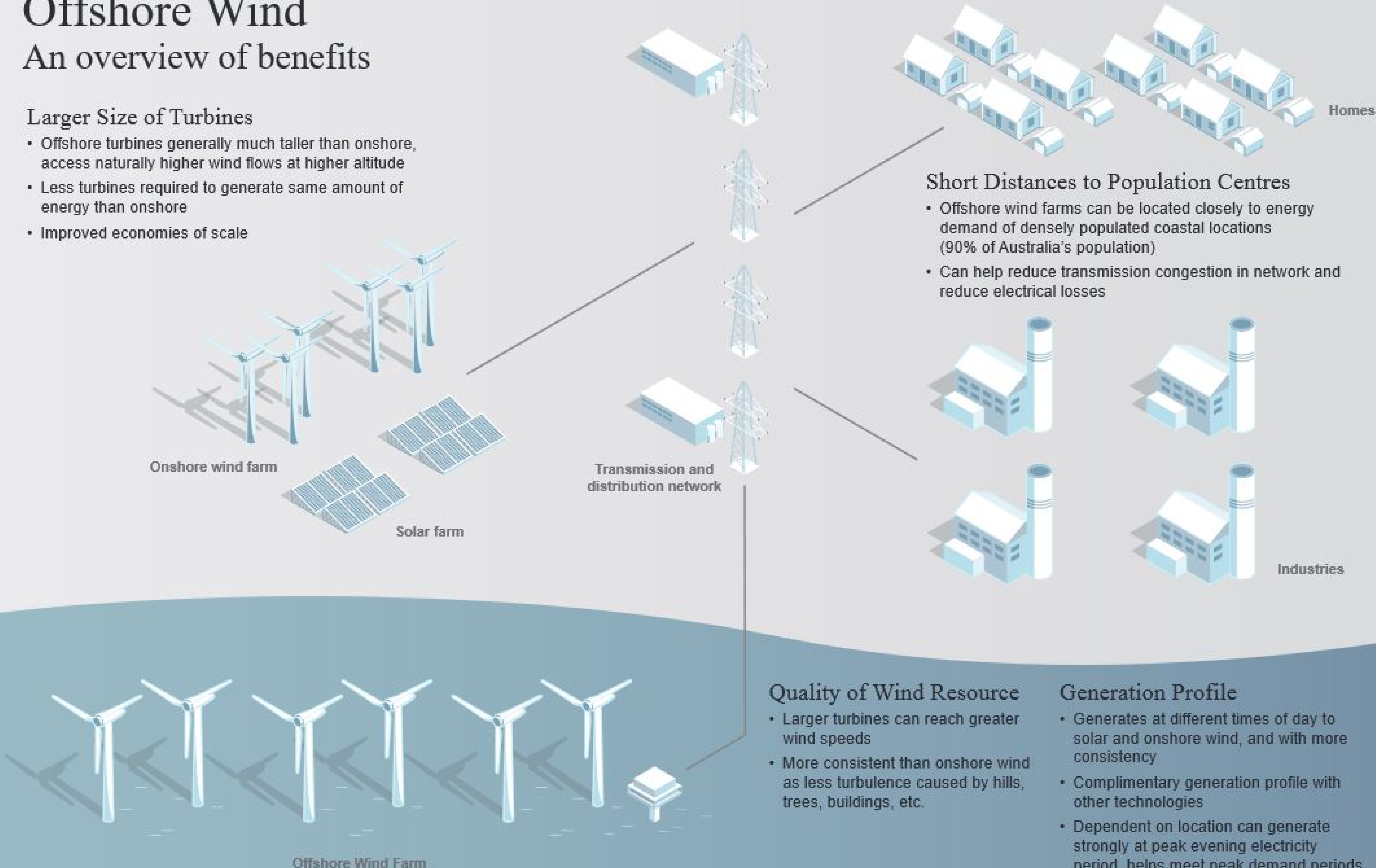
The project has an estimated capital investment value of approximately $1.5 billion ±30%. It would introduce proven offshore wind technology to Victoria, increasing the State’s energy productivity and delivering jobs and investment into regional Victoria.

It is the intent of VIC Offshore Windfarm Pty Ltd and Australis Ltd to maximise direct benefits to the local community and economy, and opportunities for such would be further explored throughout the project’s planning and development process.

