

Development Application Response to Verbal Submissions

10 December 2018



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The following has been prepared as a response to a further information request from the State Commission Assessment Panel.

Neoen acknowledges the Panel's invitation to respond to other matters raised by representors at the hearing in Port Pirie. However, Neoen considers that the Panel's list of questions for clarification touches on the vast majority of the material topics which were raised, and, given the considerable length of this response and the previous response, does not believe that further additions would add significant value.



1. General

1.1 Quality of application documentation

Quality of application documentation (noting concerns raised by representors of numerous errors and inconsistencies in the planning report).

Neoen has addressed this issue in its first response (to written submissions), and makes the following additional comments.

Neoen considers that the number and significance of errors or inconsistencies in the Development Application has been greatly overstated by some representors. As noted in the first response, Neoen acknowledges that the DA contained some errors of material significance, most particularly the mistaken siting of one turbine approximately 100m inside the Rural Landscape Protection Zone (noting that the RLP Zone extended into flat cropping land). This error was corrected as soon as it was brought to Neoen's attention.

Neoen also acknowledges that there were several typographical, formatting or version-control errors and inconsistencies in the DA. Most of these errors arose from the complexity of the project (containing wind, solar, storage and various items of ancillary infrastructure), the number of contributing authors to the DA (around 8) and the iterative nature of the project's development; that is, multiple layouts were communicated to consultants as turbines were incrementally removed (and as tip height was slightly increased). Not all changes were fully updated by consultants across successive versions as they prepared final reports; nor (regrettably) were these errors always found by proof-reading.

Some representors have seized on these minor errors, arguing that they somehow undermine the validity of the DA or the quality of the project development work itself. This is a specious argument; the vast majority of these errors are clearly errors on their face, and have no impact on the actual substance of the conclusions reached in the DA. For example, the traffic report quoted an incorrect turbine tip height in several places. This error has little bearing on the conclusions reached within the report, as towers are transported in segments, all of which must comply with applicable road rules, and none of which will therefore be of a problematic length for road transport regardless of the actual height of the fully constructed tower.

Neoen also notes that it is common for wind farm projects to receive such criticisms, as is evidenced by similar issues raised for other wind farm projects and other large scale infrastructure projects in Australia. This is partly due to the scale and complexity of these types of projects and the unavoidable unknown factors associated with the final design and construction phase. However, it is recognised that a development assessment decision requires confidence in the documentation of the application and Neoen regrets any errors or oversights contained in the Development Application, material or immaterial.

Neoen confirms that the updated plans lodged for this application are true and accurate. Neoen also notes that the standard and well-established approach to wind farm conditioning requires that final plans and a range of management plan are provided prior to construction to address the complexities of these projects.

1.2 Impact of project on adjoining zones

The windfarm component is located within a section of the Primary Production Zone that is situated between the Rural Landscape Protection Zone to the north and the Crystal Brook township to the south (where windfarms are not envisaged). What consideration has been given to impacts on adjoining zones? These are extremely large structures and will have a visual impact, for a long time, regardless of any noise or other more scientifically assessed impacts.

One representor raised the concern that even though CBEP is proposed to be sited on Primary Production-zoned land, it may create visual impacts on adjoining non-Primary Production zones, such as the Rural Landscape Protection Zone to the north, and the Rural Living and Residential zones to the south. This matter has been previously considered by courts, which led to inclusion of policy in Development Plans to provide for set-backs.

In response, Neoen notes the following:

- 1. **Turbines specifically envisioned:** The project is located in a Primary Production Zone, which specifically envisions wind turbines. Turbines are tall structures which may be visible from significant distances, and it is a foreseeable outcome that by zoning the proposed CBEP site in such a way that they are explicitly envisaged, they may be visible from other zones. This would be the case even for smaller, older turbines. Neoen considers that if the planning system had wished to prevent visibility of turbines from adjoining Rural Landscape Protection or Rural Living zones, the site would have been zoned in such a way that turbines were prohibited (or, at the very least, not specifically envisioned).
- 2. It is noted that the matter of turbine visibility was previously addressed by the courts which led to the policy now continued in the Development Plan that requires minimum setbacks.
- 3. **Rural Landscape Protection Zone 'buffer':** The Port Pirie Council Development Plan divides the Rural Landscape Protection Zone into two categories Policy Area 11 and Policy Area 12. The differing Desired Characters of these two areas (pages 169-172 of the Port Pirie Council Development Plan) show a clear differentiation between their respective landscape values and intended usages. Policy Area 11 has a clear conservation and preservation rationale (*'high environmental value and...outstanding scenery'*), with development to be extremely limited. Policy Area 12, by contrast, is acknowledged to have 'generally been cleared for farming, mainly for cropping and grazing purposes in the past', with development to be allowed where consistent with the landscape.

The southern edge of Policy Area 11 is at 'Davies Track', a dirt road approximately 11km north of the northernmost proposed CBEP turbine. South of Davies Track, down to the Wilkins Highway, the hills are zoned as Policy Area 12. Neoen argues that this designation reflects the lesser scenic qualities and more modified, agricultural character of the southern hill ranges, and has been put in place in order for Policy Area 12 to act as a 'buffer' between the Primary Production-zoned land to the south and Policy Area 11 to the north. Relevantly, Neoen notes that there is a large quarry in Policy Area 12, clearly visible from the Princes Highway.





Figure 1 - Quarry in Rural Landscape Zone Policy Area 12

This characterisation has also been cemented through Neoen's verbal discussions with Port Pirie Council – see below an extract from a letter sent by Neoen to Council on November 14, 2017, summarising conclusions reached at an in-person meeting on November 10 (the full form of this letter was attached to Neoen's first response to submissions):

I have set out below some high-level points emerging from our discussion. These broadly reflect Neoen's understanding of the issues to date and the path forward for Neoen, Council and the community as discussed in our meeting on Friday the 10th of November.

 Council considers that the visual impact of wind turbines in the hills to the north-east of the Wilkins Highway is incompatible with that area's current zoning, and would prefer to maintain it as a buffer from the Flinders Ranges;

The effect of this is, Neoen submits, that while there will be some visual impacts on Policy Area 12 adjoining the project, these should be viewed in the context of its role as a buffer zone between Primary Production Land and the scenic, natural areas covered by Policy Area 11. Since Policy Area 12 is approximately 11km in length, Neoen considers that it forms an effective protection for Policy Area 11 from visual impacts associated with CBEP.

4. Northern Areas Council Rural Landscape Protection Zone: Part of the Rural Landscape Protection Zone to the north of CBEP falls under Northern Areas Council management. Unlike Port Pirie Council, the Northern Areas Council does not split the Rural Landscape Zone into policy areas, instead treating it as one area. Preservation of its natural character is an objective; however, Neoen notes that specific allowance is made for an explosives manufacturing and testing zone.

Neoen also notes that in its agency response, the Northern Areas Council has not stated any concerns with CBEP's impact on the adjoining Rural Landscape Zone under its management.



2. Design

2.1 Confirmation of WTG dimensions

Confirmation of WTG dimensions, including base and section diameters

One representor claimed that Neoen has misrepresented the width of the proposed turbine towers, and that this width should have been portrayed in photomontages as 16 metres. This is incorrect – the turbine towers will not be greater than 7.5 metres in cross-section at their base (7.5 meters is likely to be a substantial overestimate). The question of photomontage accuracy is discussed at greater length in the 'photomontage' section of this response.

Please note that Neoen is unable to provide exact dimensions for most turbine components because:

- (1) detailed design information is proprietary and has been received from manufacturers in commercial confidence;
- (2) Neoen has not yet selected a turbine supplier, with components differing in size from supplier to supplier, not always directly correlated with generating power or tip/hub heights. For example, a 4.8MW machine may still have a smaller nacelle than a 4.2MW machine, depending on manufacturer design;
- (3) Manufacturers may slightly alter certain specifications (such as tower cross-section) based on detailed site investigations, which cannot be performed until a supplier is selected;
- (4) There are multiple types of foundations which may be used pending detailed geotechnical investigation of the site – some are wider and shallower, while others are narrower but deeper.

Neoen emphasises that these factors are standard for wind projects at this stage of development.

Neoen notes that turbine dimensions other than tip height, hub height and rotor diameter/blade length (such as nacelle size and tower cross-section) have only a relatively small range of variation between turbine models in the 4-5MW range (for example, tower cross-section might range between 4.5 and 7.5 metres, and nacelle length might range between 12 and 18 metres). It is also important to emphasise that by comparison with tip height, hub height and blade length, these dimensions make a negligible contribution to overall visual impact.

Neoen offers the following diagram and table setting out 'maximum' and 'likely' dimensions for each component. Please note that the diagram depicts only a generic turbine to clarify which measurements apply to which component, and is **not to scale**.





Figure 2 - Typical Wind Turbine

Label	Dimension	Maximum figure (metres)	Likely figure (metres)
А	Hub height	161	161
В	Rotor diameter	158	158
С	Foundation width	40	22
D	Blade chord	6	4.5
E	Nacelle height	7	5
F	Nacelle length	20	16
G	Nacelle width	7	5
Н	Tip height	240	240
I	Tower cross-section	8	5.8

2.2 Height of turbines

Height of towers/turbines and accuracy of information related to these, bearing in mind these will be the tallest land-based towers in Australia.

It is incorrect to state that the proposed turbines will be the tallest in Australia as this technology has been approved in Qld on another Neoen project (Kaban Wind Farm). The technology proposed in this application has been selected to provide a balance between minimising the number of turbines and achieving the generation levels needed to make the project financially viable. Compared to other wind farm projects, CBEP is relatively small in terms of the number of turbines.

To enable the transition of the economy away from fossil fuels to renewable energy, and to bring down power prices in South Australia, it is vital that the cost of renewable energy continues to fall. In order for this to occur, wind turbines and solar panels must be constantly improved – in the case of wind turbines, this will typically mean increases in height and blade length. Taller turbines are able to access higher wind speeds which are present further above the ground, while greater blade lengths will increase the 'swept area', and thus the amount of energy captured by the wind. It is also far more efficient to install a single large machine than two smaller ones; there are significant savings in concrete foundations, vehicular movements, construction time and labour. There are also substantial reductions in the amount of land and vegetation clearance required, including for access roads and underground cables.

This technology curve means that while it is correct that the turbines proposed at CBEP are **among** the tallest onshore models currently proposed in Australia, this is true of most wind projects which have been built, and will continue to be true of most new projects which are proposed in the future; it is analogous to saying that each new generation of computer technology is the fastest ever made. That is, every new project will strive to utilise the latest, largest and most cost-efficient turbine models available. Projects which do not do this will not produce the cheapest possible electricity, which will make them uncompetitive and thus unlikely to be built. This is particularly true of smaller projects such as the 26-turbine Crystal Brook, where the smaller size of the project reduces Neoen's ability to leverage scale discounts from turbine manufacturers.

Neoen notes the following other wind developments with comparable turbine heights around Australia which are at various stages of permitting or approval. Please note that there are most likely other projects intending to submit Development Applications for 240m or above of which Neoen is not currently aware.

Project name	State	Company	Tip height	Current Status
Hills of Gold	NSW	Wind Energy Partners Pty Ltd	220m	Prelim Env.
				Assessment submitted
Golden Plains	Vic	Westwind	230m	Permitted
Kaban	Qld	Neoen	240m	Permitted
Clark Creek	Qld	Lacour Energy	220m	Permitted
Kennedy	Qld	Windlab	200m	Turbines installed
Sapphire Windfarm	NSW	Continental Wind Partners	200m	In operation

2.3 Hydrogen production facility

Hydrogen production facility: is this included or just provision for future application? If a future proposal, the likely timing of such an application.

As stated in section 3.3.1 of the DA, Neoen confirms that the hydrogen production facility is **not** intended to be included in the Crystal Brook Development Application. Reference to this component was provided with the intention of openly disclosing a possible future project to avoid any later perception of Neoen having 'covered up' the project. The 'Hydrogen Superhub' is a proposal which is still undergoing study and investigation in cooperation with the South Australian Government. Neoen elected not to include a hydrogen component in the CBEP DA because it remains subject to:

- (a) selection of a final location for hydrogen production infrastructure;
- (b) a detailed understanding of all potential impacts; and
- (c) finalisation of technical and economic feasibility studies.

Consequently, an investment decision remains in the future. If a decision is made to progress the Hydrogen Superhub, a variation to the CBEP DA or (most likely) an entirely separate DA will be submitted for assessment via the appropriate planning pathway.

It is not currently possible for Neoen to state when such an application may be made as it is contingent on a number of factors including the availability, nature and location of a hydrogen offtaker (that is, purchaser). Once timelines become clearer, Neoen will engage with the community to provide details of the proposal.

2.4 Micro-siting & detailed design

Developer expectations re: detailed design, micro-siting etc – what is the anticipated level of change from what people have seen to what is to be built?

Micro-siting is a well-established and accepted technique applied to wind farms and other large scale infrastructure projects where soil and ground conditions are unknown (and impractical to fully explore) at the Development Application stage. This approach is also accepted by the Courts. However, Neoen appreciates that this may create some uncertainty for some members of the public.

Neoen confirms that the visual appearance of CBEP will not vary materially from the proposed design, unless that variation results in a reduction of visual impact (such as the removal of a turbine or solar panels).

Neoen proposes a standard micro-siting allowance of 100 metres, subject to the following parameters:

- 1. Current setback distances between non-involved dwellings and the closest turbines to those dwellings must not be reduced. For example:
 - a. No turbine will be micro-sited closer than 1.6km to dwelling H24;
 - b. No turbine will be micro-sited closer than 1.31km to dwelling H17;
 - c. No turbine will be micro-sited closer than 1.5km to dwelling H15;
 - d. No turbine will be micro-sited closer than 2.85km to dwelling H53.
- 2. Turbines will not be micro-sited within the 500m Wedge-Tailed Eagle buffer zone.



3. Operations

3.1 Communications interference

Communication interference (TV, radio, mobile phone). There is an acknowledgement of "minor" service degradation but what does this mean in practice? Further details need to be provided on the potential effects of windfarm operations on telecommunication services utilised by residents and primary producers – i.e. Bluff transmission tower, Huddleson Road ABC antennae, mobile networks (esp. medical / emergency notifications), effectiveness, cost and timing of mitigation measures if a loss of service or an extended interruption is experienced (and how a loss of signal loss / interference is determined timeliness of any response).

Neoen provides the following response, in consultation with its EMI consultant, GHD:

GHD accepts that the technical terminology used within this report has led to confusion over the extent of the findings.

In particular, the meaning of the terms nil, negligible and minor were left open to interpretation. This response will clarify these terms in the context of each service type and discuss the difference between actual degradation to signal (i.e. the signal power level received at the particular receiver) and perceived degradation to services (i.e. what a person using that service can notice).

This response will address each of the services discussed during the SCAP meeting, to further clarify the findings of the report included in the application.

As discussed in the next section, there are many sources of radio interference, and as such a precise calculation of the effect on each resident is impossible. The response is therefore developed by the application of well-established principles from previous tests and experiences.

3.1.1 Radio Signal Losses (in general)

There are many types of losses that affect the power of a radio signal as it traverses the path from transmitter to receiving unit. These losses include:

- Free space loss: the diminishing of the signal as it traverses the air. Signal power is inversely proportional to the square of distance (in free space), so the signal will get exponentially weaker the further it travels. To allow for losses, practically this can extend to a 1/(distance)^{3.5} relationship.
- *Diffraction:* refer report commentary
- Multipath (reflections): refer report commentary
- Absorption (buildings / vegetation / etc.): signals can both reflect, and be absorbed, as they pass through walls, buildings, furniture, etc. Higher frequency services are more susceptible to absorption.
- Atmospheric Moisture (rain fade): signal loss can vary due to the weather conditions, such as moisture in the air. Higher frequency services are more susceptible to rain fade.
- *Terrain:* different types of terrain can impact the ability of the wave to traverse over it
- Atmospheric reflections: atmospheric layers at certain frequencies (ionosphere for below 50 MHz, troposphere for above 50 MHz) can reflect signals back towards the ground. This can allow signals to extend beyond the horizon.



