

Executive Summary

Executive Summary

- 1. Executive Summary2
- 2. Project Details.....2
- 3. Pacific Hydro Pty Ltd.....2
- 4. Environmental Policy Imperatives.....3
- 5. Benefits of Proposal3
- 6. Site Location.....5
- 7. Site Selection and Design Process.....5
- 8. Infrastructure Details5
- 9. Community Consultation and Project Evolution6
- 10. Environmental Assessment7

1. Executive Summary

Energy Pacific (Vic) Pty Ltd, a wholly owned subsidiary of Pacific Hydro Pty Ltd (and hereafter referred to as “Pacific Hydro”) has submitted a Development Application to the Department of Planning, Transport and Infrastructure (DPTI) for lodgement to the Development Assessment Commission (DAC), for the construction and operation of a Wind Farm at Keyneton, South Australia.

A detailed assessment of the proposal against the Mid Murray Development Plan has been undertaken by Nolan Rumsby Planners. The Planning Assessment also considered State Government Policy. The Planning Assessment tested the wind farm proposal against the appropriate planning objectives. Where those tests required a subjective assessment, Nolan Rumsby Planners undertook their own analysis and considerations and were also informed by the specialist environmental assessments undertaken.

The Planning Assessment considered the proposed Wind Farm against the Development Plan as a whole and in the context of Statewide policy directions. It concluded, having regard to the technical environmental assessments, that the proposed development appropriately satisfies the criteria laid out by Section 49 of the *Development Act 1993* and, in particular, has appropriately addressed the relevant provisions of the Mid Murray Development Plan.

2. Project Details

The proposed Keyneton Wind Farm is located along the ridgeline of the Eastern Mount Lofty Ranges, approximately 6km north-west of Cambrai, 8km west of Sedan, 4km east of Keyneton and 8km east of Eden Valley. The site is approximately 70km north-east of Adelaide.

The wind farm will comprise 42 wind turbines with an estimated capacity of 105MW and is estimated to generate electricity for 25 – 30 years. The Development Application Report for the proposed Keyneton Wind Farm has been prepared to support the Development Application.

This Executive Summary provides a non-technical summary of the design investigations, proposed development, community and agency consultations and the various environmental assessment undertaken.

3. Pacific Hydro Pty Ltd

Pacific Hydro is a leading renewable energy company, producing clean power from natural resources. For nearly 20 years, we have lived our vision – powering a cleaner world – by identifying, delivering and operating clean energy projects and providing carbon abatement products and services to our customers across the globe.

Founded in Australia in 1992, Pacific Hydro has approximately 453 MW of operating assets, which includes 52 MW of Australian hydro operations; 141 MW of international hydro operations; 200 MW of Australia/Pacific wind energy projects and 58 MW wind energy projects in Latin America.

4. Environmental Policy Imperatives

It is widely accepted that climate change is one of the greatest economic, social, and environmental challenges of our time. The vast majority of informed scientific opinion continues to conclude that human activity is largely responsible for accelerating climate change effects, resulting in changing rainfall patterns, temperature effects, reducing water availability in Australia and increasing the frequency and intensity of severe weather events such as drought, bushfires, storms and floods.

The potential eco-system impacts and destruction of natural icons resulting from climate change such as coral bleaching on the Great Barrier Reef¹ and multiple eco-system impacts in Kakadu leading to habitat destruction and subsequent species extinction is well documented².

The impacts of climate change on Australia are not just environmental; they are also social and economic. Social impacts from climate change will likely include affects on human health^{3 & 4}, which have numerous flow-on effects on the community. Mitigating the impacts of climate change and at the same time reducing the (well documented) effects of fossil fuel use on human health will help ameliorate the real and significant threats to the health of Australians now and for many decades into the future.

Wind farm projects such as the Keyneton Wind Farm are taking place in a context of increasing scientific consensus, public awareness and policy settings designed to begin to mitigate climate change caused by the use of fossil fuels for energy needs, widespread deforestation and other human activities.

