

# Liverpool Range Wind Farm

Fact Sheet

06

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## Construction Noise Fact Sheet



### Why was the assessment undertaken?

During construction of a wind farm, like any major infrastructure project, there are potential amenity impacts at nearby residences due to general construction noise associated with the movement of construction vehicles within the wind farm, operation of machinery and equipment, blasting activities, and traffic along public roads.

A Predictive Noise Impact Assessment was prepared by Sonus Pty Ltd for the Modified Project which provides a comparative assessment of on-site construction noise and construction traffic noise associated with the Modified Project and Approved Project (the Sonus Report). Wherever relevant, the Sonus Report relies on the findings of the Noise Impact Assessment (and Addendum) prepared by SLR Pty Ltd in 2014 (and 2017) in support of the Approved Project (the SLR Report).

The Sonus Report also includes a detailed assessment of the potential noise impacts associated with 24 potential concrete batch plant locations proposed by the Modified Project.

### What was the approach?

The Sonus Report was prepared considering the relevant conditions of Development Consent SSD 6696 that was granted for the Approved Project in 2018 and in accordance with the *NSW Wind Energy: Noise Assessment Bulletin AB02* (EPA/DPE, 2016).

The Sonus Report identifies that the infrastructure layout and construction traffic volumes estimated for the Modified Project do not differ greatly from the Approved Project, and therefore the findings of the SLR Report related to construction noise, vibration, blasting and construction traffic noise remain valid and should be relied upon for the Modified Project.



## CONSTRUCTION NOISE

The SLR Report includes a detailed assessment of potential noise impacts associated with the operation of anticipated machinery and equipment during construction.

The SLR Report modelled the following four typical construction scenarios and assumed all anticipated mobile machinery and equipment are in operation simultaneously at full load:

- Construction of Access Roads
- Establishment of Turbine Foundations
- Trench Excavation
- WTG Erection and Assembly

Construction noise must be minimised and managed in accordance with the NSW Interim Construction Noise Guidelines (DECC, 2009) (ICN Guideline). The ICN Guideline establishes Noise Management Levels (NMLs) to identify residences which may be considered 'noise affected' or 'highly noise affected' as a result of construction works undertaken during the day or night, and the associated noise minimisation and mitigation strategies that should be applied. In accordance with the ICN Guideline the SLR Report assumed a minimum rated background noise level (RBL) of 30 dB(A) which corresponds to the following applicable Noise Management Levels for proposed construction activities:

- Daytime construction works: **40 dB(A)**
- Nighttime construction works: **35 dB(A)**

The application of the [ICN Guideline Noise Management Levels](#) are summarised in the table below.

Time of day	Management Level LAeq (15 min) *	How to apply
<b>Recommended standard hours:</b>  Monday to Friday 7am to 6pm  Saturday 8am to 1pm  No work on Sundays or public holidays	Noise affected RBL + 10 dB	The noise affected level represents the point above which there may be some community reaction to noise. <ul style="list-style-type: none"> <li>• Where the predicted or measured LAeq (15 min) is greater than the noise affected level, the proponent should apply all feasible and reasonable work practices to meet the noise affected level.</li> <li>• The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.</li> </ul>
	Highly noise affected 75dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. <ul style="list-style-type: none"> <li>• Where noise is above this level, the relevant authority (consent, determining or regulatory) may require respite periods by restricting the hours that the very noisy activities can occur, taking into account: <ol style="list-style-type: none"> <li>1. times identified by the community when they are less sensitive to noise (such as before and after school for works near schools, or mid-morning or mid-afternoon for works near residences)</li> <li>2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.</li> </ol> </li> </ul>
<b>Outside recommended standard hours</b>	Noise affected RBL + 5 dB	<ul style="list-style-type: none"> <li>• A strong justification would typically be required for works outside the recommended standard hours.</li> <li>• The proponent should apply all feasible and reasonable work practices to meet the noise affected level.</li> <li>• Where all feasible and reasonable practices have been applied and noise is more than 5 dB(A) above the noise affected level, the proponent should negotiate with the community.</li> <li>• For guidance on negotiating agreements see section 7.2.2.</li> </ul>

## CONCRETE BATCH PLANT NOISE

The operation of concrete batch plants is generally considered to be one of the noisiest activities related to the construction of a wind farm project.