In order to combat the many (uncontrolled) sources of signal loss, radio systems are designed to incorporate a "fade margin"; an extra amount of signal power required at the transmitter, to allow for these losses while still receiving the required signal at the receiver.

The wind turbines are expected to cause some losses through diffraction and multipath, however this is expected to be similar to that caused by existing buildings or trees. The distance to the nearest residence, at approximately 1.3 km, is not expected to be a concern since the reflected signal will have travelled a significantly greater distance and hence the reflected signal should be sufficiently lower in power that it can be filtered out by the inbuilt capabilities of the electronic device receiving the signal.

While the report acknowledges there will be some level of signal loss introduced by the turbines, it is not anticipated that the losses will be perceptible to end users, as discussed below for each service type. The many factors above also make it impossible to accurately predict the expected signal level at each impacted residence, and as such the EMI report can only assess expected impacts developed on the basis of experience and data made available by the various service providers.

3.1.2 Television

As shown in the original EMI report, the township of Crystal Brook is in an area of good television coverage, and there will remain a line of sight between "The Bluff" transmitter tower and the township.

During the panel, representor Genevieve Wells tabled an email / report prepared by Michael Large with the following key claims:

- Approximately 2,000 residences *may be* subjected to digital TV signal interference (with included image demonstrating).
- Many residences required new infrastructure for the Snowtown development.
- May be a very small impact for 4G services.





The key factors influencing television reception are as follows (as taken from ITU-R BT.2142-1 – The effect of the scattering of digital television signals from a turbine):

- The strength and quality of the direct signal from the transmitter to the receiving TV aerial: Crystal Brook and nearby major towns do not have the wind farm directly blocking the signal
- The strength of the interfering signal, which is caused by reflections of the transmissions by the wind turbines: Crystal Brook is sufficiently offset from the wind farm to avoid damaging reflections.
- The location and distance of the receiving TV aerial relative to the wind development: Aerials outside of line of sight won't be pointing towards the wind farm. This also means that the reflected signals will be received at an angle to the directional antenna where the impact of the signal will be reduced (and effectively ignored) compared to the direct signal.
- *Effects can occur at distances up to 13.5 km:* This is a significantly smaller area than shown in Michael Large's report tabled at the SCAP hearing.



Considering the 13.5 km area of affect above, alone, we can see the area stated in Michael Large's report is overstated compared to reasonable expectation as seen below, assuming still that the reflection zones presented are in fact correct.



As noted above, the reflection area shown is also likely overstated.

No basis of calculation is provided for this assessment of impact.

The effect (if any) experienced by the vast majority of the 2,000 residences suggested would very likely be small enough to have no visible (perceived) impact on the image presented on a television. The report does not state the level of impact expected.

The second reference provided by Michael Large's report (*TV Interference from Wind Turbines, Salema, Fernandes and Fauro*) states in the conclusion that the ITU recommendation states that a single wind turbine is unlikely to impair reception at more than 0.5 km, a distance that Neoen has exceeded by more than 200%. The findings of this report assume an omnidirectional antenna (i.e. the source signal and the 'noise' would be received equally). It is reasonable to expect that all TV antennas in the area surrounding the wind farm are directional.

While Michael's email mentions issues relating to the Snowtown Wind Farm development, there is no information with regards to where the location of these properties are in relation to the TV tower (also Spencer Gulf / The Bluff) and the wind farm (i.e. they may be located behind the wind farm relative to the transmitter and therefore issues to TV reception would be expected).

Neoen has committed to the installation of new antennas, and in the worst case, satellite television (discussed later in this response), should residents experience issues caused by the wind farm development.



3.1.3 NBN Wireless Broadband

Note: It is assumed that respondents who discussed 'Wi-Fi' were actually meaning to refer to the NBN Wireless Broadband service. Wi-Fi within a property has too short a coverage range to be affected by the turbines.

NBN Fixed Wireless uses a directional antenna pointed towards the NBN tower, the location of which is shown in the following diagram. As can be seen, the majority of these antennas will be pointed away from the wind farm, and the wind farm itself sits within a coverage gap between the Gladstone and Crystal Brook transmitters.







The majority of the township is serviced by Fibre to the Premises (FTTP), which utilises underground fibre cables and not radio frequency services to deliver internet services.



It is not expected that NBN Wireless Broadband services will be affected by the wind farm development, as it is a directional service and no antennas should be pointing in the direction of the turbines through the wind farm area.



3.1.4 Mobile Phone

The following diagram shows the locations of Telstra (T), Optus (O) and Vodafone (V) towers for 3G and 4G within the vicinity of the wind farm. As you can see they are located in several locations within the area, and the range will in practice act as a barrier from one side to the other for signal propagation.





The following diagrams show the coverage maps provided by each of the providers for the area.

Optus



4G PLUS - OUTDOOR
3G - OUTDOOR
3G - WITH ANTENNA



Telstra





Vodafone





Around the area, it is likely that a mobile phone will be within range to connect to the stronger signal from the Crystal Brook and Gladstone towers, particularly along Wilkins Highway (for Telstra and Optus users). If the mobile phone can connect to either of these towers, it will have signal.

There is no reason to believe that there will be an impact on the signal within the townships as the tower is so close, relative to the wind farm.

There may be some impact along Wilkins Highway, travelling past the wind farm, if the Gladstone towers for Optus and Telstra do not service that area. Neoen notes that in the experience of its project managers, reception is already non-existent on the stretch of the Wilkins Highway which is immediately north of the project. As this information is not released by these providers, we are unable to definitively state that there will or will not be reception impacts in that area.

Land-line phones will not be affected by the wind turbines as they are delivered by underground/overhead cable.



3.1.5 AM & FM Radio

AM waves are not typically affected by wind turbines, as stated in the EMI report, due to their long wavelength.

The EMI report does not mention the nearby AM tower specifically as it is sufficiently far away from the closest turbine to not be affected, at over 3.1km as suggested by

<u>https://www.broadcastwind.com/wind-farms-tv-and-radio-interference/</u>. However, Neoen will ensure that it engages fully with the owner/operators of the tower, ABC and Broadcast Australia, and commits to mitigating impacts if any are experienced.







The following diagram provides a coverage map for ABC 639 radio service.

There is no licencing information showing a direct link between ABC's Port Pirie facilities and the Crystal Brook AM repeater tower, as mentioned in a submission by Peter Cousins. It is likely that the broadcast information is sent via an alternative method rather than a direct point-to-point link.

FM services have been sufficiently covered in the original EMI report.



3.1.6 Satellite Services

The provision of satellite TV or internet services are an option of last resort for Neoen, and all other viable alternatives will be investigated before resorting to satellite services.

During the SCAP hearing, it was mentioned that there was no local content on satellite television. This is only partly true. The table below describes the services available on satellite television (VAST) in South Australia.

Network	Channels	Content Source
ABC	ABC, ABC Kids, ABC Me, ABC News	South Australia
SBS	SBS, Viceland, Food Network, NITV	South Australia
Seven	7, 7mate, 7two	South East (Sydney)
Nine	9imparja, 9Gem, 9Go!	South East (Sydney)
Ten	One, Ten, 11	South East (Melbourne)
SC Spencer	Regional News	Alternating broadcast of Spencer Gulf
Gulf		and Tasmanian news bulletins from
		7:05pm through to the next
		afternoon

The Adelaide versions of channels for networks Seven, Nine and Ten can be streamed on a variety of players (such as Apple TV or Chromecast) from their network apps or Freeview apps.

3.1.7 GPS

GPS works through devices connecting to satellites. The requirement for this to function is for "clear sky". An example of this is how GPS navigation in a car typically will not connect when inside a garage, but can function once outside and able to connect with a satellite.

The only possible effect on GPS would be if the receiving unit was situated directly next to / under the wind turbine, and even then, that would be situational depending on the direction of the blades relative to the position of the GPS device.

There will be no effect on GPS from the turbines for those outside of the direct wind farm area.



3.1.8 Bureau of Meteorology Radar Systems

During the panel hearing, an image taken from the Bureau website's radar display feature was tabled, claiming that the radar showed rain / cloud at the wind farm locations within the mid north on a day with "clear blue skies".

GHD has not seen this image, as it was not provided during the panel hearing or subsequently to that with the remainder of submissions, and is therefore unable to comment specifically on it.

Viewing the radar image at 15/10/2018 at 1:10pm, a generally drizzly day with some rain around, there is no evidence of rain shown at all in the location of Hornsdale Wind Farm (north of Jamestown), and nothing at the location of the Hallett Wind Farm. Minor rainfall is shown around Snowtown Wind Farm however this moves across in the time delay images.





The following was taken at 8:24am on 16/10/2018 during a rain event in Adelaide's CBD, again not showing any rainfall at the wind farm areas of Snowtown, Hornsdale and Hallett:



The following was taken at 3:30pm on 24/10/2018 during which it was mostly sunny, a few clouds in Adelaide CBD, again not showing any rainfall at the wind farm areas of Snowtown, Hornsdale and Hallett:



As part of the EMI study for any wind farm development in Australia, we undertake a process of consultation with the Bureau to ask them about the impact on the radar should the development be approved, and to inform them such that they can implement filters should the turbines cause noise on the radar.

3.1.9 Radiation Concerns

One respondent claimed that the wind turbines would result in radiation from the turbines propagating into the township of Crystal Brook, to provide a response, we have assumed this is in reference to the health of residents. There is no scientific basis on which this claim was made and while what may be considered radiation could reach the town, this will not be a health hazard.

For comparison, there is stronger RF radiation emitted from a mobile phone than from the wind turbines (as measured at the body).

3.1.10 Council Comments

The council have asked for a nil effect on television, mobile phone, etc. services. Interpreted in the strictest sense, this is impossible to achieve in terms of absolute signal levels, as the smallest of disruptions (from any source) can have a small effect on the received signal power.

In accordance with the standards usually applied to significant infrastructure projects, Neoen will commit to, as best as possible, producing a nil effect on the perceived signals.

3.1.11 Hornsdale Comparisons

Some comparisons were drawn to the impact on services at the Hornsdale Wind Farm site. It should be noted that the television and mobile phone signal levels in that area are much weaker than at Crystal Brook. The effected households were on the edge of reception areas. They were also situated such that the wind farm was placed in the direct line to the transmitters. Neither of these factors apply to Crystal Brook.

Neoen purchased the Hornsdale project as a 'brownfield' project – that is, with the layout already largely fixed by an existing Development Approval, which was received in 2012 for the first two stages. Consequently, EMI effects were largely out of Neoen's control. Neoen has since worked with the few affected residents at Hornsdale to address unintended impacts. Since that time, the methodology used to predict such impacts has also improved and Neoen has leveraged this to improve outcomes at CBEP.

3.1.12 Lack of Third Party Guarantees

One representor noted that Telstra and NBN have refused to promise service with the wind farm present. While this was presented as potentially meaning that there would be impacts to service in the surrounding area, in the experience of Neoen's EMI consultant, GHD, this is a standard response from those entities to absolve themselves of legal responsibility.

As shown above, we expect very minimal interference, and no perceived change to service within the township of Crystal Brook.



3.1.13 Pre-Construction Survey Methodology

The methodology for the reception coverage survey would involve the hiring of a sub-contractor with suitable signal level monitoring equipment. They would drive around the area of interest, with equipment mounted to their vehicle continuously polling the signal strength at the relevant frequency for the service of interest. These data points would be logged against a GPS location and later processed into a coverage map. This would allow for a comparison post turbine installation, conducted with the same method and ideally in similar climactic conditions to verify claims of signal disruption.

3.2 Solar panel microclimatic conditions

Do the solar panels (in a farm arrangement) create any microclimatic conditions and if so the characteristics? This is currently being investigated with other solar projects in cropping regions.

One representor expressed the concern that solar panels may create 'microclimates' which could impact adjoining parcels of land.

This phenomenon is termed the 'Photovoltaic Heat Island' effect (PVHI), and has recently been subjected to considerable study with the rapid rise in large-scale solar installations around the world, mostly sited in agricultural areas. This effect, it is claimed, occurs when dark, non-reflective solar panels absorb and trap heat from sunlight, raising the soil and air temperature within and around solar arrays and leading to an increase in air temperatures up to 3-4 degrees Celsius.

Findings from recent studies have shown strongly that the PVHI effect may occur <u>within</u> the perimeter of solar arrays, but does not occur <u>outside</u> of it to any significant extent. Consequently, use of appropriate setbacks from non-involved property boundaries will prevent any impacts on non-involved landholders.

These studies were considered by the expert planning panel at Neoen's Shepparton Solar Farm in Victoria in 2018.¹ Following this hearing, Neoen's standard policy on solar farm layouts, and the one which will be used at Crystal Brook, is a **25-metre** setback from solar panels to the edge of neighbouring non-involved properties.

Shepparton Solar Farm was one of four permit applications for solar energy facilities which were submitted to Shepparton Council in 2017. In March 2018, a planning panel was appointed to consider the four permit applications. Under the *Planning and Environment Act 1987* (the Act), a Panel is appointed by the Minister for Planning to hear submissions made about amendments to planning schemes and to make recommendations or provide advice about whether or not the amendment should proceed.

In May 2018, a six-day panel hearing took place in Shepparton. Proponents, Council and objectors gave submissions, including expert evidence, regarding the applicable policies and potential impacts of the solar energy facilities.

The panel report was released on 23 July 2018, with conclusions and recommendations, including a recommendation that the Neoen proposal be approved.

The panel had the following to say in relation to the PVHI effect outside the solar array perimeter (page 38 of their report):

"Outside the solar array perimeter

The Panel gave considerable weight to Dr Barron-Gafford's evidence and it accepts the results of the Barron-Gafford study related to the extent of any PVHI effect which states:

¹ Greater Shepparton Permit Applications 2017-162, 2017-274, 2017-301 and 2017-344 - Panel Report - 23 July 2018, Planning Panels Victoria, Victoria State Government



... that the PVHI was indistinguishable from air temperatures over native vegetation when measured at a distance of 30m from the edge of the PV array. This pattern held true for both daytime and night-time conditions. Because the PV panels themselves trap the energy from diffuse sunlight that was able to reach the ground underneath them, air temperatures remain elevated within a PV array. As you leave this "overstorey" of PV panels, energy is able to radiate back towards the atmosphere, as it does in a natural setting, and the PVHI quickly dissipates.

The temperature variation shown in Fthenakis and Yu (2013) for the first 100 metres either side of the edge of the solar array is broadly consistent with those observed by Dr Barron-Gafford in Figure 4 of his evidence statement. The Panel was not presented with any credible evidence to oppose the findings of Fthenakis and Yu (2013) which states:

Analyses of 18 months of detailed data showed that in most days, the solar array was completely cooled at night, and thus, it is unlikely that a heat island effect could occur.

There is scientific consensus that a 'heat island effect' is unlikely to occur; therefore, the precautionary principle does not apply for any of the proposed four solar energy facilities. This is supported by expert consensus that a serious or irreversible effect will not occur. As outlined in Mr Harriott's explanation, Mr Guthrie's recommended 25-metre setback will 'protect against heat impacts on adjoining landowners'."

4. Environmental

4.1 Background noise level measurements and Sonus documentation

Clarification around background noise level measurements (and level of documentation provided by Sonus.