Both the Federal and State governments are supporting Australia's transition to renewable power through federally legislating an increased Renewable Energy Target (20% by 2020 federally and 33% in by 2020 in South Australia) and introducing a price on carbon to facilitate clean energy investment.

5. Benefits of Proposal

Based on an approximate 105MW capacity project, the wind farm will generate significant environmental, economic and social benefits, a summary of which are listed below:

- Over 240,000 tonnes of carbon pollution avoided each year.^{5 and 6}

¹ Great Barrier Reef Marine Park Authority (2007). Climate change and the Great Barrier Reef: vulnerability assessment.

² Australian Government. (2011). Australia's biodiversity and climate change – Kakadu: a climate change hot spot.

³ Climate Commission (2011). The Critical Decade: climate science, risks and responses. p. 3,4

⁴ Horton, R (2009). The climate dividend. The Lancet 374:1869 – 1870,

⁵ Calculations based on expected annual generation (340,326 MWh) x state emissions factor (0.72). Emissions factors are as per the 2010 Factors and Methods update from the Federal Department of Climate Change and Energy Efficiency
<http://www.climatechange.gov.au/~media/publications/greenhouse-acctg/national-greenhouse-factors-july-2010-pdf>.

⁶ The estimated greenhouse gas mitigation, electricity generation and water savings are based on a capacity factor of 37%

- Enough electricity to power approximately 68,000 homes each year⁷
- A similar amount of electricity produced by a brown coal-fired power station would use over 500,000 megalitres of clean water each year.⁸
- The permanent works take up less than 1% of the landholder's property, ensuring current farming practices can continue and ensuring a minimal environmental footprint of the project.
- Diversify the income base of the agricultural sector in the region.
- Pacific Hydro aims to maximise local contracts and jobs in construction and operation - typically 30% by capital value, from the approximate \$242 million project cost.
- Pacific Hydro estimates that the construction stage will involve around 500 individuals over a 24 month period with over 380 of those likely to be sought from the local region⁹ or within South Australia¹⁰.
- Local firms will also be invited to bid for a significant portion of works on roads, foundations, electrical components, concrete batching, etc.
- Once operational, around six to eight full-time jobs (equivalent) are likely to be generated
- Indirect economic benefits will be realised by local business (e.g. – retail, hospitality, accommodation businesses, vehicle and fuel service businesses, concrete businesses, transport operators, quarries, general labour and electrician services etc) throughout construction and operation. For example, Pacific Hydro estimates around \$4 million will be spent locally on accommodation, food services and fuel during the construction phase¹¹.
- Pacific Hydro supports local activities at all our wind farm sites and once a project is operational, dedicates a portion of its revenue to sponsor local community organisations through our Sustainable Communities Fund (SCF).
- Once operational, Pacific Hydro will call for local volunteers to assist in the allocation of the Keyneton SCF and to ensure the community has direct input to the delivery of sustainable outcomes from the estimated annual amount of \$100,000 over the life of the project.
- Mid-Murray Council has inquired about Pacific Hydro's intentions (if any) to provide a lookout or viewing platform with interpretative signage so that visitors and tourists in the area may view and learn about the wind farm. Pacific Hydro will discuss further with Mid-Murray (and Barossa) Council(s) and other relevant parties to determine whether a suitable and safe location which will not cause a traffic hazard exists.

⁷ Calculations based on expected generation x average household consumption. Average household consumption based on AEMC assumptions for South Australia outlined in Future Possible Retail Electricity Prices: 1 July 2011 to 30 June 2014, Appendix B.

⁸ Calculation based on sent out generation x water consumption factor (brown coal). Water consumption figures derived from 2009, National Water Commission Report: Water and Electricity Generation Industry, Implications of Use.

⁹ In relation to employment opportunities, the local region is assumed to be within a 20km radius of the project

¹⁰ Note: quantities and periods of employment are highly dependent on proximity to regional centres, presence of suitable labour and accommodation in the area and contracting methodologies.