Offshore Wind
An overview of benefits

Larger Size of Turbines
- Offshore turbines generally much taller than onshore, access naturally higher wind flows at higher altitude
- Less turbines required to generate same amount of energy than onshore
- Improved economies of scale

Short Distances to Population Centres
- Offshore wind farms can be located closely to energy demand of densely populated coastal locations (90% of Australia's population)
- Can help reduce transmission congestion in network and reduce electrical losses



Quality of Wind Resource
- Larger turbines can reach greater wind speeds
- More consistent than onshore wind as less turbulence caused by hills, trees, buildings, etc.

Generation Profile
- Generates at different times of day to solar and onshore wind, and with more consistency
- Complimentary generation profile with other technologies
- Dependent on location can generate strongly at peak evening electricity period, helps meet peak demand periods

2 Project description

2.1 Overview

The Project comprises the construction, operation and decommissioning of an offshore windfarm with generating capacity of up to 495 MW connected to the existing electricity network.

Detailed site selection and design of the Project will be ongoing throughout the EES and pre-construction phases. Therefore, the following description of the Project is indicative and designed to provide context for the EES scoping process. The design envelope, possible construction methodologies and operational parameters will be developed in parallel with the EES and will be influenced by the results of environmental and technical studies, and stakeholder consultation.

The key features of the Project are expected to include:

1. Offshore components

- Up to 62 offshore wind turbines (WTGs) supported by monopile (or similar) foundations
- A network of buried or mechanically protected subsea cables along the seabed connecting the WTGs together and connecting the strings of WTGs to the offshore substation (known as inter-array cables)
- An offshore substation and substructure supported by monopile (or similar) foundations to collect and transform the output to a higher voltage
- Subsea cables buried or mechanically protected transmitting electricity generated from the windfarm to the onshore substation (known as the offshore export cable)

The offshore windfarm assets will be located within State waters. At this stage, it is anticipated that individual turbines (WTGs) delivering between 8 MW and 15 MW WTGs will be installed, however the ultimate number and final location of the WTGs will be determined prior to construction and based on the Project approval and commercial and supply chain considerations.

The WTGs are expected to be supported by monopile structures. Monopiles may be installed from a jack-up vessel or a floating vessel. The transition piece is usually lifted and grouted or bolted in place from the same vessel.

Monopiles (up to 10m diameter) are generally moved into position using the main crane and upending tool and held in position by a gripper tool. They are the driven into the seabed before mounting and grouting transition pieces.

Transition pieces are usually carried and installed by the same vessel, although a two-vessel strategy in which transition pieces are installed by a separate vessel has been used on several occasions. An approximate timetable for installation once at the windfarm site is:

- Transport and positioning: 2 hours for floating vessels; 4 hours for jack-ups

- Preparations: 1 hour
- Lifting and pile positioning: 1 hour
- Driving: 6 hours, and
- Grouting: 2 hours.

Under some ground conditions, monopiles are grouted into a pre-drilled rock socket. Under conditions with boulders, a combination of drilling and driving may be required.

Cable installation activities will be preceded with a survey to define the route. This will be followed by a pre-lay grapnel run (or alternative method) to clear any debris from the cable route.

Different strategies for cable laying may be employed involving one or two vessels, and the chosen approach depends on seabed conditions, equipment available to the contractor and presence of any benthic communities and habitat.

Burial will provide protection to the cables, however additional protection (rock dumping, or grout bags, etc) may be required at key locations (e.g. where cables enter the WTG or offshore substation platform or when ground conditions or crossings result in the cable being laid near to or on the seabed surface). Burial of cables will also assist in avoiding impacts to marine species (sharks, rays, bony fish, turtles and crustaceans) from electromagnetic fields (EMF). Burial depths for the offshore export cable will be subject to detailed assessment but is likely to be in the range of 1-3m below seabed.

Pre-trenching and simultaneous lay and burial using a cable plough is preferred if the soil is suitable, as immediate burial and protection is obtained in a single pass which reduces costs and seabed disturbance. If seabed conditions are not suitable then a two-stage process will be used where the cable is laid on the seabed, after which a vessel with trenching vertical injector or jetting sled, undertakes the burial.