Sonus is the leading acoustic consulting firm in South Australia, and, with regard to wind farm acoustic modelling, likely the most experienced firm in Australia. They have consulted on the following wind projects:

- Starfish Hill (SA)
- Kemmiss Hill (SA)
- Troubridge Point (SA)
- Waitpinga (SA)
- Snowtown II (SA)
- Barunga (SA)
- Clements Gap (SA)
- Nalpa
- Canunda (SA)
- Carmody's Hill (SA)
- Wattle Point (SA)
- Barn Hill (SA)
- Hallett Hill (Hallett 2) (SA)

- Vincent North (SA)
- Taralga (NSW)
- Brown Hill Range (Hallett 1) (SA)
- Badgingarra (WA)
- Willogoleche (SA)
- Nilgen (WA)
- The Bluff Range (Hallett 5) (SA)
- Yaloak Estate (Vic)
- North Brown Hill (SA)
- Naroghid (Vic)
- Mt Bryan (Hallett 3) (SA)
- Ararat (Vic)
- Woolsthorpe (Vic)

Background noise levels are measured in the vicinity of a wind farm during the planning stage of a project to increase the allowable noise level. This practice is in recognition that the background noise levels (generated by sources such wind in the trees) at a dwelling will typically increase with an increase in wind speeds. This increase in background noise levels can "mask" the noise from the wind farm and reduce its impacts. Therefore, if the background noise levels are measured to be sufficiently high, the authorities allow the assessment criteria to be relaxed.

The South Australian *EPA Wind Farms Environmental Noise Guidelines July 2009* (the EPA Guidelines) utilise such an approach and establish the assessment criteria to be a baseline level of 40 dB(A) or the background noise level plus 5 dB(A), whichever is the greater. Based on the above, the measurement of background noise levels is **not an essential component** of a planning assessment if the wind farm can be designed to achieve 40 dB(A) or less.

Background noise monitoring has been conducted at 5 locations in the vicinity of the Crystal Brook Energy Park. The locations were selected to be representative of the existing background noise environment in all directions from the wind farm. The selection of the locations and the monitoring methodology were consistent with the requirements of the EPA Guidelines.

Whilst the background noise level results indicate that the assessment criteria can be increased above the baseline level of 40 dB(A) at some dwellings at higher wind speeds, the wind farm has been designed to achieve 40 dB(A) at any dwelling not associated with the wind farm. In other words, acoustic modelling conducted for CBEP does not rely on the background noise monitoring results to adjust the compliance threshold.

4.2 Noise impacts of larger, more closely-spaced turbines

Cumulative noise impact of larger, more closely spaced turbines (26) – including potential health and sleep disturbance impacts from infrasound noise (esp. amplitude modulation, pulsating, inaudible, low frequency noise).

The SA EPA guidelines have been reviewed and tested on many previous occasions in relation to a range of wind farm projects with different technology, spacing, numbers and settings across South Australia. The key aim of the guidelines is to ensure that noise levels at sensitive receivers can be limited to a level that reflects appropriate health and amenity targets regardless of the wind farm design or setting.

The noise from wind farms is predicted by using measurements close to the proposed turbines in accordance with an international standard. A three-dimensional computer model is then used to extrapolate the level of noise from the cumulative effect of all turbines to dwelling locations. Inputs to the model include the inherent noise generating properties of the turbine (taking account of its size), the proposed turbine locations, the topography, an assumption of all turbines operating with the wind blowing from that turbine to the residence location (obviously a conservative 'worst case scenario' assumption) and a range of meteorological conditions. That is, the noise associated with the size, number and location of the turbines is inherently covered by the noise measurement and the location (including spacing) of turbines is included in the noise model.

As stated in Neoen's first response, whether turbines are closely spaced or not makes no qualitative difference to acoustic emissions. Neither Neoen nor Sonus are aware of evidence for any 'clustering effect', and do not accept that such effect exists.

4.3 Relevance of (South Australian) EPA Guidelines for larger turbines

Relevance of EPA Windfarm Guidelines and Development Plan policies for larger / higher powered turbines and cumulative impact of windfarms in the region (and comparative analysis of interstate guidelines and their consistency with SA). The adequacy of current standards was raised as an issue by a number of representors at the public hearing.

The South Australian (SA) EPA Guidelines were the first wind farm specific guidelines to be developed in an Australian jurisdiction, with the first version published in 2003. The EPA Guidelines have been reviewed and developed over time and are considered to provide a *contemporary and stringent* approach which has formed the basis for the assessment approach in other jurisdictions, including NSW, WA and Queensland.

Specifically, the EPA Guidelines have been:

- Developed over a period of 17 years (including their development period) accounting for a range of available input and research data including that provided by Senate hearings, National Health and Medical Research Council (NHMRC) investigations, a dedicated EPA review, the EPA's own investigations into infrasound and low frequency noise and recent operational wind farm measurements in South Australia;
- 2. Considered and upheld as suitable standards in the wake of available input and research data in four wind farm cases in the Environment, Resources and Development Court (the ERD Court) for the Allendale, Mt Bryan, Stony Gap and Palmer wind farms; and
- 3. Developed to ensure that wind farms do not unreasonably impact on the acoustic amenity of surrounding dwellings.

The Crystal Brook Energy Park has been assessed against the EPA Guidelines and the assessment concludes that the wind farm can be readily designed to achieve the Guidelines. The EPA guidelines are based on establishing external noise level criteria at which a wind farm will not unreasonably interfere with the amenity of nearby residents. Therefore, the size, shape and type of wind turbine do not influence the efficacy of the EPA Guidelines, provided the particular arrangement can achieve the criteria (further information on how the size and layout of a wind farm is accounted for in the assessment process is provided below).

Where achieved, the criteria ensure any audible wind farm noise (whether it be from a large, small, distant, relatively close, high hub height, large diameter, small diameter or any other potential wind farm variable) is low enough in level within the existing background noise environment so as to not unreasonably impact on the health or amenity of the community.

The EPA has conducted recent and extensive research and testing with the finding that the EPA Guidelines provide an appropriate tool for a contemporary wind farm environmental noise assessment. Further, the World Health Organisation (WHO) has very recently released recommendations for noise from wind farms (during the SCAP hearing). Although the noise descriptors are different, a wind farm complying with the EPA Guidelines will also comply with the WHO Guidelines (more detail on this is provided below).

4.3 Response to issues raised by Stephen Cooper

Consideration and response the issues raised by Steven Cooper in his detailed representation and presentation (along with tabled materials).

4.4 Infrasound

All sound is a pressure fluctuation in air. The number of "fluctuations" in a period of time is known as the "frequency". Low frequency sounds, such as bass drums, diesel locomotives and distant thunder have a smaller number of fluctuations per second. High frequency sounds such as whistles and birdsong have a higher number of waves per second.

The human ear detects both the frequency of the sound and the pressure that has been created. In general terms, a higher frequency sound is perceived as having a higher "pitch" and a sound with a higher pressure level is perceived to be louder.

The human ear can detect an enormous range of frequencies and pressure levels. The decibel scale enables a meaningful description and analysis of such a large range and is therefore used to represent noise level. Over time, frequency "weightings" have been developed to assist in simulating the human response to different frequencies. For example, in general terms, a high frequency sound is perceived to be louder than a low frequency sound at the same pressure level. Therefore, weighting networks make this adjustment to simulate perception.

The A weighting scale, where noise levels are presented as dB(A), represents the response of the human ear. Other scales have been developed to represent human perception to specific parts of the frequency spectrum or to emphasise specific parts of the spectrum.

Infrasound represents the lowest frequencies of the sound spectrum. The G weighting scale, where noise levels are presented as dB(G), has been developed to specifically represent human perception of infrasound.

A common misconception is that infrasound cannot be perceived. All sound above a minimum pressure level can be perceived and there have been perception thresholds established across the frequency spectrum, including specifically for infrasound.

Another common misconception is that infrasound can be felt through the body (like the effect experienced close to a speaker at a music event), at levels that are below the perception thresholds. The perception thresholds are exactly that. Testing has even been conducted to show that deaf people "feel" infrasound only at levels that are well above the established perception thresholds. For more detail on this, please see section 2.2 of the EPA's 2013 study, 'Infrasound levels near windfarms and in other environments' (Attachment A).

Sound does not have adverse effects below the threshold of perception.

Mr Steven Cooper of The Acoustic Group provided a presentation to the SCAP which referenced his study "The results of an acoustic testing program Cape Bridgewater Wind Farm". Mr Cooper indicated to SCAP that his study showed that residents in the vicinity of the Cape Bridgewater Wind Farm could sense the presence of infrasound. The study measured infrasound at levels which are well below the threshold of human perception and asked local residents to determine whether the turbines were 'on' or 'off' at the time (the wind farm operator participated in this study by pausing their operations as requested).



Mr Cooper indicated to SCAP that his research showed that infrasound from wind farms could be sensed below perception levels, and that residents were able to determine when turbines were 'on' or 'off'. **On review of that research, Mr Cooper's methodology was highly flawed:** the participants were exposed to audible levels of noise as distinct from levels which were 'well below perception', meaning that it is to be expected that they were able to determine when the wind farm was operating. In addition, the study showed that the residents experienced "sensations" when the wind farm was **not** operating, suggesting a 'nocebo' effect. The following excerpt from the study has been included to show instances (red circle added) where the residents experienced "sensations" when the wind farm was not operating:



Other researchers have simulated the character and level of infrasound measured at wind farms to determine any human reaction. The research conducted by The University of Adelaide, Flinders University, University of NSW (Hansen et al, 2015), Renzo Tonin and Associates (Tonin and Brett, 2015) and Channel Island Acoustics (Walker and Celano, 2015) all indicates that there is no human reaction to the level of infrasound measured at wind farms.

In contrast, Mr Cooper indicated to the SCAP that he had conducted similar research which showed that infrasound from wind farms could be sensed below perception levels. A review of that research has been conducted and it indicates that the participants were exposed to audible levels of noise as distinct to levels which were well below perception. The following excerpt from the study has been included to show where the signal provided to the subjects was audible and higher than the ambient noise level in the room (blue circle added):





Figure 3 - Spectra of Test Sample

Wind turbines produce sound across the range of the frequency spectrum including infrasound.

The infrasound levels from wind farms can be measured. The measured levels of infrasound from wind farms are several orders of magnitude below the perception thresholds. Indeed, a person would need to be within 200m of more than 30 turbines (effectively "on top" of each other) to even approach the perception threshold for infrasound from a typical wind farm.

It is for the above reasons that infrasound from wind farms is not required to be assessed in any of the contemporary standards and guidelines used by Australian and International authorities.

Sonus has conducted studies into the level of infrasound produced by wind turbines. These studies confirmed that measured infrasound from wind farms is no greater than naturally occurring levels of infrasound from sources such as waves breaking on a beach, and that it is well below (by many orders of magnitude) established perception thresholds. The 2013 South Australian EPA study mentioned above provided consistent findings to the Sonus studies and a wide range of national and international peer reviewed papers.

This study compared infrasound levels generated near wind farms with those in typical urban and rural environments (measuring down to a frequency of 0.25Hz). Some of the findings are set out in the excerpts below:

- Infrasound levels at houses adjacent to wind farms (Locations 8 and 9) are no higher than those at houses located a considerable distance from wind farms (Locations 10 and 11). For example, the outdoor infrasound levels at Location 8 are significantly lower than those at Location 11, despite the house being located much closer to operational wind turbines (1.5 kilometres compared to 30 kilometres).
- Infrasound levels in the rural environment appear to be controlled by localised wind conditions. During low wind periods, levels as low as 40dB(G) were measured at locations both near to and away from wind turbines. At higher wind speeds, infrasound levels of 50 to 70dB(G) were common at both wind farm and non-wind farm sites.
- Organised shutdowns of the wind farms adjacent to Location 8 and Location 9 indicate that there did not appear to be any noticeable contribution from the wind farm to the G-weighted infrasound level measured at either house. This suggests that wind turbines are not a significant source of infrasound at houses located approximately 1.5 kilometres away from wind farm sites.
- This study concludes that the level of infrasound at houses near the wind turbines assessed is no greater than that experienced in other urban and rural environments, and that the contribution of wind turbines to the measured infrasound levels is insignificant in comparison with the background level of infrasound in the environment.

Notwithstanding the above, representations against wind farm development continue to be made on the basis of a link between adverse health impacts and infrasound from wind farms.

4.5 Amplitude modulation

Contrary to Mr Cooper's claims, the EPA Noise Guidelines have been developed accounting for the operating characteristics of a wind farm, which include amplitude modulation associated with the rotation of the blades.

That is, an assessment against the EPA Guidelines inherently accounts for amplitude modulation from a wind farm.

4.5 South Australian Environment, Resources and Development Court

The representation by Mr Steven Cooper supported many representors' concerns as they relate to the inadequacy of the EPA Guidelines and the link between infrasound and health impacts.

To assist the SCAP in considering the technical support of these concerns, excerpts of the judgment for the *Tru-Energy Renewable Developments Pty Ltd v Regional Council of Goyder & Ors SAERDC 48 [2014]* matter in the South Australian Environment, Resources and Development Court are provided below.

The excerpts (emphasis Neoen's) show the Court accepts the assessment methodology of the EPA Guidelines and their approach to infrasound, and dismisses Mr Cooper's assertions.

The purpose of the guidelines is to set a noise level at which a wind farm will not unreasonably adversely affect the amenity of nearby residents. The guidelines refer to the general environmental duty under the Environment Protection Act 1993 (SA). Usually, compliance with an applicable EPA noise policy would be sufficient to satisfy a planning authority that the health and amenity of people within the locality of the noise source, or proposed noise source would be protected. In Mr Cooper's opinion, however, there are other factors in relation to wind farm noise which are not dealt with in the 2009 noise guidelines, which have the potential to affect amenity. Those factors are infrasound and low frequency sound.

We accept Mr Turnbull's evidence [Mr Turnbull is the Principal Engineer at Sonus] in relation to infrasound and low frequency noise. Our task in this matter is to assess the planning merits of the proposed development, which includes the issue of noise. Our task is not, as Mr Cooper seemed to think, to assess the adequacy or the integrity of the 2009 noise guidelines. No factual basis has been established for the refusal of development plan consent to the proposed development on the basis of noise or the perception of energy below the audibility level. Mr Cooper has a number of theories, to do with low frequency noise, which he is investigating. At present, on the basis of his evidence before us, it seems that his approach to the task includes privileging the subjective experiences of



those residents who have experienced problems, and their perceptions as to the cause of these experiences, over other contradictory data. The investigations by the EPA and Mr Turnbull in relation to the same or similar material have not yielded any basis for refusing to grant development plan consent to the proposed development on the basis of noise generally, infrasound or low frequency noise.

4.6 Human health studies and findings

Clarification of recent research findings and/or studies on noise and human health impacts – WHO, NHMRC and Flinders University – in relation to the intended performance / operation of the proposed development. What percentage of the population could be susceptible to such impacts?

Neoen is aware that the previous Development Assessment Commission (DAC) sought and obtained Crown Law advices regarding the assessment of wind farms and health issues. We respectfully request that the SCAP refer to this advice.

Neoen's position on health impacts is informed by the work of the National Health and Medical Research Council (NHMRC) as well as the company's experiences of operating wind farms across Europe, Central America, Australia, Africa and the Middle East. To date, Neoen has not received any complaints from involved landholders or nearby residents at any of our operating wind farms which have raised health complaints.

In 2015, the NHMRC released an Information Paper providing a summary of evidence from research on wind farms and human health. The Paper concluded that there was 'no direct evidence that exposure to wind farm noise affects physical or mental health',² and that there was 'no direct evidence that considered possible effects on health of infrasound or low-frequency noise from wind farms'.³ The Australian Medical Association has prepared a separate Position Statement on wind farms and health, which concurs with the NHMRC position.