¹¹ Estimated spend based on actual expenditure during construction of Clements Gap

6. Site Location

The proposed Keyneton Wind Farm is located along the ridgeline of the Eastern Mount Lofty Ranges, approximately 6km north-west of Cambrai, 8km west of Sedan, 4km east of Keyneton and 8km east of Eden Valley. The project layout runs generally north to south for approximately 15km, inclusive of an approximate 6km “gap” in the centre of the site, forming two distinct clusters. A total of 42 turbines are proposed, 22 in the north and 20 in the south. Figure 1.1 shows the general site location. The proposed turbine layout is shown in Figures 1.2 and 1.3.

7. Site Selection and Design Process

Pacific Hydro has investigated a number of sites throughout South Australia for their suitability for wind farm development and has developed and now operates Clements Gap Wind Farm just south of Port Pirie. Sites are initially selected according to a number of broad criteria namely suitable wind speeds, proximity to grid, topography and site characteristics, land availability, accessibility and distance from sensitive land uses.

In order to reach the final wind farm layout Pacific Hydro follows an iterative design process allowing refinement as further information relating to the site is uncovered. The final turbine layout therefore reflects a balance between maximising the energy production from the site whilst avoiding and minimising environmental impacts. The results of surveys and assessments of native vegetation, cultural heritage, noise and landscape therefore also significantly influence the final turbine layout.

Environmental assessments are conducted to identify potential impacts and inform the design in order that impacts can be avoided in the first instance. If these impacts cannot be completely avoided, the design and associated environmental management and mitigations proposed will minimise impacts in order to reduce their extent and consequence.

With respect to the Keyneton Wind Farm from an initial layout comprising 60 turbines a number of modifications have been made resulting in a reduction in turbine numbers to 42.

8. Infrastructure Details

This application is being made for the construction and operation of a wind farm including the following:

- 42 wind turbines comprising:
 - Tapered cylindrical tubular towers
 - Three blades
 - Maximum tip height of 145.5m
 - Turbine foundation (approximate 6m diameter at surface, 14m diameter sub-surface)
 - Adjacent hardstand at each turbine (with an area of up to 1,700m²)
 - External electrical transformer (approximate 4m length x 2m width x 2m height) at the base of each turbine
- Approximately 45 km of on-site access tracks

- Approximately 42 km of underground cabling, predominantly adjacent to access tracks
- One on-site electrical substation / switching yard (within an approximate 2.3 hectare compound with approximate dimensions of 285m x 80m and including transformers and switchgear, control building, staff amenities, workshop, storage, etc)
- Three (3) permanent meteorological masts to hub height
- Five (5) temporary meteorological masts between 80m and hub height
- Three temporary construction compounds (approximately 50m x 50m)
- Approximately 6.1km overhead transmission line on 20-25 m high poles to connect the northern and southern clusters (wholly contained on-site) and facilitate a single grid connection point

The proposed site infrastructure is shown on Figures 1.2 and 1.3. The wind farm will connect to the National Electricity Grid by direct connection to the existing 275kV line which passes through the site. There is therefore no requirement for any offsite overhead transmission line or associated electrical infrastructure.

9. Community Consultation and Project Evolution

Pacific Hydro commenced consultation with a number of local groups in mid 2009. At that stage, a 60 turbine layout was proposed. Consultation commenced with a series of meetings with Mid Murray and Barossa Councils and presentations to a number of other local groups. In July 2009, Pacific Hydro wrote to neighbours (generally within 2km of proposed turbines) providing them with information about the project and offering to meet and/or provide more information about the project as required. Consultation with these neighbours has continued since this initial contact.