Cable ploughs can bury the cable down to 3-4 m below seabed level. The plough requires a tow force to pull the plough through the soil depending on the soil conditions and the required burial depth. Using a barge (for shallow water operations), this force is supplied by an anchor or a tow tug. For a dynamically positioned vessel, a specialist vessel with an appropriate bollard pull will be required. It is often not possible to plough close to the turbine or substation. In that case, a trenching remotely operated vehicle (ROV) may be used.

ROVs can have either a jetting system or a mechanical cutter. A high-pressure jetting system is used to fluidise the seabed and allow the cable to sink to the required depth (only in sandy sediments and softer clays). For rocky or hard clay seabed conditions, a mechanical cutter will be used.

Shore crossing is typically undertaken via trenching at shallow relief beach sites, such as those seen at this location. In hard (non-sand) coastal beach lithologies, and or steeper or cliff related coastal settings horizonal directional drilling is undertaken to create the cable shore crossing conduit.

Offshore ancillary components may also be required during pre-construction, construction and operation, such as navigational aids, meteorological and oceanographic monitoring devices. The type, number and positions will be confirmed during development of the Project, and in consultation with the relevant authorities. It is anticipated these will be located within both State and Commonwealth waters.

2. Coastal and onshore assets

- A landfall site with a transition joint pit connecting the marine cables from the offshore substation to the onshore cables that will run to the onshore substation
- An onshore substation, which may include further transformers
- A new overhead transmission line supplying energy generated from windfarm to the National Electricity Market (NEM), with additional equipment as required, which may include battery storage for fast frequency response to provide stability to the grid
- Temporary construction areas and upgrade to access roads.

Currently a location at Portland, close to the coast and existing electricity network is being investigated for the landfall site and onshore transmission infrastructure, with final locations subject to design development, further technical and environmental studies, and discussions with Project stakeholders. The landfall site would be located landward of the mean high-water mark (MHWM) on land suitable to accommodate an underground joint pit. The transmission infrastructure is anticipated to be predominately above ground.

The existing 550 kV network substation at Heywood Terminal Station is being investigated as the connection point to the NEM, which is located approximately 30 km from the coastline. Options being investigated include use of the Alcoa easement from the Portland Aluminium Smelter to Heywood Terminal Station, or potentially the Alcoa transmission system (should the plant cease operations), as well as a new easement from Portland to Heywood. An alternate option consisting of a new easement from Cape Bridgewater to Heywood, potentially connecting into a point on the existing easement from the Smelter to Heywood, may also be considered. For all options, the preference is to utilise existing electricity easements and other infrastructure corridors as much as practicable to minimise impacts.

Onshore ancillary infrastructure associated with the Project includes operation and maintenance facilities comprising a control room, site offices, storage facilities, crew transfer vessels (CTVs) and personnel facilities. These will be sited remote to the Project area in a local port.

3. Construction and maintenance vessels

Turbine installation is normally undertaken with a self-propelled jack-up vessel designed primarily for the purpose, though in some cases, jack-up barges have been towed with tugs. An example of specification for these vessels is:

- Length: 130m, Beam 40m, Draft 5m
- Crew berths: 100

- Crane: 1,500 tonnes
- Carrying capacity: 9,300 tonnes
- Maximum transit speed: 12 knots
- Jack-up depth: 45m
- Wind turbine component capacity: 5 sets
- Number of jack-up legs: 4-6
- Jack up speed: 1m/min, and
- Dynamic positioning system (DP2).

Most of the vessels in operation have been used for both turbine and foundation installation. Increasingly the fleets are diverging. The increase in turbine capacity (and therefore rotor diameter) is associated with a higher hub height. At the same time, foundation mass is increasing, and they can now be installed more rapidly from a floating vessel. Floating vessels are considered a natural next step for turbine installation, offering theoretically faster installation than jack-ups.

Different specialist vessels will normally be used for export and array cable installation, as export cable-laying vessels will typically have larger carousels to accommodate longer cables. It is possible that the same vessel might be used for both operations on this Project. The vessels may need to have a shallow draft to install the cables in shallow water.

Simultaneous lay and burial can be carried out with a variety of burial tools. In that case, the cable is buried during the lay to obtain immediate protection. Otherwise, a post-lay burial is required.