The other two studies raised in some submissions were the WHO *Environmental Noise Guidelines for the European Union*,⁴ and a study being undertaken by Flinders University into whether sleep disturbance may arise from wind farm noise.⁵ The WHO guidelines recommended reducing noise levels produced by wind turbines below 45 dB L_{den} to prevent adverse health impacts such as annoyance and sleep disturbance. Although L_{den} is a different descriptor to dB(A), a wind farm which is operating in accordance with the EPA guidelines with a baseline allowable noise level of 40db(A) will achieve this WHO recommendation. As the Crystal Brook Energy Park has been designed to operate in accordance with the EPA Guidelines of 40dB(A), it is therefore inherently compliant with the WHO guidelines.

As the Flinders University is still underway and yet to reach any conclusions, Neoen is not able to comment on this study.

² National Health and Medical Research Council, *Information Paper: Evidence on Wind Farms and Human Health* (February 2015), p. 1, accessible at <u>https://nhmrc.gov.au/about-us/publications/nhmrc-information-paper-evidence-wind-farms-and-human-health</u>.

³ Ibid 2.

⁴ World Health Organisation, *Environmental Noise Guidelines for the European Union* (2018) accessible at <u>http://www.euro.who.int/___data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf?ua=1</u>.

⁵ Flinders University, 'Wind Farm Noise Study', <u>https://www.flinders.edu.au/wind-farm-noise-study/</u>.

4.7 Submissions of Ms Morris, Ms Laurie and Mr Cooper

Submissions were made at the SCAP hearing by Mr Stephen Cooper, Ms Mary Morris, and Ms Sarah Laurie. Neoen makes the following comments with respect to these submissions.

4.7.1 Involvement with the Waubra Foundation

Firstly, we note that Ms Morris and Ms Laurie have been, or are currently, directly associated with the Waubra Foundation, while Mr Stephen Cooper is strongly linked to its work and is frequently called in support of the Foundation's efforts to oppose wind farm developments. The Foundation was founded following the proposed development of a wind farm near the town of Waubra. Some have asserted strong links between the Foundation and the anti-wind 'Landscape Guardians' groups which sometimes arise in communities, under different names, where wind farms are proposed (for example, the 'Eastern Mt Lofty Ranges Landscape Guardians', or the 'Taralga Landscape Guardians').⁶ On its website, the Foundation lists its purposes as:

To promote human health and well-being through the prevention and control of diseases and other adverse health effects due to industrial sound and vibration.

To promote and protect human rights where those human rights are, or may be, adversely affected because of industrial sound and vibration.⁷

In 2017, the Administrative Appeals Tribunal of Australia (AATA) affirmed a decision by the Commissioner of the Australian Charities and Not-for-profits Commission (ACNC) to disallow an objection by the Waubra Foundation to the decision of the Assistant Commissioner to revoke its registration as a charity in subtypes 7 and 13.⁸ These subtypes included an entity with the charitable purpose of promoting or protecting human rights (Item 7), and an institution whose principal activity is to promote the prevention or the control of diseases in human beings (Item 13).

In this case:

- Ms Laurie was described as the current CEO of the Foundation;⁹
- Ms Morris described an arrangement between herself and the applicant whereby she would provide the applicant with relevant literature on noise, some authored by herself, which the applicant would upload to its website. She also described a number of occasions on which she invited Ms Laurie to attend stakeholder meetings;¹⁰ and
- Mr Cooper was listed in evidence submitted by the Waubra Foundation as one of the acousticians who have completed acoustic field testing at the request of the Foundation.¹¹

In affirming the decision of the Commissioner, the Tribunal determined that:

⁶ https://independentaustralia.net/environment/environment-display/the-landscape-guardians-and-the-waubra-foundation, 3995

⁷ <u>https://waubrafoundation.org.au/about/objectives/</u>.

⁸ Waubra Foundation and Commissioner of Australian Charities and Not-for-profits Commission [2017] AATA 2424, [539], accessible at <u>http://www8.austlii.edu.au/cgi-</u>

bin/viewdoc/au/cases/cth/AATA/2017/2424.html?context=1;query=waubra;mask_path=au/cases/cth/AATA.
⁹ Ibid [149].

¹⁰ Ibid [205].

¹¹ Ibid [180].

- The 'proposition that sound emissions from wind farms directly cause any adverse health effects which could be regarded as a "disease" for the purposes of the ACNC Act is not established';¹²
- The applicant's principal activity was the 'provision of support, assistance and information to individuals and communities...that activity does not constitute the promotion of the prevention or control of diseases in human beings';¹³
- The 'promotion or protection of human rights, per se, is not one of the applicant's purposes, at least in a way which is other than incidental to its actual purposes';¹⁴ and
- The Applicant was not entitled to be registered as an Item 7 or as an Item 13 entity under s 255 of the Australian Charities and Not-for-profits Commission Act 2012 (Cth).¹⁵

4.7.2 Consideration of research in NHMRC study

The 2015 NHMRC study considered numerous studies, including a 2012 study conducted by Ms Morris entitled 'Waterloo Wind Farm survey'.¹⁶ This study assessed annoyance from wind farm noise and shadow flicker and self-reported sleep quality against proximity to a wind farm.¹⁷ The NHMRC commented that this study had a 'high risk of bias'.¹⁸ In its general conclusions about the direct evidence, the NHMRC concluded that there was 'consistent but poor quality direct evidence that wind farm noise is associated with annoyance', and that 'direct evidence of an association between wind farms and sleep disturbance is less consistent but also of poor quality'.¹⁹

4.7.3 Consideration of research in Court proceedings

Mr Cooper and Ms Laurie have both provided evidence in Court proceedings relating to wind farms, including in the cases described below.

4.7.3.1 McLachlan & Ors v Mid Murray Council & Tilt Renewables Australia Pty Ltd [2018] SAERDC 15

The appellants appealed against the grant of development plan consent by the Mid Murray Council to Tilt Renewables Australia Pty Ltd (Tilt) in respect of the Palmer Wind Farm.²⁰ The South Australian Environment, Resources and Development Court held that the proposal was in sufficient compliance with the relevant provisions of the Development Plan to warrant approval subject to the imposition of appropriate conditions.²¹ Mr Cooper provided evidence for the applicant in this case. In relation to noise and health, the Court stated that 'Mr Cooper's concerns about noise were based upon the anecdotal evidence of nine residents who live in the general locality of the existing Waterloo Wind Farm and two residents who live in the general locality of the respondent, and who pointed out issues with anecdotal evidence.²³ The Court ultimately accepted Professor Wittert's evidence and conclusions, including that there was:

¹² Ibid [490].

¹³ Ibid.

¹⁴ Ibid [536].

¹⁵ Ibid [538].

¹⁶ Accessible at <u>https://www.wind-watch.org/news/wp-content/uploads/2012/07/Waterloo-Wind-Farm-</u> <u>Survey-April-2012-Select-Committee.pdf</u>.

¹⁷ Above n 3, 8.

¹⁸ Ibid 22.

¹⁹ Ibid 24.

²⁰ McLachlan & Ors v Mid Murray Council & Tilt Renewables Australia Pty Ltd [2018] SAERDC 15, [1].

²¹ Ibid [210].

²² Ibid [84].

²³ Ibid [85].

- 'no evidence that audible noise resulting from the operation of wind turbines constitutes a significant risk to health provided the development is compliant with current guidelines';
- 'no evidence that adverse health effects can be directly attributable to inaudible low-frequency sound emissions'; and
- 'no evidence that the level of infrasound produced by wind turbines constitutes a problem to health'.²⁴

4.7.3.2 Tru Energy Renewable Developments Pty Ltd v Regional Council of Goyder & Ors [2014] SAERDC 48

Tru Energy appealed the decision of the Regional Council of Goyder to refuse development consent for a wind farm in the Tothill Ranges. The South Australian Environment, Resources and Development Court again determined that there was no basis for refusal of development plan consent.²⁵ The Court reversed the decision of the Council and granted provisional development plan consent subject to conditions.²⁶ In relation to noise, 11 affidavits were tendered in the respondents' case from residents who believe that they experienced adverse impacts from the Waterloo Wind Farm.²⁷ The Court noted a 2013 study conducted by the EPA to investigate these concerns, which concluded that 'no evidence was found to link the noise of the Waterloo Wind Farm to adverse impacts on residents'.²⁸ Mr Cooper provided evidence for the respondents. The Court concluded that:

Mr Cooper has a number of theories, to do with low frequency noise, which he is investigating. At present, based on his evidence before us, it seems that his approach to the task includes **privileging the subjective experiences of those residents who have experienced problems, and their perceptions as to the cause of these experiences, over other contradictory data**.²⁹

The Court accepted the evidence of Mr Chris Turnbull (of consulting firm Sonus) with respect to infrasound and low frequency noise.³⁰

Ms Laurie also gave evidence in the respondents' case. Justice Cole with Commissioners Mosel and Brookman stated in the judgement that Dr Laurie 'is not an expert in assessing whether there is a causal link between wind farm noise and health impacts. She has no relevant qualifications or experience in this kind of research'.³¹ However, the Court went on to consider her evidence, comprising a report including 'quotes from papers by other people on a variety of topics, a literature review relating to infrasound and low frequency noise, a discourse on the nature of wind turbine sound, reference to anecdotal reports of health problems and speculation about possible links between wind turbines and the reported health problems'.³² The Court considered that her evidence:

- ²⁸ Ibid [47].
- ²⁹ Ibid [50].

- ³¹ Ibid [42].
- ³² Ibid [81].

²⁴ Ibid [93] – [94].

²⁵ Tru Energy Renewable Developments Pty Itd v Regional Council of Goyder & Ors [2014] SAERDC 48, [118].

²⁶ Ibid.

²⁷ Ibid [80].

³⁰ Ibid.



Did not contain evidence (whether from her own research, or that of others) of a causal link between contemporary operating wind turbines and the kind of health problems reported by the deponents, which is consistent with any accepted scientific or legal method of proof.³³

4.7.4 Recent research

Neoen is not aware of any recent research conducted by Mr Cooper, Ms Laurie or Ms Morris containing legitimate evidence which would controvert the findings described above. As Neoen is neither a medical research body nor a court, it is also not the company's place to attempt to analyse such evidence itself, and believes that more qualified parties have already undertaken this effort.

³³ Ibid [84].

4.8 Comparative analysis of interstate guidelines and consistency with South

Australia

The table below shows a comparison of the applicable noise criteria and setbacks for CBEP with other states. These criteria are broadly consistent with other States where turbines with similar dimensions to those proposed for CBEP have been approved (for a list of these projects, see 'Height of Turbines' section of this response).

Table: Comparison of noise criteria and setbacks

	SA	Qld	NSW	Vic	
Noise criteria					
Reference	EPA, Wind farms environmental noise guidelines (2009), section 2.2 Noise criteria – new wind farm development	<i>Qld Wind Farm State Code 2017,</i> PO11 and PO12	Wind Energy: Noise Assessment Bulletin, Dec 2016, p. 7	Policy and planning guidelines: Development of wind energy facilities in Victoria (2017), p. 33	
Rural living zone	35dB(A) at receivers in rural living or background noise + 5dB(A)				
Other zones	40dB(A) at receivers in other zones or background noise + 5dB(A)				
Involved dwellings	 'the existence of an agreement will affect the consideration of whether the interference [with the 'enjoyment of the area'] is unreasonable in a given situation. It is unlikely that there will be unreasonable interference if: a formal agreement is documented between the parties, the agreement clearly outlines to the landowner the expected impact of the noise from the wind farm and its effect upon the landowner's amenity, and the likely impact of exposure will not result in adverse health impacts (eg the level does not result in sleep disturbance). 	45dB(A) or background noise + 5dB(A)	35dB(A) or the background noise + 5dB(A)	45dB(A) or background noise + 5dB(A)	
Non-involved dwellings		35dB(A) (night- time) or background noise + 5dB(A); and 37dB(A) (day-time) or background noise + 5dB(A);	35dB(A) or the background noise + 5dB(A)	40dB(A) or the background noise + 5dB(A)	



	SA	Qld	NSW	Vic
		Unless a Deed of Release is obtained accepting the 45dB(A) limit		
Special circumstances				35dB(A) limit applies in 'special circumstances'
Setbacks				
Guideline	Port Pirie Regional Council Development Plan, Renewable Energy Facilities, p. 76	Qld Wind Farm State Code 2017, PO 10	Wind Energy: Noise Assessment Bulletin, Dec 2016, p. 4	Policy and planning guidelines: Development of wind energy facilities in Victoria (2017), p. 12
Setbacks from non-involved dwellings	2(a)(i) Minimum setback of 1km from non-stakeholder dwellings and tourist accommodation	AO10.1 Wind turbines setback at least 1.5km from existing or approved sensitive land uses on non- host lots, unless Deed of Release obtained (AO10.2)	The NSW criteria would typically be achieved at setback distances of between 0.8 – 1.5km	
Setbacks from tourist accommodation	2(a)(i) Minimum setback of 1km from non-stakeholder dwellings and tourist accommodation			Minimum of 1km unless consent of resident obtained
Setbacks from towns	2(a)(ii) Minimum setback of 2km from defined and zoned township, settlement or urban areas			

4.9 Relevance of Development Plan policies for larger turbines

Neoen assumes that with regard to 'Development Plan policies', SCAP is referring to the question of current setbacks and whether or not these policies are adequate in terms of visual impact, given that turbines have grown larger since the policies were instituted, and will likely continue to grow larger in the future.

Neoen has designed the project to meet and exceed setbacks prescribed under the *Port Pirie Regional Council Development Plan*, along with the *South Australian Wind Farm Development Guidelines* (Attachments A, B and B(1)). While Neoen will continue to strive to exceed minimum setbacks on its projects wherever possible in order to minimise visual impacts on local residents, Neoen does not (as stated in the first response) accept that an increase in turbine height necessarily equates to increased visual impact; overall numbers of turbines and their rotational speed (RPM) are also important factors.

Based on its experience with the Hornsdale Wind Farm, at which no complaints have been made since operation commenced, Neoen considers that the current South Australian planning guidelines are delivering satisfactory outcomes. This trend appears to be consistent across South Australia, with the number of complaints submitted to the Wind Farm Commissioner regarding operating wind farms totalling 1 in 2017.



Figure 4 – Complaints regarding operating wind farms in 2017 by state

Neoen notes that it is a legislative requirement that development applications are assessed based on the policies that apply within the relevant Development Plan at the time of lodgement. If the South Australian government or planning authorities wish to conduct a systematic review of current wind farm planning guidelines, Neoen will be glad to participate.

³⁴ National Wind Farm Commissioner Annual Report 2017 (https://www.nwfc.gov.au/sites/g/files/net1881/f/nwfc-annualreport-2017.pdf?v=1523425280)



4.10 Cumulative visual impact of wind farms in the region

The cumulative impact of other wind farms in the region was considered in Section 9 of the Visual and Landscape Impact Study (Volume 2 of the DA). The LVIA made the following findings with regard to cumulative impacts:

There would be no significant direct visual link between other regional wind farms and Project Site; however, very long distant views toward one or more wind farms would be visible from some elevated, but generally unpopulated areas including portions of Youngs Road to the north of the Project Site...

The potential for views toward wind turbines within the Project Site as well as other existing wind farms from residential dwellings and local roads/highways are generally restricted by tree cover and landform and the overall potential for any significant 'indirect' and 'sequential' cumulative impacts are considered to be low.³⁵

As stated elsewhere, Neoen has striven to minimise the total number of turbines associated with this project. While the turbines are taller, the overall land area affected is minimal, helping to avoid any 'direct visual link' between CBEP and other wind farms.