To provide flexibility during the detailed design phase, the Modified Project proposes up to 24 potential locations for temporary concrete batching plants, with up to 9 operational at any given time during construction.

The SLR Report assessed the potential noise impacts at 4 potential concrete batching plant locations proposed by the Approved Project.

As the Modified Project proposes to increase the potential number of temporary concrete batch plants the Sonus Report includes a detailed assessment of the predicted noise levels associated with the operation of these additional potential concrete batch plant locations.

To model a conservative worst-case noise impact scenario, the Sonus Report assumes that all 24 potential concrete batch plant locations are in operation concurrently, although this will not occur in practice. As required under the ICN Guideline, the noise level predictions include a 5 dB(A) penalty to account for the particular noise characteristics of construction activities that may cause annoyance to nearby residents.

## VIBRATION

The SLR Report included a detailed assessment of potential vibration impacts during construction.

The activities and equipment with the potential to generate the highest levels of ground vibration are the operation of the vibratory roller during construction of access roads and the operation of the rock breaker during construction of turbine tower foundations.

Typical vibration emissions levels associated with these activities are summarised in the table below.

Activity	PPV Vibration Level (mm/s) at Distance			
	10m	20m	30m	100m
4-Tonne Vibratory Roller	2.0 - 2.4	0.4 - 1.2	0.2 - 0.8	<0.2
Hydraulic Hammer 30t	3.0	1.5	1.0	<0.5

Acceptable values for continuous and impulsive vibration are set out in the *Assessing Vibration: A Technical Guideline* (DEC, 2006) which are based upon guidelines contained in BS 6472-1992, *Evaluation of human exposure to vibration in buildings (1-80 Hz)*.

The SLR Report adopted the most stringent value of **0.2 mm/s** preferred peak velocity (PPV) for continuous vibration at residences during the night-time period.

## BLASTING

Blasting may be required in some areas to clear large rock outcrops to prepare turbine foundations.

The SLR Report assessed the potential for residential disturbance arising from blast emissions against the *Technical Basis for Guidelines to Minimise Annoyance due to Blasting Overpressure and Ground Vibration* (ANZEC, 1990) (ANZEC Guidelines) which sets out the following recommended controls:

- The recommended maximum level for airblast is **115 dB Linear**
- The recommended maximum for ground vibration is **5 mm/s**, Peak Vector Sum (PVS) vibration velocity.
- Blasting should generally only be permitted during the hours of 9:00 am to 5:00 pm Monday to Saturday.
- Blasting should not take place on Sundays and public holidays.
- Blasting should generally take place no more than once per day.

## CONSTRUCTION TRAFFIC NOISE

The SLR Report assessed the potential noise impacts associated with construction vehicle movements along public roads which has the potential to increase noise levels at nearby residences. The relevant road traffic noise criteria set out in the NSW Road Noise Policy (DEC, 2011) are summarised in the table below.

### Road Noise Traffic Criteria – taken from SLR Noise Impact Assessment

Type of Development	Criteria	
	Day 7am - 10pm (dB(A))	Where Criteria are Already Exceeded
Existing residences affected by additional traffic on existing freeways/arterial/sub-arterial roads generated by land use developments	LAeq(15hour) 60 dB(A)	In all cases, the redevelopment should be designed so as not to increase existing noise levels by more than 2 dB(A)
Existing residences affected by additional traffic on local roads generated by land use developments	LAeq(1hour) 55 dB(A)	In all cases, the redevelopment should be designed so as not to increase existing noise levels by more than 2 dB(A)

## What did we find and how does it compare to the Approved Project?

The Sonus Report identifies that the Modified Project does not propose to locate wind farm infrastructure closer to non-associated residences than the Approved Project, and is expected to result in a minor decrease in the estimated daily volume of construction traffic compared to the Approved Project (reducing from approximately 325 one-way trips per day during the peak construction period to approximately 304 one-way trips per day during the peak construction period).

Based on this, the Sonus Report concludes that the Modified Project is not expected to result in any greater noise impacts from construction activities, vibration, blasting or traffic movements along public roads at non-associated residences, and that the findings of the SLR Report remain valid and should be relied on for the Modified Project.