Cable-laying vessels are characterised as follows:

- Up to 30m (breadth) by 140m (length) and can operate at a speed up to 14kn (transit speed).
- Accommodation for a crew of up to 90.
- The current capacity of carousels is of up to 7,000t. Some contractors offer vessels with a double carousel
- Likely to be equipped with a 3D motion compensated crane with up to 25t and a 25t A-frame.
- Generally equipped with a personnel transfer gangway (for example Ampelmann system) and a helideck.

CTVs and service operation vessels (SOVs) may be used to support construction and maintenance activities. SOVs are larger vessels than CTVs and can fulfil a wider range of functions being capable of operating offshore for weeks rather than a single day.

Specialist vessels are used for crew transfer to the windfarm for installation and commissioning tasks. These are typically 15-20m workboats of the kind regularly used during windfarm maintenance.

ROV support vessels are 80-100 m DP2 vessels with a moon pool and deck crane.

The types and mix of vessels will depend on vessel availability as well as distance and capacity of ports from the Project area and construction and maintenance requirements and strategies.

Where possible, vessel movements and docking would be limited to State waters. However, some navigation may be required through Commonwealth waters.

4. Existing port and harbour modifications

Existing port facilities will be used where possible to support the transport and marshalling of equipment and Project components from globally distributed supply chains, as well as construction and maintenance vessels and activities.

Suitable port and harbour facilities are currently being investigated based on the following criteria:

- Proximity to the Project, to allow for efficient vessel movements and transportation during construction and maintenance
- Water depths and tidal conditions suitable to the proposed Project vessels and activities
- Dedicated or shared berthing facilities
- Portside facilities and land availability for construction and maintenance activities (including laydown, storage and assembly of WTG components)
- Potential opportunity to provide local employment benefits.

Construction port requirements are typically:

- At least 8 hectares suitable for lay down and pre-assembly of product
- Quayside of length 200-300m length with high load bearing capacity and adjacent access
- Water access to accommodate vessels up to 140m length, 45m beam and 6m draft with no tidal or other access restrictions, and
- Overhead clearance to sea of 100m minimum (to allow vertical shipment of towers).
- Sites with greater weather restrictions or for larger scale construction may require an additional lay-down area, up to 30 hectares.
- Large areas of land are required due to the space taken when turbines are stored lying down on the ground.

Ancillary components at existing ports to support with construction and maintenance activities may include staff car parking areas, waste handling and refuelling facilities, staff office areas and a marine control centre for directing activities, and storage facilities for minor components).

A schematic of the Project is shown in Figure 3 below.

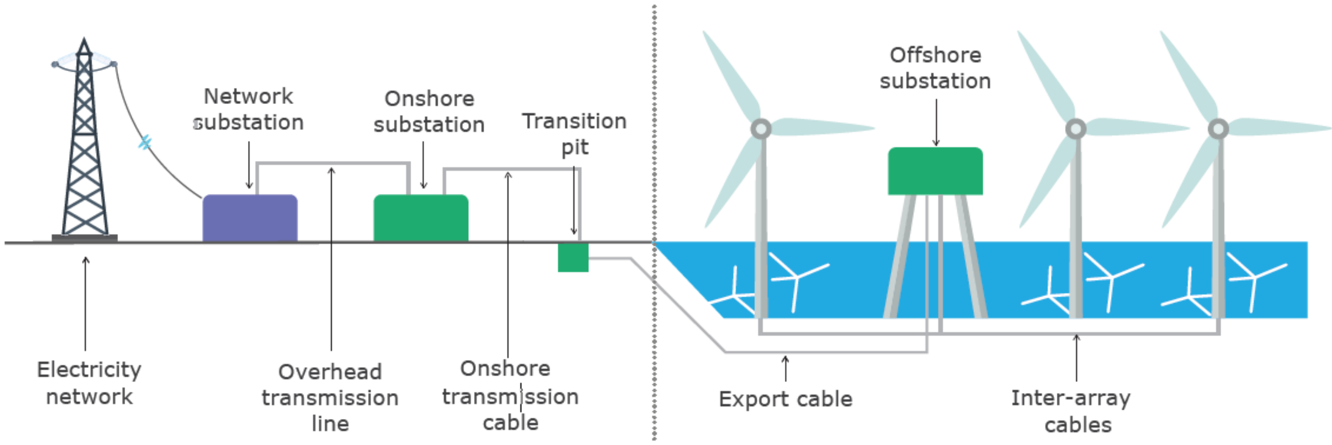


Figure 3: Project schematic

2.1.1 Project specifications

The indicative offshore Project characteristics are detailed in Table 1 below, along with anticipated location in State and/or Commonwealth waters.