³⁵ Landscape and Visual Assessment (March 2018), 74.



5. Site disturbance and impact on flora and fauna, adequacy of vegetation and fauna studies

Site disturbance and impact on flora and fauna (needs to be more than rehabilitation and offsets) Adequacy of vegetation and fauna studies (level of disturbance significant in unique transition ecosystem) and impacts / visual scarring of road construction / layout.

It should be noted that the methodology and approach to native vegetation and fauna is wellestablished and accepted practice for all large infrastructure projects. This approach is fundamentally based on the requirements of the Department for Environment and Water in relation to the *Native Vegetation Act 1992*. While the development assessment task may take into consideration the general implications of projects for flora and fauna, it is the responsibility of the Native Vegetation Act to address clearance. Neoen respectfully considers that it would be inappropriate to establish two standards of assessment for this matter.

Neoen notes that the ecological study for the DA was authored by EBS Ecology, the premier ecological consulting firm in South Australia. EBS have extensive experience in undertaking a range of assessment work for infrastructure projects, including wind farms, at all project phases: prior to lodgement, during construction and post-construction.

Neoen also notes that the Department for Environment and Water (DEW) agency response contained no criticism of the study's conclusions or its methodology (aside from recommendation of a spring survey (which has been undertaken) and collision modelling of raptors).

In consultation with EBS Ecology, Neoen makes the following response to verbal representations:

5.1 Adequacy of assessments

The baseline assessments undertaken for this project, by EBS Ecology were additional to previous assessments undertaken historically, by both Biosis Heritage and Ecology Consultants and Sinclair Knight Merz (SKM, now Jacobs). The information garnered through these assessments indicated the presence of a number of threatened flora and fauna species as occurring within the project and surrounding areas.

It was accepted in the DA that some limitations existed around the extent of species distribution and the availability of species occurrences through climatic and seasonal conditions. This is an unavoidable consequence of dynamic ecosystems and every effort to collect the widest range of species available has been made, including field surveys in autumn, summer and spring. Assessments at the site were undertaken following the guidelines produced by the Native Vegetation Council. With reference to flora species, the Native Vegetation Council Bushland Assessment Manual (2017) states the following;

"Use any plant species of National and State conservation significance observed within the site during the inspection (not just the quadrat) for this score. Historical records cannot be used because the score is supposed to reflect the state of the site at the time of the inspection."

5.2 Vegetation clearance

The clearance of some intact native (indigenous) vegetation is a recognised impact of the CBEP proposal. As stated in Neoen's first response, clearance of intact vegetation will be avoided wherever practically possible, particularly ecosystems that may not have formal legislative

protection but are considered as poorly represented or of local importance. Turbines, cable and access routes would be micro-sited to minimise vegetation clearance wherever practically possible.

Where avoidance is not possible, these routes would be assessed utilising the methodology required under the *Native Vegetation Regulations 2017*, which takes into account all historical threatened fauna species within a 10km radius of the project site and acts as a multiplication factor for the Significant Environmental Benefit (SEB) offset requirement.

If CBEP is approved by the Minister, there will be more detailed vegetation impact assessment undertaken in association with the micro-siting process. At this point the native vegetation clearance application would be finalised with DEW, and the Native Vegetation Council will assess the existence of alternatives that involve no clearance, less clearance or clearance of vegetation that is less significant (or has been degraded to a greater extent than the vegetation proposed to be cleared). If Neoen determines that these alternatives are unsuitable, it will be required to provide justification.

This is the normal and accepted approach for all significant infrastructure projects, including roads, transmission lines, pipelines and wind farms.

5.3 Biodiversity corridors

The location of the project site does provide connectivity with other intact vegetation patches which include areas contiguous with the Mount Remarkable Conservation Park. However, this is accounted for with landscape context scoring (under the Native Vegetation Council Bushland Assessment Manual (2017)) when undertaking the clearance assessment.

The Mount Remarkable Conservation Park remains the nearest area under formal protection at just over 15.3 km from the southernmost tip of the park to the northern most turbine structure of the revised layout. As noted by some representors, additional parks include the Spaniards Gully CP (15.9km), Wirrabara Range (21.3km) and Telowie Gorge CP (25.5km) respectively. While the vegetation increases in fragmentation with increasing latitude, areas such as the Crystal Brook Creek do provide connectivity in the form of biodiversity corridors. However, as stated above, this is accounted for with landscape context scoring. The following is an extract from the Native Vegetation Council Bushland Assessment Manual, (2017):

"Landscape context is included to allow remnants that are large, wellbuffered and/or are providing important corridor habitat to be recognised as important, regardless of condition. The Landscape Context scores pertains to the Block that is under application and must be an area of contiguous vegetation."

The Manual also considers the amount of remnant vegetation in the area as a surrogate for connectivity by measuring the amount of remnant vegetation that is left in the local landscape. This is determined by measuring the percentage of vegetation that is contained within a 5km radius of any one point. Higher scores are given to areas of vegetation that are in parts of the landscape with intermediate levels of vegetation cover (NVC, 2017). This information is freely available on the Naturemaps website, *<<https://data.environment.sa.gov.au/NatureMaps/Pages/default.aspx>>*. Other landscape considerations in landscape context scoring include the size of remnant patches (including native vegetation on adjacent properties) and distance to remnant area of more than 50 hectares which is a measure of the distance (km) to the closest remnant that is greater than 50 ha in size.



5.4 Fauna

Some concerns were raised in regards to species such as echidnas not being observed and reported on. It is accepted that these species are highly likely to be present within the project area; however, any impact to ground dwelling species during construction is expected to be low, and during operation, inconsequential.

5.5 Access roads

Neoen acknowledges concerns raised in relation to construction and operation of the project's access roads, primarily with regard to run off and erosional deposition. If CBEP is approved, a detailed Construction Environmental Management Plan (CEMP) will be instituted in the first instance to provide mitigation measures to control these risks, such as drainage systems and plantings to mitigate erosion. Neoen welcomes ongoing input in the form of specialist advice and local site-specific expertise from local NRM officers and other stakeholders, such as Anne Brown from Greening Australia whose verbal representation was heard and noted.

6. Cable installations within the Rural Landscape Protection Zone

Clarification of any cable installation within the Rural Landscape Protection Zone (and potential impacts as a result of its installation / mitigation strategies).

One representor raised the concern that the cables connecting the turbines and solar panels with the substation will be located within the Rural Landscape Protection Zone.

It is correct that the cables are proposed to pass through approximately 2.5-3.5km of the RLP Zone. Neoen also acknowledges that PDC 9 of the Port Pirie Council Development Plan states that 'pipelines and transmission lines should not be routed through the Rural Landscape Protection Zone unless no practical alternative exists.' However, Neoen makes the following comments:

- It is doubtful that the specific exclusion of 'transmission lines' was intended to cover underground cables, which, once buried, have no visual impact whatsoever. This would be particularly so where they are buried in grassy or cropped areas, with no associated damage to native vegetation. The RLP Zone land under which the cables are proposed to pass at CBEP is cropped land with negligible native vegetation. As is the case for all other land affected by construction, this land will be rehabilitated in accordance with CEMP requirements, and within a few months of installation, these cable routes will be invisible;
- 2. The proposed route is parallel to an existing (above-ground) water pipeline, which already creates substantial visual impact;

7. Preparation of site for solar farm development

Preparation of the project site for the solar farm development (removal of ground cover to manage hazard risk vs retaining ground cover to minimise dust impacts during construction).

It is understood that dust management problems with some solar projects in more arid locations have been reported. Potential for dust impacts depends greatly on soil characteristics, climatic conditions and vegetation cover during and post-construction. This is also likely to be seasonally dependent; if peak construction occurs in summer, with comparatively lower soil moisture and precipitation levels, it will be more of a factor, and in winter, less so. With construction timelines on large-scale solar plants now typically a year or less, there are likely to be only a few months total characterised by any significant dust potential.

The land identified for the solar farm has been demonstrated to be arable land, capable of supporting crops over many years. This is markedly different to context for solar projects located to the north of Port Augusta. Other than at Port Augusta, dust issues have not been a significant problem for other solar farm locations, the majority of which are located on more arable land like that at Crystal Brook.

As is standard practice, Neoen's EPC contractor is likely to clear most remnant crops from the solar site prior to commencing installation of the solar panel support structures (which will comprise tubular steel poles, most likely driven or screwed directly into the ground without any need for concrete foundations, though final determination of this is subject to geotechnical investigations). Among other considerations dictating removal of most vegetation at the commencement of construction, it may be unsafe to operate heavy equipment and undertake construction activities with heat sources etc in a field with substantial (possibly dry) remnant vegetation.

Regardless of soil type or season, Neoen will ensure that contractors utilise all possible dust mitigation techniques, including dust suppression using water sprinkling and the avoidance of activities likely to generate substantial amounts of dust on days when conditions are unfavourable (for example, on hot, dry days when there is significant wind blowing toward uninvolved neighbours).

Neoen proposes that a condition be included in the DA for the CEMP to include a specialised dust management plan.

8. Transport and access

8.1 Main site access point

Clarification of main access point to the project site for heavy vehicles, transport logistics during construction phase.

Several representors cited safety and traffic delay concerns with the first access point proposed in the DA on Wilkins Highway.

As noted in Neoen's first response, DPTI has also expressed a preference for an access point other than the Wilkins Highway. Neoen accepts this feedback from DPTI and representors, and acknowledges that the proposed Wilkins Highway access point may not be suitable.

Neoen considers that the following access points are options for CBEP:

1. Wilkins Highway

Acknowledging the concerns expressed by DPTI and representors, it is possible that a safe Wilkins Highway access point could be achieved if an access point were secured further west along the road (see, for example, the stretch of road highlighted in bright green in the image below), away from the problematic reverse curves and inclines at the Hughes Gap/Wilkins intersection and on a sufficiently straight section of road, possibly accompanied by works (undertaken at Neoen's cost) to create a pull-off area or other appropriate measure. For instance, the section indicated by the green line below is approximately 1.8km in length and is both quite straight and quite flat (rising approximately 15m from west to east over its length). In combination with sufficient signage, an access point toward the western end of this section may allow adequate sightlines and stopping distance for west-bound drivers, even of heavy vehicles such as grain trucks. The (cropping) land on which H14 is located is owned by an involved landowner, and securing an access road route would not be problematic.



Figure 5 - Potential Wilkins Access Points



2. Hughes Gap/Gladstone-Laura Road

The site could also potentially be accessed via Hughes Gap Road, which was proposed by DPTI. Neoen considers that Hughes Gap Road may be suitable, but notes that further investigation is required to determine how construction traffic should be routed to Hughes Gap Road from the Princes Highway without impacting unduly on residents of Crystal Brook township and surrounds. Inquiries with nearby (western) neighbouring property owners regarding temporary use of their land for access roads may be necessary to achieve a route to Hughes Gap Rd with acceptable impact levels on town residents.

This access point has the advantage of being located on a road with significantly lower traffic volumes than the Wilkins Highway and few non-involved dwellings nearby (as stated in the DA, H13 is slated for demolition due to white ant infestation). It is also located on a long, flat, fairly straight section of road with excellent driver sightlines to entry points to the site, allowing the safe use of graduated speed reduction zones up to any access points. Since the land on either side is owned by involved landowners, it will also be possible to add pull-off areas, turning bays or other works to reduce the impacts of construction traffic on local residents.



3. Eastern

Alternately, access could be gained via the eastern half of the site, at or near the intersection of Gumdale Rd and Pipe Line Track. The advantage of this access point includes very low traffic volumes and, likewise, a very low number of occupied dwellings (Neoen understands, based on conversations with their owners, that H56 and H54 are both unoccupied, with no plans to change this). However, the routing of construction traffic from Adelaide will need careful investigation to mitigate impacts on local residents and traffic. The routing of vehicles from east to west over the ridge to the solar site may also require consideration of ecological impacts and efficiency.

Routing to this access point offers a number of possibilities:



a. Construction vehicles travelling north-west along Goyder Highway, turning north-east onto an unnamed, unsealed road, and eventually joining Huddleston Road for a short distance before turning north-west onto another unnamed unsealed road which leads to the site boundary.



Figure 6 - Eastern Access Route A

b. Construction vehicles travelling north along the Main North Road, turning west onto the Georgetown-Huddleston Road, and ultimately crossing Huddleston Road in a north-westerly direction. This would require construction traffic to be routed through Georgetown.



Figure 7 - Eastern Access Route B



c. Construction vehicles travelling north along Clare Highway, before turning north onto the Narridy-Huddleston Road.



Figure 8 - Eastern Access Route C

It may prove that the best option is to use the eastern access point (via routes A, B or C) for wind turbine construction traffic, while substation and solar construction traffic (substantially less by vehicle movement volume and vehicle size) may use a western entry point on either the Wilkins Highway or Gladstone-Laura Rd. This will help to distribute traffic impacts more widely between local residents, and minimise construction traffic over the more ecologically sensitive portion of the site on the hills.

Neoen is unable to commit to final proposal of any options to DPTI and Council until it has engaged in additional detail with all relevant stakeholders. However, Neoen commits to investigating all options thoroughly and consulting widely regarding potential access points. Based on Neoen's experience at Hornsdale Wind Farm and other projects around Australia, this is a process in which it is best to include EPC contractors (usually turbine manufacturers or large construction firms), whom Neoen has not yet selected. In the meantime, Neoen restates the proposal made in the first written response: that a standard condition be added to the Development Application whereby, prior to commencing construction, Neoen must submit a detailed Traffic Management Plan (TMP) to Port Pirie Council, Northern Areas Council and DPTI. The TMP will, of course, contain a detailed analysis of the pros and cons of various access points. Any right to commence construction will be contingent on these stakeholders' unanimous approval of this plan, including selection of a main access point.

8.2 Aviation impacts

Impact on aviation > aerial agriculture, flight training, lighting and fire-fighting

8.2.1 Flight training

The Risk Assessment conducted as part of the Aeronautical and Aviation study in the DA (Volume 2) found no likely impact on flight training from the CBEP, for the following reasons:

- Contrary to what one representor claimed, there are no promulgated low flying or flying training areas in the vicinity of the CBEP;
- Spencer Gulf Flight Training in Port Pirie was contacted (along with the other local stakeholders listed in Appendix E of the DA, copied below for convenience) during the DA study investigation and did not express a concern with CBEP; and
- Commentary from various Chief Flying Instructors that Chiron has interviewed during the conduct of numerous Risk Assessments can be summarised as 'wind farms provide a good navigation marker for VFR training flights and are a reminder to students of the need for thorough flight planning of the route, including weather forecasts, prior to departure.'

Stakeholder	Contact		
Port Pirie Aerodrome	Airport operator – Port Pirie Regional Council		
Jamestown Aerodrome	Airport operator – Northern Areas Council		
Booleroo Centre Aerodrome	Airport operator – District Council of Mount Remarkable		
Spencer Gulf Flight Training, Port Pirie	Owner and Chief Flying Instructor		
Jamestown Flying Group	Committee member and pilot		
Aerotech – Aerial Agricultural Operator	Hoyleton Base		
"MAC Helicopter"	Babcock Mission Critical Adelaide Base		
RFDS	Adelaide Base		

Appendix E

Stakeholder List.

8.2.2 Aerial agricultural applications

Neoen understands that this issue was explored in detail in relation to the Ceres Wind Farm where aerial farming practice is much more commonly used.