In June and September 2011 public consultation sessions were held in Keyneton, Cambrai and Eden Valley. At this stage, a revised 57 turbine layout was proposed. The aim of these sessions was to provide the local community with an opportunity to view information about the proposed wind farm, ask questions of Pacific Hydro staff, make suggestions and raise concerns. Following the project's re-design and a reduction in the number of proposed turbines to 42, these were followed up with four drop-in community information sessions / stands between January and March 2012.

In order to provide people with an understanding of an operational wind farm, tours of Pacific Hydro's operating Clements Gap Wind Farm were arranged in August 2011. In addition a visit to the proposed site was arranged - at the request of a group of residents - and meetings and one-to-one contact with community members have been on-going. Where requested photomontages have also been prepared for residents in order to illustrate to them how the wind farm will look from their property.

As a result of community feedback received over the course of the consultation period significant design changes have been made. During this time Pacific Hydro has reduced the number of turbines proposed from 60 to 42 (a 30% reduction from the initial layout).

In addition to the turbine number reduction other design amendments include:

- Increase of separation from nearest dwellings from 1km to over 1.5km
- Changes to the proposed site access routes for over-dimensional vehicles, in order to avoid environmentally sensitive local roads
- A reduction from two sub-station's to one

- Other measures include the relocation of the northern substation to reduce visual impact, undergrounding a section of transmission line between the northern and southern clusters and a commitment that the access track between the northern and southern clusters will not be used by over-dimensional vehicles - except to the extent required to construct the overhead line.

10. Environmental Assessment

Pacific Hydro employed a number of specialist environmental consultants to carry out detailed environmental assessments for the wind farm project. Assessments were carried out to determine the current state of the environment within the site, identify any potential impacts and recommend appropriate mitigation measures. The environmental assessment findings are summarised in the following section with the name of the specialist consultant that undertook the assessment provided in the sub-headings.

10.1 Flora and Fauna - EBS Ecology

Assessments of native vegetation, terrestrial fauna and avifauna were carried out at the site. Following these assessments, and in accordance with recommendations by EBS Ecology, a number of modifications to the proposed turbine layout were made. These included removing or relocating turbines in order to avoid native vegetation or adopt recommended buffer zones around bat and bird habitat and nests.

The majority of the vegetation within the proposed project site is exotic grassland/ herbs with some areas of scattered South Australian Blue Gum and Peppermint Box. Whilst areas of scattered South Australian Blue Gum (over exotic grasslands) are considered as suitable for turbine placement, the removal of mature Blue Gums will be avoided. No turbines are proposed within the Peppermint Box woodlands.

Two nationally threatened ecological communities were identified within the project site: Peppermint Box Grassy Woodland of South Australia and Iron-Grass Natural Temperate Grassland of South Australia, however all the patches were found to be in poor condition and therefore did not qualify as critically endangered under the *Environmental Protection and Biodiversity Act 1999* (EPBC Act). These Peppermint Box Grassy Woodland areas may be suitable to direct any Significant Environmental Benefit (SEB) requirements associated with the project.

Four state rare species were recorded on site and nine nests were identified as belonging to at least two breeding pairs of Wedge-tailed Eagles. One Peregrine Falcon nest was identified in the site's north-east. Recommended buffers of 500m around Wedge-tailed Eagle nest sites and 1000m around the Peregrine Falcon Nest site have been incorporated within the site design.

Eight bat species were positively identified on site and although not detected, five other species are likely to occur on site. Of those undetected species, the South-eastern Long-eared Bat is listed as state vulnerable and the Yellow-bellied Sheath-tail Bat as state rare. It is possible that these threatened species would occur, although only infrequently and in low numbers. Hence the potential risk of impact to these species is considered to be very low.

The potential impacts of the proposed development are clearing of vegetation resulting in loss of native vegetation and suitable fauna habitat, collision of birds and bats, disturbance (particularly during construction) and barotrauma (affecting bats only).