Table 1: Indicative offshore characteristics

Feature	Parameters	State waters	Commonwealth waters
Wind Turbine Generators (WTGs)		✓	
Maximum generation capacity	495 MW		
Number of turbines	33 - 62		
OWT capacity	8 – 15 MW		
Max. rotor diameter	220 m		
Max. hub height	154 m		
Design. life	30 years		
Separation between OWT	825 – 1100 m (5 x rotor diameter)		
Max. water depth at turbine locations	45 m		
Monopile foundations dimensions	6.5 – 8 m		
Monopile foundations depth	30 – 50 m		
Offshore substation		✓	
Platform size	800 m^2		
Format	66 – 132 275kV		
Monopile foundations depth	30 – 50 m		
Inter-array cables		✓	
Total length (dependent upon WTG size)	250 km – 465 km		
Format	66kV		
Offshore export cable		✓	
Length (straight to shore and offshore to Portland)	11km and 58km		
Format	i.e. Up to 2x275kV		
Burial depth	1 – 4 m		
Offshore construction platforms (J/U)		✓	
Number	1		
Size	Up to length: 260m, beam: 50m, draft: 12m		
Construction support vessels (CSV)		✓	✓
Number	3-5		
Size	15-20m (CTV) 80-100m (ROV support)		
Service Operation Vessels (SOV)		✓	✓
Number	1		

Size	Up to 85m in length with accommodation for 60 POB		
Navigational aids and monitoring devices		✓	✓
Type	TBD		
Number	TBD		

The indicative onshore Project characteristics are detailed in Table 2 below.

Table 2: Indicative onshore characteristics

Feature	Parameters
Transition pit	
Footprint	10 x 15 m (5m deep)
Cable size	275 kV
Onshore substation	
Footprint	300 x 250 m (20 m high)
Format	275 kV
Transmission line (to Heywood)	
Total length	Approximately 30 km for all options being investigated
Format	2 x 275kV
Connection point	550 kV network substation at Heywood Terminal Station
Construction sites	
Footprint of temporary construction compound and lay down areas	Construction port requirements are typically: • At least 8 hectares suitable for lay down and pre-assembly of product • Quayside of length 200-300m length with high load bearing capacity and adjacent access • Water access to accommodate vessels up to 140m length, 45m beam and 6m draft with no tidal or other access restrictions, and • Overhead clearance to sea of 100m minimum (to allow vertical shipment of towers). Sites with greater weather restrictions or for larger scale construction may require an additional lay-down area, up to 30 hectares. Large areas of land are required due to the space taken when turbines are stored lying down on the ground.
Operation and maintenance facilities	Operations relate to management of the asset such as health and safety, control and operation of the asset including wind turbines and balance of plant, remote site monitoring, environmental monitoring, electricity sales, administration, marine operations supervision, operation of vessels and quayside infrastructure, and back office tasks. An onshore control room provides access to detailed real-time and historical data for the wind turbines, substation, met station, offshore crew and vessels. Systems ensure that the operations duty manager knows where all personnel and vessels are located.

2.1.2 Project area

2.1.2.1 Site selection

A multi-criteria assessment (MCA) was adopted as the methodology to delineate potential sites for offshore wind development in the Western Australia coastal waters. The criteria were spatially represented via a Geographic Information System (GIS) database, thus allowing a "heat map" to be developed for visual assessment of suitable sites along the coastline. Several categories were assessed to determine the most appropriate sites for the offshore windfarms which included legislative boundaries (State vs Commonwealth), distance to major port facilities, marine traffic, wind resource, water depth, environmentally sensitive sites and receptors, proximity to built-up areas and proximity to onshore electricity networks.
Each of the evaluation criteria were then weighted to reflect their relative importance in influencing the site selection. For example, Proximity to Built-Up Areas was assigned a weighting of 20% whereas Legislative Boundaries was assigned a weighting of 10%. The site characteristics were also assigned a suitability score ranging from zero to three with zero indicating an unsuitable site and three a suitable site. The scoring was than combined for each category in order to generate the "heat map" to allow a visual assessment of suitable sites.