One of the major aerial agricultural operators advised Chiron that they undertake aerial applications in the area; however, it is dependent on the seasons, pests and the farmers' needs. This operator has an airstrip in the Crystal Brook area but did not disclose its location. The same operator uses YPIR and YJST and is a primary aerial firefighting contractor for the South Australian Country Fire Service. The operator made the comment that *'wind farms are becoming common, they're a fact of life, we know more about them and can operate safely in their vicinity.'*

Neoen also notes that:

• only a few CBEP turbines are located on cropped land where crop-dusting may be expected to occur, and these (CB18, CB14, CB22 and CB19) are on land owned by an involved landholder, at a significant distance from any neighbouring paddocks.



• Advice from Neoen's aviation consultant, Chiron, is that crop-dusting operations tend to occur at extremely low altitudes. With the modern turbines proposed at CBEP, blade tips will be no lower than around 70m off the ground; consequently, crop-dusting pilots are likely to be capable of flying under the rotors if necessary.

8.2.3 Aerial firefighting



Figure 9 - Aerial firefighting operations at Waterloo Wind Farm (photo credit: Waterloo Wind Farm technicians, via www.ramblingsdc.net)

Neoen has addressed this issue in its first response and has no further comments. These statements are reproduced below for convenience:

The Crystal Brook region is prone to hot, dry summers, and Neoen fully appreciates the importance of facilitating firefighting access. However, drawing upon the Aeronautical and Aviation assessment contained in the CBEP DA, it is likely that the project will in fact reduce the overall risk and potential impact of fire in the region, noting the following:

1. Wind farms conduct lightning strikes safely

As very tall structures, turbines tend to attract lightning strikes which would otherwise have hit trees. Turbines are designed to deal with such strikes, and reduce the likelihood of a fire being started by conducting them safely to earth.

2. No special aviation risks associated with turbines

Fire authorities generally consider aerial firefighting a secondary, complementary tactic to groundbased operations. The South Australian CFS has noted that: *'The popular perception amongst much of the population is that aircraft alone can put out bushfires. This is not true.* **CFS firefighters and fire** *appliance for the vast majority of instances are the primary and only method of controlling bushfires'*³⁶ [as per its first response, Neoen notes that creation of access roads will greatly facilitate ground-based firefighting efforts].

³⁶ SA CFS Fact Sheet 10-01, *Understanding Aerial Firefighting,* August 2017



Authorities also do not consider that turbines pose unique issues in aerial firefighting. Pilots view turbines as no different to other tall structures and hazards such as power lines, transmission towers, radio masts, mountains and valleys; turbines are simply another piece of infrastructure in the environment that needs to be managed on a risk basis when fighting fires. Pilots fly by sight and will not fly into smoke. Wind turbines, if not covered by smoke, are easily visible in the environment. Regarding the hazard posed by moving blades to pilots, turbines will generally be turned off and locked as soon as requested by firefighters, as occurred at a recent grass fire near the Waterloo Wind Farm.³⁷ Neoen maintains a 24-hour control room in Canberra which is able to turn off turbines remotely, in addition to local maintenance staff and technicians. However, the Australasian Fire and Emergency Services Council (AFAC) position paper on Wind Farms and Bushfire Operations also concluded that "wind turbines are not expected to pose increased risks due to wind turbulence or the moving blades. Local wind speeds and direction are already highly variable across landscapes affected by turbulence from ridge lines, tall trees and buildings."

³⁷ https://www.cleanenergycouncil.org.au/news/2017/october/In-case-of-fire.html

9. Visibility and screening

9.1 Effectiveness of vegetative screening

Effectiveness & suitability of vegetation buffers to screen non-host residences.

Some representors claimed that vegetative screening would be ineffective due to the length of time required for trees to reach a sufficient height. This is incorrect. If fast-growing, semi-established trees (of a species appropriate for the area and acceptable to the landholder) are planted relatively close to a dwelling at the beginning of the 2-year construction period, they will rapidly reach a height where they are able to screen turbines. By way of example, Neoen notes the following photomontage put together for a house at the northern end of Talbot Road:



Figure 10 - View from Talbot Road

From it, it is clear that small trees of no more than 4-5m, located at a distance of 10-15m from a house, are more than sufficient to filter or block views of turbines at distances over 2km.

The following photomontage was also created for the owner of a dwelling at around 1.6km distance to the nearest turbine (the camera is facing south-west in this image). There is a substantial amount of established vegetation around the dwelling at various distances, but it should be noted that trees in the mid-ground of around 6-8m height are easily able to block views of the project.



Figure 11 - View from dwelling at 1.6km

Relatedly, Neoen also notes that the closest non-involved dwelling to the project, H17, is surrounded by significant established vegetation:





Figure 12 - Vegetative Screening at H17

One representor also claimed that in answer to concerns of visual impacts, Neoen had 'told them to plant trees'. This statement is incorrect. Neoen has never suggested that neighbours should carry out or pay for vegetative screening at their own cost. Neoen repeats the offer made in its first response and during community engagement, to plant and maintain vegetative screening at its own cost at all dwellings within 2.5km of a turbine.

9.2 Photomontages

9.2.1 Vistas

Clarification of photo montage vistas and their location – with reference to the height, spacing and distance from the Crystal Brook township, top of Heads Road and Beetaloo Valley.

Neoen directs the Panel to Section 12 of the LVIA in Volume 2 of the DA. Figure 25 (reproduced in small scale below) shows the locations of photomontages, with numbers (P1, P2 etc) corresponding to photomontages shown on following pages. Neoen clarifies that photos were taken from the centres of each orange circle, facing in the direction indicated by the orange triangle.

Photomontages	Elevation	Distance to CB Township
P1	128m	1km
P2 (Head's Rd/Wilkins Hwy)	265m	8.1km
P3 (Beetaloo Valley)	240m	9.3km
P4	192m	7.3km
P4	151m	6.3km
P6	113m	2.7km

The details of these photo positions are as follows:

Section 12 of the LVIA also states the following regarding selection of locations and the techniques used to create the photomontages (more on this in the 'Visual Impact' section of this response):

Photomontages have been prepared to illustrate the general appearance of the wind turbines following construction. Four **[correction by Neoen: six]** photomontages locations were selected to

illustrate the Project. The photomontages have been located to illustrate views from areas close to residential dwellings or to illustrate cumulative impacts where possible.

The photomontage locations were selected following a review of ZTV maps, together with a site inspection to identify potential representative viewpoints. The photomontage locations were selected from surrounding road corridors and at a range of distances between the viewpoint and wind turbine to illustrate the potential influence of distance on visibility. The photomontages locations are illustrated in Figure 25 and photomontages presented in Figures 26 to 31.

Each photomontage was generated through the following steps:

- A digital terrain model (DTM) of the Project Site was created from a terrain model of the surrounding area using digital contours
- The site DTM was loaded in the modelling software package
- The layout of the wind farm and 3-dimensional representation of the wind turbine was configured in the modelling software
- The wind turbine dimensions assumed are a tip height of 240m and a hub height of 161m and blade length of 79m
- The location of each viewpoint (photo location) was configured in the modelling software for sun position for each viewpoint by using the time and date of the photographs from that viewpoint
- The view from each photomontage location was then assessed in the modelling software package. This process requires accurate mapping of the terrain as modelled, with that as seen in the photographs. The photographs taken from each photomontage location were loaded into the modelling software and the visible turbines superimposed on the photographs
- The photomontages were adjusted using Photoshop CS3 to compensate for fogging due to haze or distance, as well as screening by vegetation or obstacles

• The final image was converted to JPG format and imported and annotated as the final figure. The horizontal and vertical field of view within the majority of the photomontages exceeds the parameters of normal human vision. However, in reality the eyes, head and body can all move and under normal conditions a person would sample a broad area of landscape within a panorama view. Rather than restricting the extent of each photomontage to a single photographic image, a broader field of view is presented to more fully illustrate the extent of the wind turbines.

Whilst a photomontage can provide an image that illustrates a very accurate representation of a wind turbine in relation to its proposed location and scale relative to the surrounding landscape, this LVIA acknowledges that large scale objects in the landscape can appear smaller in photomontage than in real life and is partly due to the fact that a flat image does not allow the viewer to perceive any information relating to depth or distance.

9.2.2 Accuracy of photomontages

One representor accused Neoen of employing photomontages in the Landscape and Visual Impact Assessment (LVIA) which were inaccurate or misleading. In particular, this representor stated two claims:

(a) Turbine height was underestimated in photomontages

The representor was unable to offer clear guidance as to the modelling methodology used by himself or his consultant to dispute the accuracy of the photomontages. The methodology used by

Neoen's consultant (DNV-GL, through Green Bean Designs) is set out in Section 12 of the LVIA in Volume 2 of the DA, and was copied above under the 'Visibility' section of this DA.

(b) All turbines should have been pictured with significantly greater tower diameters of 16 metres, versus the approximately 5.5 metre diameters used in the photomontages

Once again, the representor was unable to offer clear guidance as to the manner in which he arrived at the conclusion that the turbines should be approximately 3 times greater in diameter than pictured. When questioned, he compared the turbines to the height of the Port Pirie smelter stack, and suggested that because the turbines proposed at Crystal Brook are larger than previous generations of turbines, their diameter should be proportionately scaled up.

Neoen notes that:

- It is possible that the representor confused the width of turbine towers with the width of their underground foundations, which are significantly wider, though invisible;
- 'Intuitive' comparisons to structures of similar height which are older, made of different materials and are designed to perform entirely different functions (such as smelting stacks, which require large internal volumes in order to facilitate movement of waste gases) are inappropriate and simplistic;
- Attempting to 'scale up' tower diameters proportionately from older turbine designs fails to account both for advances in materials, design and technology, and for the fact that the relationship between the strength of a tube and its diameter is not linear the area of a tower cross-section increases with the square of the radius. That is to say, if one increases the diameter of a tube (say, to 5.5m from 4.5m, an increase of around 22%), the bigger tube will be much more than 22% stronger and stiffer than the smaller one (subject to wall thickness specifications).
- 16m tower segments would be impossible to transport by road as they would be immensely heavy and wide.

Finally, Neoen notes that while the LVIA was prepared by Neoen's consultant, Green Bean Designs, wireframes and photomontages depicting turbines are a highly technical area, and these were subcontracted by Green Bean Designs to a consulting firm called DNV-GL.

DNV-GL is, perhaps, the pre-eminent wind energy consulting firm in the world. DNV-GL built the photomontage software used to create these images (part of a larger wind farm software package known as 'WindFarmer'). This software is now industry-standard and used by many other consulting firms around the world.

In producing photomontages, DNV-GL rely primarily on the Scottish Natural Heritage 'Visual Representation of Wind Farms' guidelines, version 2.2, February 2017, widely acknowledged as the industry-standard guidelines around the world.

DNV-GL would reject in the strongest terms any assertion that their work is not independent. Neoen likewise rejects any assertion or implication that they would ask a consultant to falsify studies.

If the representor or SCAP wish to investigate these claims further, we will be more than happy to organise a direct meeting with DNV-GL and the representor's consultant to discuss the methodology used by DNV-GL.

10. Hazard risk

10.1 Lightning strikes

Clarification of additional risk of lightning strikes

Some representors claimed that turbines would attract lightning, thereby resulting in the starting of more bushfires. This claim is patently and demonstrably incorrect.

As very tall structures which are built on ridges, and thus typically the highest points in a given landscape, it is true that it is not uncommon for turbines to be struck by lightning. However, as pointed out in Neoen's first response, it is **incorrect** that such strikes commonly result in fires. Turbines are specifically designed to deal with strikes with minimal damage. There is an obvious commercial reason for this: if a turbine is significantly damaged by lightning, the financial losses from repair/replacement costs and 'downtime' are significant. Similarly, if a turbine starts a fire which causes damage to nearby property or land, the potential liability for the wind farm operator is considerable.

Consequently, turbine blades are constructed with a large cable running from their tips back to the nacelle. From here, another cable runs down the tower to the ground, where it connects to an 'earthing mat' – a network of cables buried underground which are designed to dissipate energy from a strike safely.

In a landscape without turbines, trees on ridges are typically the tallest points, and are most likely to be struck by lightning. Because wood is a poor conductor of electricity, when a tree is struck it will often catch alight (potentially starting bushfires). By attracting strikes which would otherwise have struck trees, turbines function in a similar way to lightning rods on tall buildings, which are also designed to dissipate the energy from strikes safely.

Finally, Neoen notes that there are now well over 2000 wind turbines installed in Australia. Taken in aggregate, these turbines have now accumulated millennia of 'operational years'. On the other hand, to Neoen's knowledge there have only been 4 fires recorded as ever having been started by turbines in Australia, and none since 2010 (as discussed in Neoen's first response, and in the section below on fire management). If turbines presented a meaningful risk of bushfires due to lightning strikes, these statistics would appear very different.

10.2 Fire management

Fire management including impediment to aerial water bombing to the north of Crystal Brook, (likely direction from which wild fire may approach)

The issue of aerial firefighting has been addressed at in the appendices of the Aeronautical and Aviation section of the DA (Volume 2) and in Neoen's first response. It has also been addressed in the 'Aviation impacts' section of this response.

Regarding ground-based firefighting, Neoen notes that CBEP will greatly facilitate local firefighting efforts, and restates the following from the first response:



Wind farms offer several benefits to ground-based firefighting efforts:

- 1. Construction and maintenance of access tracks in previously inaccessible areas such as steep hills and ridges greatly improves access for ground-based firefighting units, which are the primary means of fighting fires;
- 2. Access tracks also act as firebreaks, as in the recent Waterloo grass fire;
- 3. Frequent presence of maintenance staff resulting in greater oversight and potential earlier notification of fire;
- 4. Reduction of fuel load by regular slashing of grass and removal of debris;
- 5. On-site firefighting resources to augment local firefighting capabilities, including water tanks and firefighting equipment especially during construction.

Finally, Neoen notes once again that in its agency response, the Country Fire Service expressed no concern with regard to CBEP's effect on firefighting capabilities in the area. The CFS stated its support for development in regional and rural areas of South Australia, and specified several ways in which the project should be designed to facilitate firefighting, such as access road gradients, water sources and firefighting equipment. Neoen will be happy to comply with all such specifications, as it did throughout construction of Hornsdale Wind Farm and Power Reserve.

10.3 CASA recommendations

CASA Recommendations > height of towers and obstacle lighting requirements.

Some representors expressed concerns that Neoen had not consulted with the Civil Aviation Safety Authority (CASA) on the aviation impacts of the project – in particular, turbine heights and obstacle lighting. This is incorrect, and is also based on a mistaken understanding of the process of aviation impact assessment.

Neoen notes that the Aeronautical and Aviation component of the DA contained four elements:

- Aviation Impact Statement (AIS)
- Solar Glare Review
- Qualitative Risk Assessment
- Obstacle Lighting Review

10.3.1 Turbine heights

As set out in the DA, the CBEP AIS was conducted in accordance with Airservices Australia requirements (the Australian air navigation regulator), and contained the following information:

- Coordinates and elevations of the Obstacles and associated topographical drawings;
- Identification of all registered and certified aerodromes within 30nm (55.6km):
- Nomination of all instrument approach and landing procedures;
- Confirmation that the obstacles do not penetrate the Annex 14 OLS;
- Confirmation that the obstacles do not penetrate the PANS-OPS;
- Identification of any published air routes over or near the obstacles; and
- Identification of the airspace classification of the airspace surrounding the development
- Investigation of any probable impact on aviation Communications, Navigation and Surveillance (CNS) facilities.



Details of Aerodromes, OLS, PANS-OPS procedures, Lowest Safe Altitudes, Navigation and Airspace Surveillance facilities were obtained from the Australian Aeronautical Information Publications (AIP), AsA sources and CASA publications.