## CONSTRUCTION NOISE

### Daytime Construction Works

Noise levels were predicted for daytime construction works at all nearby residences, of which 82 residences were deemed 'noise affected' under the ICN Guidelines as the predicted noise levels at those residences exceed the daytime Noise Management Level of 40 dB(A) under different construction scenarios. The ICN Guideline sets out recommended mitigation measures that should be implemented for noise affected residences.

The noisiest works typically occur during the turbine foundation civil works construction scenario and is largely associated with the operation of rock breaker machinery, which would be operated intermittently across the site. Due to the anticipated short period of localised works turbine foundation civil works were considered acceptable under the ICN Guideline.

Predicted noise levels for daytime construction works do not exceed 75 dB(A) and therefore no residences would be considered as being 'highly noise affected'.

### Evening/nighttime construction works

On occasion, nighttime construction works may be required to complete activities that cannot be stopped midway through or must be undertaken under favourable wind/weather conditions, for example turbine erection works.

To account for potential nighttime works, the SLR Report assumed that turbine erection works may occur at night on occasion and modelled noise levels associated with the use of large cranes operated at full load.

Assuming a conservative nighttime Noise Management Level of 35 dB(A) the SLR Report identified 45 residences that may be deemed 'noise affected' during nighttime construction activities as the predicted noise levels at those residences exceed 35 dB(A). Mitigation measures should be implemented at noise affected residences in accordance with the ICN Guideline.

Predicted noise levels for nighttime turbine erections works do not exceed 75 dB(A) and therefore no residences would be considered as being 'highly noise affected'.

### **Blasting and ground vibration**

The SLR Report concludes that blasting activities at the site are likely to meet all human comfort limits and building damage assessment criteria and comply with the ANZEC Guidelines. The SLR Report identified that the closest distance between a turbine and a residence would be approximately 1,300 m (Dwelling D4-8). Based on this minimum separation distance of 1,300 m the SLR Report identified the following potential airblast and vibration impacts:

- The predicted maximum instantaneous charge (MIC) of up to 98 kg is likely to produce an airblast overpressure below the acceptable level of 115 dB Linear.
- An MIC of 98 kg is expected to result in a vibration level of 0.8 mm/s, well within the recommended maximum level of 5 mm/s

### **Construction traffic noise**

The SLR Report concludes that the 'worst case' maximum construction traffic scenario would comply with the NSW Road Noise Policy requirements, due to the typically large setback of dwellings from the road network and that night-time deliveries are unlikely to cause sleep disturbance based on predicted maximum noise levels.

The SLR Report identified that the projected increase in road traffic noise levels on all local roads is expected to be greater than 2 dB(A) during peak construction periods. Despite this, the road traffic noise levels at nearby residences during daytime periods are anticipated to meet the NSW Road Noise Policy daytime target of 55 dB(A) for a local road at a typical setback distance of 50 m.

All but four residences located near public roads proposed to be used for construction of the Project are set back in excess of 50 m from the public road and therefore will easily meet the NSW Road Noise Policy target. The SLR Report concludes that the four identified residences located within 50 m of a public road (see table below) are unlikely to be significantly impacted by road traffic noise as:

- Predicted noise levels are based on a highly conservative worst-case estimates of daily vehicle movements along the public roads, and traffic volumes are likely to be less in practice.
- The predicted noise levels at the closest residence (D7-3, set back 24 m from the public road) would only be approximately 3 dB(A) higher than that at the 50 m setback distance.

Non-associated Residence ID	Distance from road centreline
C4-4*	40m
D7-3	24 m
E7-1	38 m
E9-3	30 m

*\*Note: Dwelling C4-4 is located along Gundare Road - this section of Gundare Road is not proposed to be used by the Modified Project.*

On occasion there could potentially be deliveries of equipment during evening periods due to traffic congestion or for the safe passage of heavy vehicle convoys or especially long loads. Night-time traffic has the potential to cause sleep disturbance to nearby residents.