The following favourable characteristics are noted for the selected site:

- Good wind resources associated with the site with mean wind speeds greater than 9.0 m/s at 150m elevation;
- Water depths < 40m along most of the coastline;
- Low marine traffic volumes;
- Access to the national electricity market (NEM) at Heywood Terminal Station (550kV); and
- Low population density within the surrounding area to mitigate the visual impact.

Following the MCA and site selection process, a second phase was conducted comprising a high-level desktop study of the Portland site based on publicly available information. The purpose of the desktop study was to investigate site characteristics and site constraints which would have a significant impact on the project and to check on potential fatal flaws to the site selected. The areas reviewed as part of this desktop study included land tenure, land use, environment, native title, heritage, topography, geology, hydrology and bathymetry and marine traffic. No fatal flaws were identified as apart of the high-level desktop study.

2.1.2.2 Project terminology

The Project area is depicted as the black dotted line in Figure 1. This is a broad and indicative Project area for the purposes of investigating and defining the extents of the Project and to identify environmental risks and potential impacts. As the design of the Project progresses, the Project area will be refined and rationalised to show a more precise design envelop and Project footprint.

For some environmental aspects, broader Study areas have been created to understand wider environmental impacts. For example, marine and terrestrial desktop studies have assessed a buffer surrounding the Project area of 5 km to better understand potential impacts to species.

2.1.2.3 Approximate Project area and disturbance footprints

The approximate Project areas (in hectares) and indicative disturbance footprints are summarised in Table 3 below.

The indicative disturbance footprints have been calculated to understand the approximate impact to marine and terrestrial environments. The marine disturbance footprint was calculated on the 15 MW array (33 turbines) and estimated dimensions of offshore infrastructure, including number of turbines, offshore substation, inter-array cabling and export cabling. The marine disturbance will vary depending on the number of turbines constructed and the cabling required to reach the onshore landfall site and transmission lines. Accordingly, the estimated marine disturbance for the 8 MW would be larger than the 15 MW because of the additional turbines and subsequent cabling required.

The terrestrial disturbance footprint was calculated for the two onshore options currently being investigated being:

1. Portland to Heywood Terminal Station; and
2. Cape Bridgewater to Heywood Terminal Station.

The calculation was based on estimated dimensions of onshore infrastructure, including shore crossing, transition pit, onshore sub-station, and transmission line. The approximate transmission line length is 33 km for both options and the width of the corridor required for construction is approximately 100 m.

Preliminary disturbance footprints are estimated to range between 950 to 975 hectares depending on the transmission route chosen within the Project area. The marine and terrestrial disturbance footprints will be further defined as design and engineering of the Project progresses.

Table 3 Approximate Project areas and indicative disturbance footprints

Project Areas	**Approx. area (ha)**
Terrestrial Project area	19,938
Marine Project area	67,521
Total Project area	87, 458
Indicative (disturbance) Footprint based on 15 MW array (33 turbines)	**Approx. area (ha)**
Marine disturbance – OWF to Cape Bridgewater	612
Marine disturbance – OWF to Portland	645
Terrestrial disturbance – Cape Bridgewater to Heywood	340
Terrestrial disturbance - Portland to Heywood	330

3 Project activities

3.1 Key development activities

Prior to commencement of pre-construction or construction works in 2026, a number of preparatory tasks need to be completed. These tasks include:

- Initial environmental assessment and referrals to relevant State and Commonwealth referral agencies
- Stakeholder engagement and community consultation
- Thorough environmental field studies and investigations
- Environmental approvals and permits and tenure agreements (shown in Figure 5)
- Detailed design of Project.

3.2 Key construction activities

A high level overview of the key construction activities and staging is provided below.

3.2.1 Offshore

Pre-construction

- Preparation of the seabed (including dredging as necessary)
- Installation of ancillary components, including navigational aids and establishment of temporary 500m exclusion zones around WTG locations

Construction

- Transport of WTGs and offshore substation monopiles and foundation components to marshalling site or sites
- Sequential driving of monopiles into seabed followed by fixing of transition pieces to the monopiles
- Installation of scour protection, as required
- Erection of WTG towers and nacelles, either pre-erected or erected individually at the site
- Installation of the turbine blades
- Construction of the offshore substation platform and installation of substation components and equipment
- Pre-trenching and simultaneous lay and burial of the array cables using a cable plough or trenching ROV

- Installation of the offshore export cable using a cable plough or trenching ROV.