The AIS was sent directly by Chiron, Neoen's aviation consultant, to Airservices Australia and the Department of Defence. Airservices Australia then provided the AIS to CASA. *Please note that CASA has requested that proponents <u>not</u> contact them directly to provide Aviation Impact Statements, instead preferring that they receive them from Airservices.*

Since the DA was lodged, Airservices Australia and the Department of Defence have both provided responses, which are outlined in the Supplementary Report (Attachment D). Neither Airservices or Defence offered any criticism of the project with regard to turbine heights.

10.3.2 Obstacle lighting

As stated in the DA, when an obstacle is beyond the Obstacle Limitation Surface (OLS) and does not penetrate ICAO Annexe 14 Prescribed Airspace (PANS-OPS) associated with a Certified, Registered or Military aerodrome, CASA is only able to recommend (**not** mandate) aviation obstacle lighting. Crystal Brook falls into this category, as it is beyond the OLS and does not penetrate prescribed airspace. Despite this, Chiron has advised Neoen, CASA's blanket position which it now applies to every project is that turbines of 150m or greater AGL should have obstacle lighting. CASA has maintained this default position on virtually every wind project in recent years, of which very few are ultimately required by planning authorities to incorporate obstacle lighting. As stated in the DA, CASA has acknowledged that "*it is a matter for the appropriate Land Use Planning Authority to consider the implementation of our recommendations*".

CASA provided comments on the project in June 2018 (Attachment E). As anticipated, CASA maintained their default position and recommended obstacle lighting of the project due to the turbines being over 150m AGL. CASA also proposed, in the alternative, that if visual impact was too great, an 'Aircraft Detection Lighting System' could be utilised, which activates obstacle lighting only when aircraft are detected in the vicinity.

In consultation with Chiron, Neoen respectfully suggests that application of CASA's default recommendation is not appropriate or necessary at Crystal Brook. Per the Aeronautical and Aviation study in the DA (page 36), CBEP poses a minimal risk to aviation in its vicinity, and requires no further mitigation (such as obstacle lighting). By day, the wind towers will be conspicuous, while by night or in times of low visibility, aircraft are required to fly 1000 feet above them. CASA did not present any evidence challenging the conclusions of this risk assessment.

Regarding the 'Aircraft Detection Lighting System' proposed by CASA, Chiron has also advised Neoen that these systems are 'not widely used, not very effective and extremely expensive', at around US\$1 million per unit, with several units required on a wind farm of this size. Based on consultation with Chiron, Neoen suggests that the negligible risk posed to aviation by CBEP in no way supports a case for the significant added cost and complexity of this relatively unproven technology, which would ultimately be reflected in the price paid by consumers for power generated by the project. CASA again acknowledged in its comments on CBEP that 'any decision to light, or not light the proposed turbines remains with the planning authority to determine.'

In conclusion, Neoen submits that obstacle lighting at CBEP would be superfluous and would needlessly increase the project's visual impact and/or cost, and strongly requests that this not be imposed as a condition.



10.4 Traffic hazard from solar panel glare

Potential traffic hazard re reflection and glare from solar panels. Further explanation on design and construction of panels and how panel tilt controllers work, i.e. continual micro movement or discrete positions that change periodically?

Neoen notes the following excerpt from its first response to submissions:

The LVIA noted that the primary function of photovoltaic (PV) cells is to absorb light rather than reflect it. The panels will therefore include an anti-reflective coating on the solar cell wafers within each panel, and high-transmission, low-iron glass, which absorbs greater amounts of light and reflects less than standard glass. This will result in a surface which will reflect around 2% of light – **less than forest or grass**. Any minor glare can be further minimised with screening vegetation.



Figure 13 – Comparative Reflection Analysis³⁸

Neoen also directs the Panel to Section 10 of the LVIA, which covers the question of solar glare, concluding that 'Based on the results of previous assessments for PV solar power projects and studies carried out in a number of countries, the potential for sun glint and glare would not be expected to have a significant impact on residential dwellings surrounding the proposed solar facility, or upon motorists or people travelling through or over the surrounding landscape. This LVIA has noted the relatively significant amount of vegetation in the landscape surrounding the proposed Project Site, as well as the screening influence of local topography. Given the vast majority of residential dwellings will not have a line of sight toward the proposed solar panels, the potential for sun glint to create a significant visual impact is considered to be low.'

Neoen adds that if there is any visual impact for a particular neighbouring dwelling or (for example) driveway turn-off, however minor, Neoen can mitigate this by planting trees in relevant locations at the edge of the solar site or at the dwelling/driveway.

³⁸ https://www.solarchoice.net.au/blog/solar-panels-near-airports-glare-issue/

10.5 Design of solar facilities, including single-axis tracking technology

As noted in the DA, the solar farm will consist of up to 500,000 solar panels mounted on single-axis trackers, cabling, access tracks and stormwater management infrastructure located within a fenced compound. The panels will be mounted on tubular steel piles driven or screwed directly into the ground (most likely without concrete foundations but this remains subject to detailed geotechnical investigations).

The panels themselves will be glass, silicon-based, containing no heavy metals or toxic substances and contained in metal frames. They may be up to 4.5m tall at maximum tilt, and may utilise the latest 'bifacial' technology (meaning that a small amount of additional energy is captured from light reflected off the ground onto the bottom faces).

Single-axis trackers will tilt from east to west, characterised by continual micro-movement. This movement will not produce any significant noise, and may be controlled by pre-set algorithms or be a feedback control system.

As stated in the first response (20 – Using Arable Land), it should also be noted that traditional grazing practices can be compatible with solar developments. Neoen has conducted a successful trial at its solar farm in Parkes, NSW, where sheep were permitted to graze among the panels (please see Attachment F for summary). This both allowed the farmer to continue using the land for agricultural purposes and helped to manage vegetation without use of sprays. Neoen hopes to implement this practice on all future solar projects, where it is ecologically appropriate and subject to landowner agreement.

It should be noted that dust management is critical to the efficient operation of the solar panels. As such, a balance between stock grazing and pasture maintenance is crucial to the success of combining the two land uses. Grazing is managed at a rate and frequency that allows vegetation management but avoids dust creation.



Figure 14 - Sheep at Neoen's Parkes Solar Farm in NSW

11. Socio-Economic Impact

11.1 Heysen Trail

Interruption to walkers / loss of access to the Heysen Trail. Is the existing trail to be closed, re-routed or permanently altered if the development proceeds?

For walkers approaching from the north, the Heysen Trail approaches the site along Tanks Road, then turns east along the Wilkins Highway for a short distance, before turning south into the project site, where it runs along a densely vegetated gully with large overhanging trees.



Figure 15 - Heysen Trail Route (approximate)

In terms of potential impacts on the Trail, there are two relevant periods: construction and operation.

11.1.1 Construction Phase

Neoen does not currently anticipate any necessity to close or re-route the Heysen Trail for any significant length of time during construction (likely to take 18-24 months in total). There may be a single crossing of the Trail (comprising an underground cable and an access road) to link the eastern-most turbines (CB18, CB14, CB22 and CB19) with the rest of the site – most likely near CB27. A re-route around this short section may be necessary during a brief period of works to ensure walker safety; if so, it will be accompanied by appropriate signage, fencing and, if necessary, selective grading to ensure safe footing. The route considered below requires a detour of no more than 200m, and is located on land owned by an involved landholder, Mr Head, removing any concerns around access.





Figure 16 - Potential Heysen Trail re-route

There is a remote possibility that walkers of the Trail may seek to approach turbine construction sites (perhaps out of curiosity). Since these sites, like all construction sites, are not safe for members of the public, Neoen will ensure that appropriate signage and fencing is erected to discourage this. However, the risk is low; most walkers of the Trail will be aware that it is often bordered by private land where access would constitute trespassing (as it would in this case). Furthermore, those turbines adjacent to the Trail (CB27, CB33, CB23, CB16, CB04 and CB05) are all at least 250m away, and access on foot from the Trail would require steep ascents over partially-to-significantly vegetated terrain.

11.1.2 Operation Phase

Neoen anticipates very limited impacts on the Heysen Trail during operation. Clearly, there will be some visibility of turbines while approaching the site, whether from the north or the south. However, as stated above, the Trail as it passes through the site is screened by tall trees and dense vegetation; consequently, views of the turbines will be substantially screened. Any noise from the nearby turbines is also likely to be masked by the sound of wind in the trees.

Neoen notes that the Heysen Trail already passes close to wind farms; for example, the Waterloo Wind Farm. Neoen has already contacted (in early 2017) the Friends of the Heysen Trail and begun a dialogue about the interaction between the project and the Trail, and opportunities for cooperation. Neoen will continue this dialogue if the project moves forward.





Figure 17 - Waterloo Wind Farm on the Webb Gap to Waterloo section of the Heysen Trail
Photo credit: https://www.walkingsa.org.au/walk/find-a-place-to-walk/lavender-federation-trail/

11.2 Community consultation

Completeness and extent of pre-lodgement consultations with the local community bearing in mind many representors argued they were not contacted (or ineffectively so) during the design of the project.

Neoen recognises that community and stakeholder engagement, although not a statutory requirement, is a vital part of any large project. At CBEP, Neoen has undertaken a program of stakeholder and community engagement in good faith, investing significant time and resources in conducting extensive consultation with the Crystal Brook community. While every endeavour has been made to reach out to local residents, Neoen acknowledges that it has not been successful in contacting every individual. Neoen makes the following comments in relation to its community engagement process.

11.2.1 Rigorous process

Neoen conducts community engagement activities in accordance with our Community Engagement Policy and bespoke Engagement Plans which are developed for each project. These documents are based on the *Best practice community engagement in wind development* (2014).³⁹ Neoen has invested significant time and resources in conducting a robust community engagement process regarding the Crystal Brook Energy Park.

³⁹ Taryn Lane and Jarra Hicks, *Best practice community engagement in wind development* (2014), accessible at <u>http://cpagency.org.au/wp-content/uploads/2014/03/Attachment-E-Best-practice-community-engagement-in-wind-development-FINAL-V1.0.pdf</u>.



Preparation of the Community Engagement Plan and stakeholder mapping occurred in late 2016. In early 2017, the project website was launched and Neoen commenced meeting with project neighbours. Neoen held an initial Community Information Session in February 2017, presenting a draft preliminary layout, fact sheets, posters and photomontages from three different viewpoints. This event was attended by approximately 60-70 persons. At this time, Neoen also commenced engagement with the Beetaloo Valley Association (BVA), a group of approximately 40 landholders who live to the north-east of the project. Over the course of the following months, Neoen held two subsequent meetings with the BVA collectively and one-on-one meetings with several members.

Neoen held a second Community Information Session in March 2018 presenting the revised layout. The Information Session was well-attended, with approximately 80-100 persons present, and overall feedback was positive. Around this time, Neoen also met again with representatives of the BVA to present the revised layout with all northern turbines removed.

Neoen also notes that Neoen has never received a complaint from the National Wind Farm Commissioner's office regarding its community engagement activities at Crystal Brook Energy Park.

The table below shows a summary of the engagement activities which have been undertaken specifically with regard to project neighbours and community members.

Activity	Date	Comments
Project website launched	Jan 2017	The website has been regularly updated. All emails and Community Feedback Forms have been responded to.
Contact with neighbours in 5km radius	Jan 2017	Neoen conducted a mail-out to neighbours outside the Crystal Brook township within a 5km radius of the site, including Talbots Road residents (Attachment G) . Neoen followed up letters with phone calls where phone numbers were publicly available to arrange face-to-face meetings prior to the first Community Information Session.
One-on-one meetings: neighbours	Feb 2017 onwards	Majority supportive of project. Concerns raised by members of the Beetaloo Valley Association and two residents on Talbots Road. Some refusals of meetings from nearby neighbours.
Community Information Session	Feb 2017	Neoen presented draft preliminary layout, posters, fact sheets and photomontages. Well-attended (60-70 persons), predominantly positive feedback.
Meeting: Beetaloo Valley Association	Feb 2017	Numerous issues raised. Verbal and written response provided. Commitment to provide additional photomontages to BVA.
Response to objection letters	March/April 2017	Written response provided to O'Deas and Petersons. Meetings held with Luke O'Dea and Ian Peterson.
Meeting: Beetaloo Valley Association	April 2017	Presented revised layout (no. of turbines reduced from 51 to 34). Verbal and written response provided.

Table: Engagement Activities

Activity Date Comments **Response to Noise** May 2017 Response to letters requesting that background noise monitoring **Monitoring letters** be conducted subject to conditions. One-on-one meetings offered. Meeting: Beetaloo March 2018 Presented revised layout (no. of turbines reduced from 34 to 26). Valley Association BVA requested that remaining 26 turbines be removed. Second Community March 2018 Presented redesigned project to the Crystal Brook community Information Session with posters, fact sheets and photomontages. Again, wellattended (80-100 persons) and predominantly positive feedback. Submission of the March 2018 Neoen alerted all stakeholders that the DA had been submitted and where to access the DA submission and web interface for Development **Approval Package** submissions in response. Further one-on-one meeting with immediate (1.6km) neighbor Meeting: Bob Lewis May 2018 regarding noise, visual and health impacts. Committed to notify of public consultation phase and continue discussion around mitigation measures. Ongoing engagement Ongoing Neoen continues to respond to outreach from community, throughout DA including numerous expressions of interest from local assessment contractors.

11.2.2 Engagement in early 2017

Some submissions raised the concern that neighbours were not contacted during Neoen's early engagement with neighbours within a 5km radius of the project in early 2017. Neoen's community engagement process is based on proximity to the project site, as follows:

- 1. Engage with involved landholders;
- 2. Meet with project neighbours; and
- 3. Engage with the broader community through Community Information Sessions.

Prior to holding an initial Community Information Session in February 2017, Neoen mailed letters to neighbouring residents living outside of Crystal Brook, within 5km of the project site. Talbots Road residents were included in this mail-out. Crystal Brook township itself was not included in this mail-out as (1) Neoen's initial priority is to meet with those closest to the project, and then to engage with the broader community through Community Information Sessions, and (2) it would not be practical to mail individual letters to a town of over 1,500. Where phone numbers were publicly available, Neoen representatives followed-up these letters with a phone call to arrange meeting with neighbouring residents. Many neighbours accepted Neoen's offer of one-on-one meetings. Neoen was unsuccessful in meeting with every individual within this radius due to the following reasons:

- Some residents declined the offer;
- Contact details were not publicly available for some residents;
- Some contact details were out of date; or
CRYSTAL BROOK

• Some residents owned land near the project but did not live nearby, making it difficult to find contact details.

Since the initial Information Session in 2017, Neoen has held numerous one-on-one meetings with neighbours, group meetings, and has held a second Community Information Session. Both Community Information Sessions were extremely well-publicised in local newspapers and by flyers delivered to Crystal Brook PO Boxes. Additionally, Neoen notes that the Crystal Brook Energy Park has been in the public domain since January 2017 when the project website was launched, while the Development Application for the project was submitted in March 2018. This timeframe has provided community members with a 14-month window within which to provide feedback.

Feedback mechanisms have included:

- Providing feedback to the project team via one-on-one meetings;
- Providing feedback to the project team via group meetings;
- Providing feedback to the project team via Community Open Days;
- Completing a Community Feedback Form in person or via the project website;
- Emailing the project team at <u>contact@crystalbrookenergypark.com.au</u>;
- Calling the project team via the Neoen hotline; and
- Writing letters to Neoen Australia.

11.2.3 Specific individuals or groups

Some submissions raised that there had been no communication, or late communication. Neoen makes the following comments in relation to these specific submissions.