A number of mitigation measures have been embedded within the project design by removing and relocating of turbines to avoid impacts. Where the design has not resulted in the complete avoidance of impacts, further mitigation measures will be adopted to minimise potential impacts such that any impacts are deemed acceptable when considered against the overall benefits of the project. Significantly the project has been designed in order to minimise native vegetation impacts and to maintain buffers around preferred bat habitat and Peregrine Falcon and Wedge-tailed Eagle nests as recommended by EBS Ecology.

10.2 Landscape and Visual Effects – Wax Design and BGLA

The Landscape Character and Visual Impact Assessment was carried out by Warwick Keates of WAX Design in association with Dr Brett Grimm of Brett Grimm Landscape Architect (BGLA). The assessment aimed to evaluate the existing landscape character and assess the extent of visual change resulting from the wind farm development. The potential visual effect was assessed using a detailed methodology involving on-site assessments, consultation with the community and the preparation of photomontages. Photomontages are used as a tool to illustrate how the wind farm will look from a series of local viewpoints.

In addition to the public viewpoint montages used within the assessment, photomontages, were also provided to residents of ten private properties. These were provided at the owners request in order to provide them with an understanding of the anticipated visual effect from their dwellings.

During the assessment Wax Design and BGLA also undertook a design review in order to identify turbines which increased the visual prominence of the wind farm. The design review contributed to the layout redesign and the previously documented removal of 15 wind turbines and relocation of others. These changes resulted in an improvement in the overall visual effect and reduction in the visual complexity of the proposed development.

The visual assessment demonstrated that wind farm will be more visible from the Murray Plains to the east of the escarpment where the majority of effects have been classed as moderate, with localised areas of substantial visual effect. From the east of the site, the agricultural land use, lack of natural vegetation cover and the prominent topographic form of the Eastern Mount Lofty Ranges reduce the potential visual impact of the wind turbines. The wind farm will be visible from the east however its overall scale is mitigated by the landscape character, underlying topography and panoramic visual qualities of the regional landscape of the Murray Plains. From the east the wind farm is therefore described as producing a slight to moderate degree of visual change within a modified rural landscape.

To the west, the vegetation and undulating topography provides significant screening and framing of views throughout the landscape. While the degree of visual change is described as moderate increasing to substantial, the actual visual effect is mitigated by the surrounding landscape context. Areas deemed as having a substantial visual effect to the west are isolated to small pockets as this area is typically heavily vegetated or has defined local ridgelines which fragment and screen views and therefore reduce the visual impact.

Pacific Hydro recognises the potential visual effect that may occur from certain properties and propose that a landscape vegetation screening programme will be offered to eligible properties in order to provide further local visual mitigation.

10.3 Cultural Heritage – Australian Cultural Heritage Management

The cultural heritage assessment was undertaken by Australian Cultural Heritage Management Pty Ltd (ACHM).

The initial Aboriginal cultural heritage desk top assessment found one previously registered site, a scarred or culturally modified tree, at the southeast section of the project area. This site will not be affected by the proposed works. In addition, 15 other registered sites, including campsites, scarred trees, a painting site, a burial and a quarry, were found to exist within 5km of the project area. The site lies within the traditional lands of the Peramangk, and records by early settlers document a population of several thousand living in large camps throughout the Mount Lofty Ranges.

Following the desk top assessment a site inspection was conducted with the Peramangk Traditional Owners (represented by the Mannum Aboriginal Community Association Inc. [MACAI]), to identify and record any Aboriginal heritage sites. This allowed different areas of the site to be characterised as likely to have a high, medium or low sensitivity or risk of encountering surface or subsurface archaeological material.

Following the site surveys and during the assessment process the wind turbine layout was revised due to a number of environmental factors including the identification of areas of high cultural sensitivity on the site. For example during the anthropological site inspection one area comprising a creek and spring within the northern section of the site was deemed to be of anthropological significance. MACAI representatives stated that they would like the spring to be protected and requested relocation of a turbine. As a result the turbine proposed for this area was subsequently deleted.