3.2.2 Onshore

Pre-construction

- Upgrades to, or construction of, site access site roads (clearing and levelling)
- Removal of areas of non-native vegetation
- Clearing and levelling of the onshore substation building area
- Establishment of onshore construction sites (offices, laydown areas, etc)
- Delivery of equipment

Construction

- Construction of foundations for the substation
- Excavation and preparation of the landfall site
- Installation of underground cables from offshore
- Installation of overhead transmission line
- Installation of substation switch-room and electrical equipment
- Electrical connection of cables
- Remove construction facilities and site tidy up.

3.3 Key operational and maintenance activities

Operation generally refers to activities contributing to the high level management of the windfarm, which will include remote monitoring, environmental monitoring, electricity sales, and administration and other back office tasks. There may be a possible 50m exclusion zone around offshore assets during operation to maintain the safety of key maintenance personnel and equipment as well as the public, as in other jurisdictions.

Maintenance refers to the up-keep and repair of the physical assets and systems, which can be divided into preventative maintenance and corrective maintenance. Preventative maintenance will include the proactive repair and replacement of known wearing components based on routine inspections or information from condition monitoring systems, and corrective maintenance will include the reactive repair or replacement of failed or damaged components. Typical O&M activities include:

- Onshore and offshore logistics
- Turbine and blade maintenance, inspection and service

- Foundation inspection and repair
- Cable inspection and repair
- Scour monitoring and management
- Substation maintenance and service
- Environmental monitoring and inspections.

3.4 Key decommissioning activities

It is expected that offshore structures (such as the WTGs) will be removed to just below the seabed as part of the decommissioning process, with cables and onshore infrastructure most likely to remain. Requirements for decommissioning will be established through the planning approvals for the Project and a decommissioning management plan will be developed prior to the commencement of decommissioning, in consultation with the relevant authorities. The decommissioning plan will include:

- Rehabilitation strategies and objectives
- Timeframes for rehabilitation
- Infrastructure (if any) agreed to remain in place
- Monitoring and mitigation measures.

3.5 Project timeline and approvals pathway

The indicative timeline and approvals pathway is shown in Figure 4 and Figure 5 respectively.