Resident	Submission	Neoen Response
Greg Hatter	No communication	The Hatter residence at 166 Hatters Road was included in the January 2017 mail-out. We subsequently learned that Mr Hatter resides in Mosman, Sydney and apologise if this letter was not received.
		Neoen received a letter from Mr Hatter on 15 February 2017 (Attachment H), shortly after Neoen's first Community Information Session, claiming that Neoen had not contacted him. Neoen acknowledged receipt of this letter via email and offered to meet with Mr Hatter to discuss the project (Attachment H). Attempts to contact Mr Hatter by phone were also made. Mr Hatter did not respond to these requests by email, phone or letter.
		Mr Hatter submitted questions on the project to Neoen to be discussed at a Beetaloo Valley Association meeting held in April 2017 (Attachment H) which were discussed at the meeting.



Resident	Submission	Neoen Response
Resident Mark Cunningham	Submission Not contacted by Neoen until April 2017	 Neoen Response The Cunningham residence (H24) was included in the January 2017 mail-out. We apologise if this letter was not received. Neoen contacted Mr Cunningham's residence by phone in April 2017 to discuss the possibility of including the Cunningham residence in the background noise monitoring. Following this call, Mr Cunningham sent a letter to the CEO of Neoen SAS, Neoen's shareholders and Garth Heron, Head of Wind Development at Neoen Australia (Attachment I). This letter attacked the integrity of Neoen and its staff, questioned how a French company could 'knowingly harm' Australian residents given that Australians had fought in France in World War II, and stated the following: The only acoustic consultant allowed on the property would be Mr Stephen Cooper; The acoustic monitoring must include full-spectrum acoustic monitoring; Neoen must agree to ensure that there is complete transparency of the data- i.e. that full copies of weather and noise data would be provided; Neoen must agree to grovide all SCADA (operational) data and all meteorological mast data;⁴⁰ Neoen must agree to "on-off" testing and fully cooperate in any other way to help identify the source of noise in the event that sleep disturbance/other adverse health impacts are reported by any nearby residents within 20km of the project; That all other residents living within the immediate acoustic impact zone of 10km from the external boundary of the wind turbines are provided with the same opportunities for independent acoustic monitoring; That the monitoring period be for at least 3 months, outside of seeding or harvest; Neoen responded to this letter in writing on 22 May 2017 (Attachment I). Neoen informed Mr Cunningham that we were unable to agree to the conditions set out in the letter. The reasons for this were: The cost of monitoring every residence in a 10km radium (inclusion deve of development as a devendent of the project;
		 The reasons for this were: The cost of monitoring every residence in a 10km radius (including thousands of dwellings) would be prohibitively costly (in the tens of millions); and It is only necessary to conduct noise monitoring at dwellings at representative locations near the project site in order to allow for accurate modelling of impacts.

⁴⁰ Please note that this data is commercially sensitive, proprietary information.



Resident	Submission	Neoen Response
		Neoen also rejects the methodology used by Mr Stephen Cooper, as addressed elsewhere in this response.
		Neoen also offered to arrange a face-to-face meeting and provided contact details if Mr Cunningham wished to discuss the project further. Neoen did not receive a response to this letter.
Simon Wooley	Not contacted by Neoen until 5 May 2017	2017 mail-out. We apologise if this letter was not received. Neoen contacted Ms Sarah Laurie by email in April 2017 asking if Ms Laurie would be willing for the property to be included in background noise monitoring (Attachment J). She
		requested that Neoen contact Mr Wooley (her husband) by email regarding the request for noise monitoring. Neoen emailed Mr Wooley on 5 May (Attachment J). Following this email, Mr Wooley sent a letter to the CEO of Neoen SAS, Neoen shareholders and Garth Heron, Head of Wind Development at Neoen Australia (Attachment J). The letter was in an identical form to that received by Mr Cunningham
		Neoen responded to this letter by writing on 22 May 2017 (Attachment J). Neoen informed Mr Wooley that we were unable to agree to the conditions set out in the letter for the same reasons set out above with respect to Mr Cunningham. Neoen offered to arrange a face-to-face meeting and provided contact details if Mr Wooley wished to discuss the project further. Neoen did not receive a response to this letter.
		Neoen apologises for an error in the written response to submissions which stated that Mr Wooley had not attended any of the Beetaloo Valley Association meetings. Neoen now realises that Mr Wooley did in fact attend one of the meetings, where he verbally abused a member of the project team but did not introduce himself. Having only corresponded with Mr Wooley in writing, Neoen's staff could not associate a face with the name.
Patricia Grieg	Haven't met with or been contacted by Neoen.	Ms Grieg's residence (H49) was included in the January 2017 mail-out. We apologise if this letter was not received.



Resident	Submission	Neoen Response
		Ms Grieg claimed at the SCAP hearing that during a phone conversation with the CBEP project manager in early-mid 2018, her son Nick Grieg raised various concerns which were 'dismissed' by the project manager, and that he was 'offered a job' on the project. The project manager was contacted by Mr Grieg, but Neoen rejects the assertion that his concerns were dismissed or that he was offered a job on the project. Regarding the latter claim, Neoen believes that Mr Grieg misinterpreted the project manager's intention. The project manager was responding to Mr Grieg's claim that only involved landholders would benefit from CBEP by emphasising that local contractors would be utilised wherever possible, thus bringing benefits to the wider community, and noting that Mr Grieg (who told the project manager that he drives heavy vehicles for his business) would be welcome to submit his resumé if the project proceeds. Neoen apologises for any confusion this may have caused. Neoen remains more than willing to meet with Mr Grieg, Ms Grieg or their family to provide project information or address concerns. For Neoen, community engagement is an ongoing
		process and we will continue to meet with any local residents who wish to discuss the project with us.
Talbots Road residents	Not spoken to/only two residents contacted	Some submissions stated that no residents on Talbots Road had been contacted, or that only two residents were contacted.
		This is incorrect. To Neoen's knowledge, all residents of Talbots Road were included in the January 2017 mail-out. We apologise if any letters were not received. Neoen met with a group of Talbots Road residents in May 2017 to discuss the project. Neoen held a further one-on-one meeting with Mr and Mrs Taylor, the closest residents of Talbots Road to the project. Neoen offered noise monitoring at their residence and later engaged an expert consultant to prepare a photomontage from their residence in response to concerns about the visual impact.



11.2.4 Engagement with Crystal Brook residents

Some representors claimed that there was insufficient engagement with Crystal Brook residents. As stated above, Neoen's approach is to begin by engaging with those closest to the project site, and then to consult with the broader community through Community Information Sessions. Neoen held two Community Information Sessions in Crystal Brook, first in February 2017 and then in March 2017. Both of these sessions were advertised in local newspapers including the Crystal Brook Chronicle, Flinders News and the Port Pirie Recorder (**Attachments K and L**). Prior to the March 2018 Information Session, a delivery of approximately 900 flyers for the event (in identical form to Attachment L) was conducted to post boxes at the Crystal Brook post office. These events were well-attended (60-80 and 80-100 persons respectively) and Neoen received a large number of Community Feedback Forms at these events.

Neoen is also committed to meeting with any local resident who expresses a wish to meet with us, and distributed numerous business cards at the Information Sessions and at one-on-one meetings. Neoen representatives have now met with many residents in the Crystal Brook township.

11.2.5 Community consultation on DA layout

Neoen has done its utmost to take into account feedback received from the community as to the appropriate placement of wind turbines, with the result that more than 50% of the turbines originally proposed have been removed.

One representor from the Beetaloo Valley Association expressed concern that the BVA and the community was not provided with adequate time to comment on the layout submitted as part of the Development Application. Neoen does not accept this claim. Neoen met with representatives of the BVA shortly before the second Community Information Session (held on March 26) where the layout was outlined in detail with reference to a map. The response from BVA representatives at that meeting was to request that Neoen remove the remaining 26 turbines. Neoen then presented the layout to the community at the Community Information Session. The Development Application was lodged on 29 March 2018, and shortly afterward went on public exhibition for a period of four weeks. This period provided residents with a significant window within which to make a submission on the project and the layout. Neoen also notes that this final layout was already the result of an extensive and detailed consultation process which had resulted in significant changes.

11.2.6 Project updates

Some submissions suggested that Neoen had not adequately updated local residents on the progress of the project. Neoen has endeavoured to keep community members up-to-date regarding key project milestones through the following mechanisms:

- Updating the News Room section on the project website.
- Updating the History section on the project website.
- Inviting members of the community who are interested in employment opportunities with the project to submit an Expression of Interest to the project email.
- Responding to Community Feedback Forms and emails received via the project email.



11.2.7 Crown Sponsorship

Some submissions suggested that Neoen claimed during community engagement at CBEP that the project had government support or backing. This is a misunderstanding of the Crown Sponsored Public Infrastructure process under s 49 of the *Development Act 1993* (SAS). Neoen explained to community members interested in the application process that the project had received Crown Sponsorship under section 49, but was also clear that this in no way meant that the project had government funding or was guaranteed approval.

CRYSTAL BROOK

11.3 Construction impacts on Crystal Brook and surrounds (catchment, local services, infrastructure, accommodation)

Further consideration of the construction impacts on the Crystal Brook catchment in particular, and region more generally (such as on local services, infrastructure, accommodation etc).

Neoen acknowledges that Crystal Brook is an important township that provides services to the surrounding agriculture and farming community. However, the project site is also within a reasonable distance of Port Pirie which is a regional centre and which offers a range of regional level services. Companies experienced in wind farm and large-scale infrastructure developments are often working in remote areas that do not have any support services or sufficient support services. These companies make the most of the services and accommodation that is available, often renting housing on farms or in nearby locations (such as Port Pirie). Where services are not available they plan for alternative strategies, such as temporary worker housing. For CBEP, the proximity of Port Pirie and other nearby towns such as Gladstone, Laura and Georgetown mean that it is highly unlikely that any type of service or infrastructure in the Crystal Brook area will come under unreasonable pressure due to the construction phase of the development.

In comparison, Jamestown (a rural centre not dissimilar to Crystal Brook, though more remote) was the key support centre for the Hornsdale Wind Farm and the Power Reserve projects. The economic activity that surrounded these projects provided an incentive to re-vitalise a number of businesses in this town, as detailed further in 'Impacts on tourism'. A similar pattern of revitalisation could be expected in Crystal Brook.

CBEP will result in the influx of tens of millions of dollars into the local community through the employment of local contractors and construction workers. After construction, a smaller but steady and long-term (25-30 years) boost will be provided by maintenance staff and their families. Both phases will provide a major uplift to local businesses, accommodation, schools and real estate. Neoen notes that representors at the hearing acknowledged that (1) the average age of the Crystal Brook demographic is well above the Australian average, and (2) the real estate market in the area is depressed, with many houses having remained on the market for years. CBEP will help to alleviate these trends and revitalise the town, as occurred in Jamestown as a result of the Hornsdale Wind Farm.

Neoen also emphasises that the Community Fund of \$80,000 per year will provide significant support to local community groups, sporting clubs and initiatives. Below is a picture from 2018 with Mayor Denis Clark of the Northern Areas Council presenting the Laura Community Caravan Park Committee, with \$8,000 in funding to reduce the Park's power bills. Laura is only a few kilometres north-east of the proposed CBEP site and slightly east of Beetaloo Valley.





Laura Community Caravan Park Committee Chairman Barrie Harvie was presented with \$8000 in Energy Efficiency funding by Mayor Denis Clark on behalf of Neoen

Regarding construction impacts on the town's infrastructure, the only anticipated impacts are traffic delays and some wear and tear on local roads (outside of the town itself); Neoen has addressed this in the DA and in its first response. Some traffic delays are inevitable, as with any large-scale construction project, but these are well-able to be mitigated (see those documents for additional details). Where damage to roads occurs, or where upgrades are required to safely accommodate construction traffic, Neoen will perform these works at its cost (should the application be approved, this arrangement will be further detailed in the Traffic Management Plan prior to construction).

CRYSTAL BROOK

11.4 Impacts on tourism

Response to concerns that Crystal Brook forms the gateway to the southern Flinders ranges, where the development could negatively impact on local business operators (i.e. tourism) and the value placed on natural amenity and landscape character as part of their business model.

Several representors claimed that CBEP would have a negative effect on the local tourism industry in Crystal Brook.

It is noted that the question identifies Crystal Brook as a "gateway" to the Flinders Ranges. Neoen notes that other places like Melrose, Quorn, Port Augusta and Port Pirie also claim to be gateways to the Flinders Ranges.

Neoen also notes that many representors have a particular view about renewable energy projects; however, this is not necessarily a view shared by the majority of people (including potential tourists). Both Jamestown and Snowtown have experienced increases in tourism activity as a result of nearby renewable energy projects, most notably the Tesla 'big battery' mentioned in Neoen's first response.

Neoen thus re-emphasises that it does not accept the premise that tourism in the town will be negatively impacted by the project. Besides the fact that noise and visual impacts on the town will be negligible (see Figure 8 of the first response), no evidence was presented by representors as to which businesses would be affected, or how. To be specific:

11.4.1 Pubs/hotels

Crystal Brook currently has two pubs/hotels – the Crystal Brook Hotel and the Royal Hotel. Given these businesses' central locations in the town, it is extremely unlikely that CBEP would be visible from these premises (see Figure 9 of the first response).

As they do not appear to advertise accommodation online, the primary business of the Crystal Brook Hotel and the Royal Hotel appears to be service of food and alcohol. These businesses could expect to receive a substantial boost to food and alcohol revenues from CBEP, through an increase in the local workforce of over 200 during construction, and a permanent increase of 10-20 locally-based operations and maintenance staff (plus their families) for 25-30 years.

11.4.2 Crystal Brook Caravan Park

This business is located at 330 Goyder Highway, with the nearest proposed CBEP turbine 4.25km away. While it is possible that there will be some distant views of the turbines from the edges of the caravan park, Neoen notes that it is heavily screened by large, established trees and vegetation, and any views from within it will be very heavily filtered. CBEP will have no noise impacts on the park or its visitors (also noting that it is approximately 350m from an active railway).



11.4.3 Bowman Park

Bowman Park is a popular caravan camping destination located near Crystal Brook, approximately 1.55km from the nearest turbine. Several representors claimed that the amenity of Bowman Park would be impacted if CBEP proceeds, and that this would in turn impact Crystal Brook's tourism industry. Neoen notes that since camping at Bowman Park is free, and since campers do not require accommodation with local providers, the only possible tourism impact which could be imagined is a lower number of campers patronising Crystal Brook food and beverage providers. Furthermore, given the low predicted noise impacts and extremely high level of established vegetative cover at Bowman Park, Neoen does not accept any premise that visitor numbers to Bowman Park will be reduced. Neoen notes, based on previous conversations, that the resident caretaker of Bowman Park (H16) is not opposed to CBEP.

With significant landscaping maintenance required annually and several historic buildings to maintain, Bowman Park would be an ideal recipient for a portion of CBEP's proposed Community Fund. Upgrades to facilities for campers may arguably attract more visitors.



Figure 18 - Crystal Brook Caravan Park

11.4.4 Kupsch Bakery, Vault 35 (café) and Damien & Ginger's Café, Pizza and Takeaway

These three businesses serve food and drinks of various kinds. Neoen accepts that tourism revenues, most likely from motorists passing through the town, are likely to form an important portion of their business. However, once again, Neoen notes that as CBEP will have negligible impact on the township, especially on the central business area, there is no evidence that these revenues will be affected. Furthermore, as with the Crystal Brook Hotel and the Royal Hotel, these businesses can expect to receive a substantial boost through an increase in the local workforce of over 200 during construction, and a permanent increase of 10-20 locally-based operations and maintenance staff (plus their families) for 25-30 years. Neoen notes that at least one new business (for example, Bindlestick café) opened in Jamestown during construction of the Hornsdale Wind Farm, and the Jamestown Bakery was also renovated and expanded. Both of these businesses remain open today, servicing tourists and the local community.