Following the assessment several of the proposed turbines have been removed from areas designated as having medium or high potential for archaeological sites to exist. Of the 42 turbines that form part of the revised layout, one turbine (turbine 5) and its associated access track lies within an area designated as being of high sensitivity, and one (turbine 23) intersects only slightly (likely to be overswept by the blades rather than ground disturbance) with the edge of an area designated as medium sensitivity. Of the associated infrastructure, one site office, a section of overhead line (between the northern and southern clusters) and limited sections of access track remain within an area of high sensitivity.

In order to further protect any unknown cultural heritage sites, a further pedestrian archaeological survey will be undertaken prior to any ground disturbing activities being carried out and in conjunction with detailed design. Where infrastructure is still proposed within high and medium sensitivity areas on-site monitoring will be carried out during initial ground disturbing works unless the further surveys allow this recommendation to be refined.

With respect to European settlement Keyneton was part of the early settlement of South Australia and the home of Joseph Keynes, who established a successful Merino sheep farming operation in the 1850s. Historic dry-stone walls associated with the area's farming history criss-cross the project area, and were documented during the site inspection.

The turbine and access track layout has sought to minimise impacts on the dry-stone walls, although some disturbance at site access points and to accommodate access tracks is expected. Where disturbance occurs, Pacific Hydro will seek the assistance of experienced "wallers" to repair or reconstruct these areas.

10.4 Noise – Vipac Engineers and Scientists Ltd

An assessment of the predicted noise impacts both during construction and operation of the wind farm has been carried out by Vipac Engineers and Scientists Ltd (Vipac).

The assessment of noise predicted to occur during construction of the proposed Keyneton Wind Farm (e.g. construction of turbines, roads and associated infrastructure) was assessed in accordance with the *Environment Protection (Noise) Policy 2007*. Construction activities will vary in intensity both across time and geographically across the site, therefore noise impacts will not impact any one area for the full length of the construction period. The extent of construction and associated noise sources at any one receiver area is likely to occur only when the construction and preparation work is occurring near that receiver. Based on previously measured emissions from typical construction plant and as distances from the nearest turbine to each residence are greater than 1,500 metres, the continuous noise criterion of 45dB(A) for construction noise is likely to be achieved at all residences.

The operational noise assessment was conducted according to the methodology and assessment criteria outlined within the South Australian Environment Protection Authority *Environmental Noise Guidelines: Wind Farms*, July 2009 (EPA Guidelines). The noise criteria (assessment limits) for residential houses around the site (nearest non-stakeholder dwelling approximately 1,560m away from the nearest turbine) were determined from background noise measurements carried out at nine locations around the site. A predictive noise model was used to assess the noise levels against the criteria developed.

The predicted noise levels have been shown to meet the appropriate assessment criteria, for all dwellings around the site. No mitigation measures are therefore required to achieve compliance with these criteria.

10.5 Site Access and Traffic Management

The majority of traffic associated with the wind farm will occur during construction. Potential impacts generated by construction traffic (in the absence of mitigations) would be short term and include, road safety, damage to roads, increased local noise, delays to local traffic and deposits of dirt or losses of excavated material from delivery trucks onto roads and dust.

Pacific Hydro has identified the proposed traffic routes for over-size and over-mass transport in consultation with the Department of Planning, Transport and Infrastructure (DPTI), Mid Murray and Barossa Council and Mid Murray Council. Key site access points are proposed at: 1) from Angaston – Sedan Road (at Sedan Hill) to access the northern cluster of turbines; and 2) from Med Wrights Road to the southern cluster. Road widening and cautionary signage will be installed at access points to provide safe entrance and exit to the site as well as ensuring the safety of other road users.