The SLR Report concludes that night-time deliveries are unlikely to cause sleep disturbance based on predicted maximum noise levels. The maximum noise levels at a residence approximately 50 metres from the road as a result of a heavy vehicle pass-by would be up to 55 dB(A) external to the residence, which is at least 5 dBA below recognised sleep disturbance criteria (i.e. 50 dB(A)). When adjusted, noise levels internal to a residence located 50 m from the road would be up to 45 dB(A).

### **Additional potential concrete batch plant locations**

The Sonus Report includes predicted noise levels from concrete batching activity. The Modified Project proposes 24 potential locations for concrete batching plants, which were not proposed by the Approved Project. The table below lists the predicted noise levels at all non-associated residences where the predicted noise level is greater than 25 dB(A). Noise contours for the operation of the concrete batch plants are shown on the plan overleaf.

Non-associated Residence ID	Predicted Noise Levels above 25 dB(A)
11	25 dB(A)
12	26 dB(A)
13	26 dB(A)
C2-3	26 dB(A)
C2-4	26 dB(A)
C6-3	29 dB(A)

The Sonus Report compares the predicted noise levels from concrete batching activity against the Noise Management Levels set out in the ICN Guideline (see table on previous page). Based on the predicted noise levels, the Sonus Report concludes that there are no non-associated residences with a predicted noise level of greater than 35 dB(A). Therefore, there are no non-associated residences that could be considered to be “noise affected” under the ICN Guideline, for the operation of concrete batching plant operations that may occur outside recommended standard hours.

It is noted that the predicted noise levels set out in the Sonus Report are conservative worst-case estimates, and that not all potential concrete batch plant locations will operate concurrently, resulting in lower noise levels at nearby residences.

## **What are the proposed mitigation strategies?**

To minimise potential noise impacts at nearby residences associated with the construction of the Modified Project Tilt Renewables will ensure compliance with the relevant construction noise conditions set out in Development Consent SSD 6696 related to construction hours, vibration and blasting limits, and construction traffic.

In addition, Tilt Renewables will implement the following recommendations set out in the SLR Report:

- Consider the following buffer distances to residences when siting any rock crushing activities:
  - Distance of less than 1,150 metres then noise potentially greater than 40 dBA = Noise affected.
  - Distance of less than 50 metres then noise potentially greater than 75 dBA = Highly noise affected.
- Consider undertaking turbine erection works near potentially ‘noise affected’ residences during the daytime, if possible.
- To minimise potential noise impacts associated with night-time construction traffic undertake the following measures:
  - Provide prior notification to affected residences where night-time convoys are scheduled
  - Restrict the use of exhaust/engine brakes in built up areas.