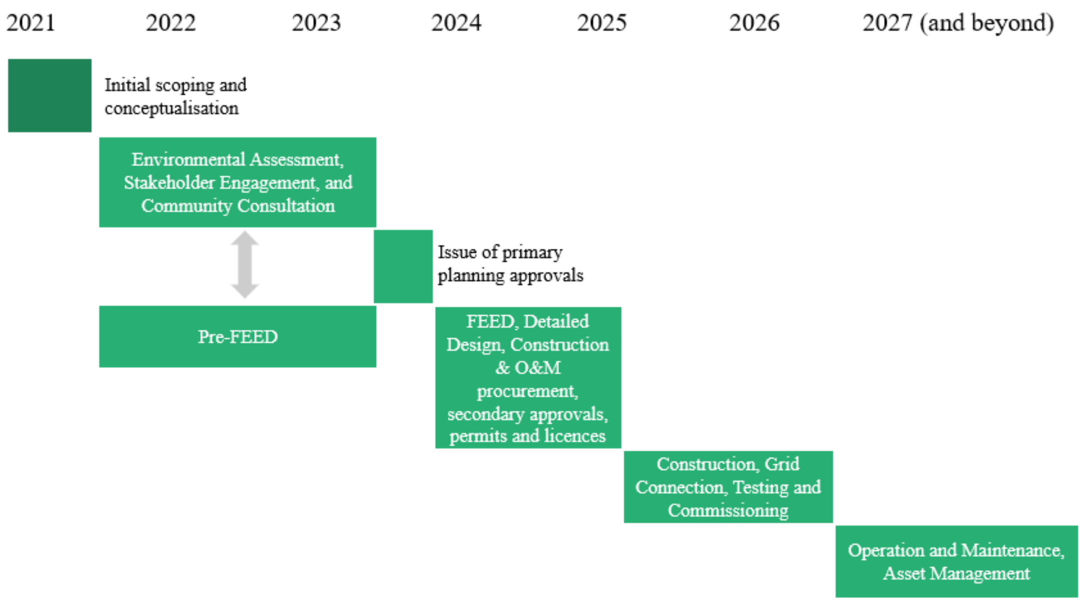


Figure 4: Indicative Project timeline

Victoria

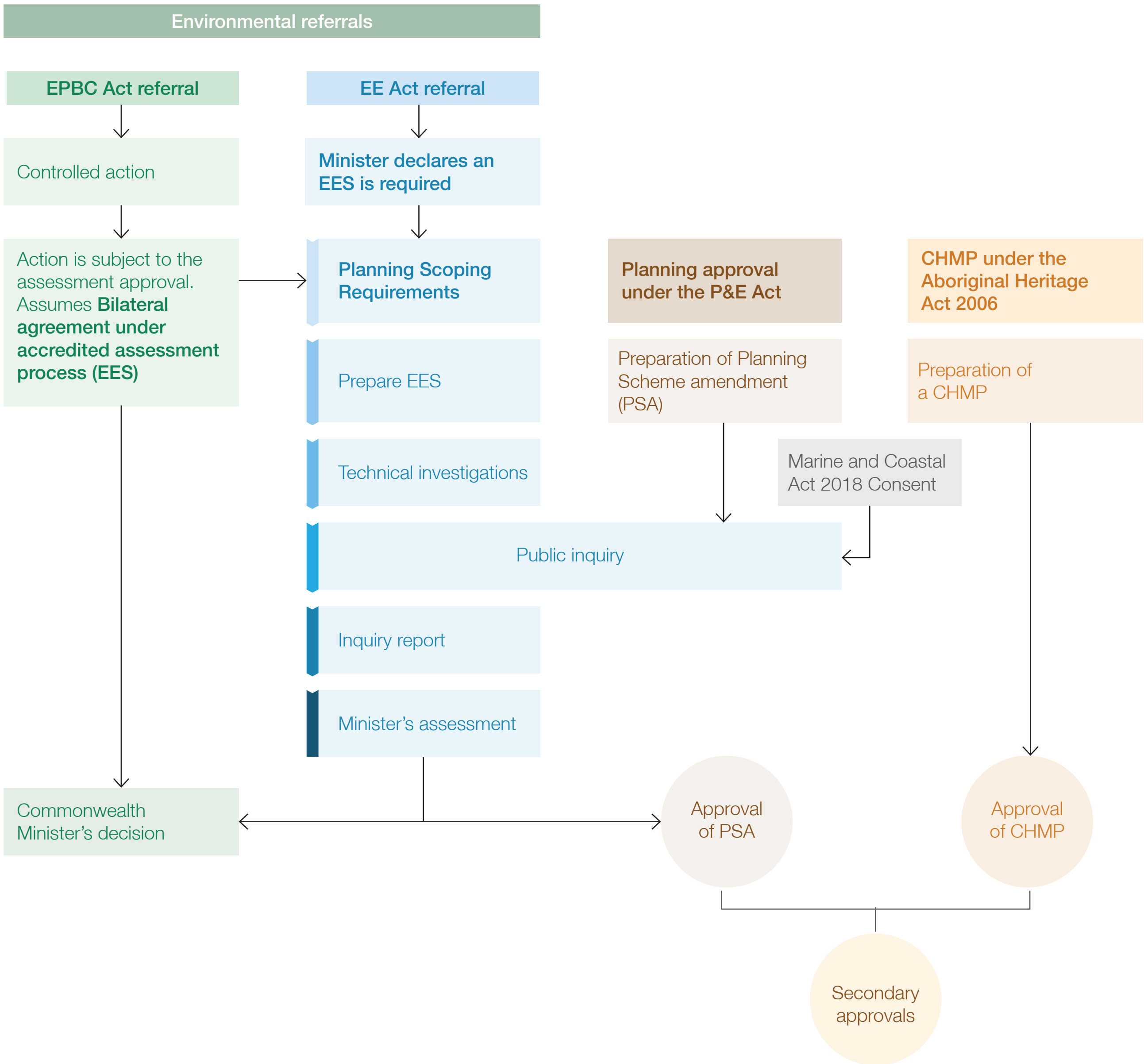


Figure 5: Approval pathway flowchart