To access the southern cluster, it is proposed that over dimensional vehicles will use the following route:

- Sturt Highway (A20) turnoff at Stockwell at Carrara Hill / Light Pass Road, travelling for a short distance on Carrara Hill Road before turning right onto Stockwell Road (Angaston Heavy Vehicle Bypass route)
- Follow Stockwell Road over Murray Street and left at Crennis Mines Road (Angaston Heavy Vehicle Bypass route)

- Turn right into Long Gully Road and then left onto Hurns Road (Angaston Heavy Vehicle Bypass route)
- Turn right onto Mount Pleasant – Angaston Road (B10) and continue through the Eden Valley township
- Turn left at Rhine Park Road, then travel over Jutland Road and onto Med-Wrights Road for one kilometre to the access point onto the wind farm’s southern cluster.

Access to the northern cluster will be via:

- Sturt Highway (A20) turnoff at Annadale onto Halfway House Road
- Continue onto Blanchetown Road and turn right at Sedan onto Angaston-Sedan Road
- Access to the site is approximately 10 kilometres heading west from Sedan

Light and commercial vehicles associated with the project are likely to be associated with locally or regionally sourced construction materials, contractors and staff and will therefore not be restricted to designated Heavy Vehicle routes.

There will be a noticeable increase in the volume of construction related traffic in the local area during two phases of the construction period (likely to be between months 4 and 12 and months 14 and 20 over a 24 month period). The other construction periods and the operational phase of the project will see an increase in traffic however these will be minor or insignificant.

Detailed Traffic Management Plans (TMP) will be prepared for all phases of the project. The TMP will outline the range of traffic management measures to be implemented including speed limits, signage, traffic control at intersections, public notifications, road escort vehicles, etc. Full contact details of the Construction Manager will also be provided to residences along the local road network adjacent to the site in advance of construction and in order that any issues and concerns arising can be addressed.

The existing public access roads used during the period of the construction will be maintained to the appropriate standard during this period. Maintenance will include filling of potholes, grading corrugations and dust suppression as required. Reconstruction of Med Wrights Road and the intersection of Jutland Road with Rhine Park / Med Wrights Roads will be undertaken to ensure a safe and all weather road access. It is expected that a formal roads agreement outlining this commitment will be put in place with Mid Murray Council.

10.6 Telecommunications and Electromagnetic Interference (EMI)

As with all tall structures, wind turbines may potentially interfere with television, radar, radio and microwave signal reception.

Due to the location of the wind farm, in relation to local TV transmitters, the risk of potential interference to local resident’s television reception is considered to be low. Despite this Pacific Hydro will carry out a pre-construction survey of TV reception in the area and investigate any reported instances of interference and undertakes to rectify any interference attributable to the wind farm.

Any potential interference to local farmer’s differential GPS will be investigated prior to construction. Measures will be put in place to firstly ensure turbines do not interfere with GPS

Systems and secondly to rectify any interference that may occur (e.g. provision of repeater stations).

Although it is considered unlikely that the wind farm will interfere with radar and navigational radar Pacific Hydro will continue to inform stakeholders including the Bureau of Meteorology (BoM), Air Services Australia (ASA) and Royal Australian Airforce (RAAF) of the proposals progress and the turbine's "as constructed" location and height details.

10.7 Aviation Safety

In order to meet its duty of care obligations and assess whether the proposed wind farm would impact on any civil or military aviation activities and operations, occurring within the vicinity of the site, Pacific Hydro has carried out the following:

- Reviewed aviation guidelines and policy
- Identified the location of any certified or registered aerodromes
- Consulted and sought advice from a number of aviation stakeholders
- Engaged Hart Aviation to undertake an Aviation Risk Assessment

Despite the inherently low risk to aircraft operations the following mitigation measures will be implemented to reduce risks to aviation activities and operations occurring within the vicinity of the wind farm:

- Continue to keep nearby aviation clubs and flying schools, BoM, Civil Aviation Safety Authority (CASA), RAAF Base Edinburgh, RAAF-AIS¹², Department of Defence and ASA informed of the proposed Keyneton Wind Farm and construction timeframes.
- Prior to construction, Pacific Hydro will inform ASA of the turbine's locations and height details, for them to advise pilots of the presence of the wind farm by way of a Notice to Airmen (NOTAM).
- Pacific Hydro notification of ASA and RAAF-AIS will allow permanent marking of the wind farm's location on World Aeronautical Charts, Tall Structures Database and Military Maps.