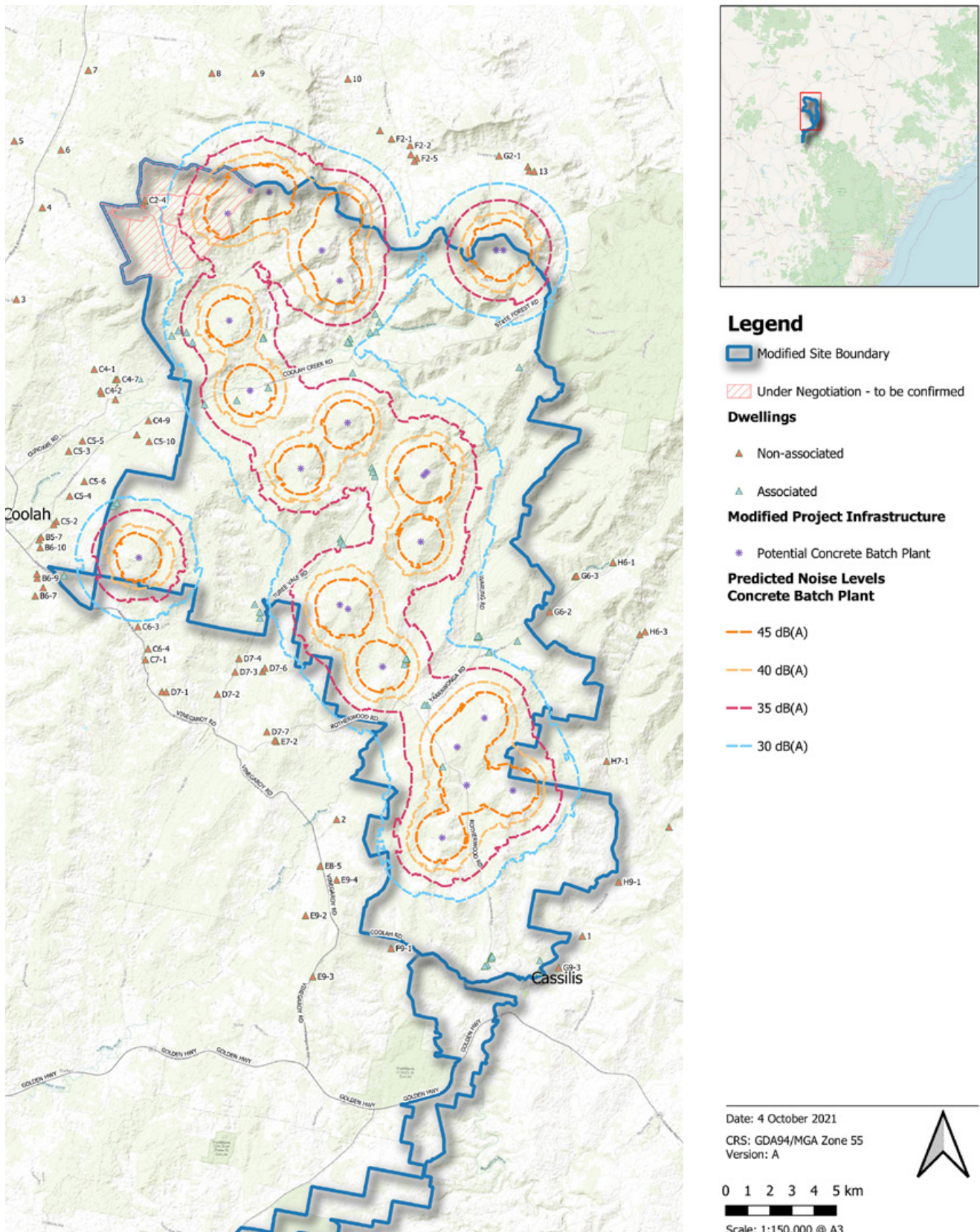
Wherever relevant Tilt Renewables will consider implementing a range of additional mitigation measures during construction, including but not limited to the following:

- Where residences are classed as ‘noise affected’, Tilt Renewables will implement feasible and reasonable work practices in accordance with the ICN Guidelines and provide advance notice to those residents of the proposed construction work.
- Locating fixed noise sources as far as reasonably practicable from residences
- Installing acoustic screens around fixed noise sources
- Enclosing generators and compressors
- Noise controls including temporary walls/earth berms and exhaust silencers
- Implementing alternative processes and/or quieter machinery and equipment (where feasible and reasonable)
- Ensuring effective site, equipment and vehicle management and maintenance

All proposed construction noise mitigation and management measures will be detailed in a Construction Noise Management Plan that will be prepared for the Project and implemented throughout the construction phase.



## Modified Project Predicted Concrete Batch Plant Noise Levels



## Assessment against Development Consent

The Modified Project can comply with the existing conditions of the Development Consent relating to construction noise, in particular:

- All construction activities must be undertaken within the following hours (unless otherwise agreed with the Secretary):
  - 7 am to 6 pm Monday to Friday;
  - 8 am to 1 pm Saturdays; and
  - at no time on Sundays and NSW public holidays.
- Ensure noise generated by construction activities is managed in accordance with the best practice requirements outlined in the ICN Guideline.
- Blasting activities may only be undertaken between 9 am and 5 pm Monday to Friday and between 8 am to 1 pm on Saturday. No blasting is allowed on Sundays or public holidays. Blasting activities must not exceed the airblast and ground vibration criteria specified in the Development Consent.
- Upon request, reasonable and feasible noise mitigation measures to be implemented at Dwellings D7-3, D7-4, E7-1 and E9-3 aimed at reducing the construction traffic noise impacts at those residences.

### GOODS AND SERVICES REGISTER

To register interest in providing goods or services for the Project, please visit [www.liverpoolrangewindfarm.com.au](http://www.liverpoolrangewindfarm.com.au) and complete the linked form under the Employment section.



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