Pacific Hydro engaged HART Aviation to undertake an Aviation Risk Assessment to determine whether aviation safety lighting is required at the proposed wind farm. Hart Aviation concluded that subject to the recommended mitigations including NOTAM action and identification of the wind farm on relevant aeronautical charts, all foreseeable risks will have been eliminated and consequently the aviation safety risk will be considered acceptably low.

Aviation safety lights are not proposed to be installed on any of the turbines at the Keyneton Wind Farm.

¹² Responsible for maintaining a database of tall structures.

10.8 Shadow flicker

Shadow flicker results from the position of the sun in relation to the blades of the wind generator as they rotate. This can cause the shadow of the generator blades to be cast onto the building, which appears to flick on and off as the blades rotate. When this flicking shadow is viewed through a narrow opening, such as a window, it is known as shadow flicker.

In the absence of any specific South Australian policy on shadow flicker, Victorian guidelines are referenced here. The *Policy and planning guidelines for wind energy facilities in Victoria* recognise the possibility of shadow flicker impacting local residents and acknowledge that simple embedded mitigation measures, such as computer modelling, careful siting and design practices can help to avoid or minimise impacts. The policy sets the maximum acceptable level of shadow flicker occurring at residences at 30 hours per year. Due to the setbacks from any dwellings of over 1.5km, this standard has been comfortably met and exceeded.

10.9 Blade glint

The occurrence of glint off any man made or natural surface depends on a combination of circumstances arising from the orientation of the nacelle, angle of the surface, angle of the sun and the reflectivity of the given surface. In any built environment, the primary means of avoiding glint is through the use of materials that avoid reflectivity. This approach is frequently and routinely adopted in the urban environment.

Standard international practice of applying a matt non-reflective finish to the tower and blades of turbines will be used on all the turbines at the Keyneton Wind Farm, the leading edges of the blades will also have a matt PVC non-reflective coating in order to avoid the effects of blade glint. This mitigation measure has proved effective internationally and in Pacific Hydro's 10 years of operational wind farm experience.

10.10 Planning Assessment – Nolan Rumsby Planners

A detailed assessment of the proposal against the Mid Murray Development Plan has been undertaken by Nolan Rumsby Planners. In assessing the merits of the proposal Nolan Rumsby carried out a detailed inspection of the site and surrounds to allow them to form their own views as to the key landscape elements contributing to the visual amenity of the area. These were further informed by the detailed Landscape Character and Visual Assessment Report prepared by Wax Design and BGLA.

The Planning Assessment also considered State Government Policy at both the strategic level and 'on ground' having regard to:

- South Australia's Strategic Plan 2011
- Strategic Infrastructure Plan for South Australia 2004/5 – 2014/15
- Renewable Energy Plan for South Australia 2011
- The Planning Strategy – Murray and Mallee Region Plan 2011
- Statewide Wind Farms DPA. 2011

- Mid Murray Development Plan 19 April 2012

A number of objectives of the Mid Murray Development Plan identify the key elements directing the siting, design and operation of wind farms so as to, variously, manage, avoid or minimise adverse impacts.

The Planning Assessment tested the wind farm proposal against the appropriate planning objectives. Where those tests required a subjective assessment, Nolan Rumsby Planners undertook their own analysis and considerations and were also informed by the specialist environmental assessments undertaken.

The Planning Assessment considered the proposed Wind Farm against the Development Plan as a whole and in the context of Statewide policy directions. It concluded, having regard to the technical environmental assessments, that the proposed development appropriately satisfies the criteria laid out by Section 49 of the *Development Act 1993* and, in particular, has appropriately addressed the relevant provisions of the Mid Murray Development Plan.