# D.4 Noise

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# Tilbuster Solar Farm Modification - Noise Assessment

## 1 Introduction

Renzo Tonin & Associates was engaged to review the noise impacts with the proposed modification to the construction phase for the Tilbuster Solar Farm project. Renzo Tonin & Associates prepared the Tilbuster Solar Farm – Construction & Operational Noise & Vibration Assessment (ref.: TK911-1F02 Report (r3) dated 2 April 2020) for the EIS, which assessed construction noise impacts to the nearest receivers to the subject site.

## 2 Project Description

The proposed modifications to the construction phase are as follows:

- Development footprint expansion including relocation of substation, access road widening, improved accuracy of mapped boundaries and addressing TransGrid requirements
- OSOM definition change from 'Over-dimensional vehicle/s" to "Heavy vehicle/s requiring escort"
- Extend weekend construction hours to 8:00am to 6:00pm Saturdays and Sundays (Previously 8:00am to 1:00pm Saturdays, no work Sundays)
- Additionality for port options including Newcastle Port as an option during construction phase

## 3 Construction Noise

The proposed extended weekend construction hours will occur outside recommended standard hours (7:00am to 6:00pm Monday to Fridays and 8:00am to 1:00pm Saturdays) nominated in the NSW '*Interim Construction Noise Guideline*' (ICNG, 2009).

Table 1 reproduced from the ICNG, sets out the noise management levels and how they are to be applied for residential receivers for the extended weekend hours.

**Table 1 – Noise Management Levels (NML) at Residential Receivers, dB(A)**

| Time of Day | Management Level $L_{Aeq\ (15\ min)}$ | How to Apply |
|---|---|---|
| Outside recommended standard hours | Noise affected RBL + 5dB(A) | A strong justification would typically be required for works outside the recommended standard hours.<br>The proponent should apply all feasible and reasonable work practices to meet the noise affected level.<br>Where all feasible and reasonable practices have been applied and noise is more than 5dB(A) above the noise affected level, the proponent should negotiate with the community.<br>For guidance on negotiating agreements see section 7.2.2 of the ICNG. |

Table 2 presents the construction noise management levels established for the nearest noise sensitive residential receivers based upon day time background noise level, the proposed construction hours and the ICNG requirements. Given that extended weekend hours are to occur during the daytime period only the daytime period will be assessed.

**Table 2 – Extended Weekend Hours Construction Noise Management Levels (NML) at Residential Receivers, dB(A)**

| Location Description | Day $L_{A90}$ Background Noise Level (RBL) | Extended Weekend Hours NML $L_{Aeq(15min)}$ |
|---|---|---|
| All residential receivers | 35[1] | 35 + 5 = **40** |

Notes: 1. Extended weekend construction works occur during the daytime period only; hence, only the day period is assessed

## 3.1 Construction Noise Assessment

Table 3 presents construction noise levels likely to be experienced at the nearby affected receivers based on the construction activities and plant and equipment associated with the proposed development site previously presented but with the expanded development footprint due to the modification. The noise level ranges represent the noise source being located at the furthest to the closest proximity to each receiver location.

**Table 3 – Predicted $L_{Aeq,15min}$ Construction Noise Levels at Receiver Locations, dB(A)**

| Plant Item | Plant Description | Predicted $L_{eq(15min)}$ Construction Noise Levels | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | R1 | R2 | R3 | R4 | R5 | R6 | R7 | R8 | R9 | R10 | R11 | R11A | R12 | R13 | R14 | R15 |
| *Noise Management Level: Day Standard Hours[1] / Extended Weekend Hours[1]* | | *40/45* | *40/45* | *40/45* | *40/45* | *40/45* | *40/45* | *40/45* | *40/45* | *40/45* | *40/45* | *40/45* | *40/45* | *40/45* | *40/45* | *40/45* | *40/45* |
| 1 | Small pile driving rig | <20-21 | <20-25 | <20-29 | <20 | <20-34 | <20-29 | <20 | <20-37 | <20-43 | <20-21 | <20-37 | <20-43 | <20 | <20-33 | <20 | <20-42 |
| 2 | Crane | <20 | <20-21 | <20-25 | <20 | <20-30 | <20-25 | <20 | <20-33 | <20-39 | <20 | <20-33 | <20-39 | <20 | <20-29 | <20 | <20-38 |
| 3 | Drum roller | <20 | <20-20 | <20-24 | <20 | <20-29 | <20-24 | <20 | <20-32 | <20-38 | <20 | <20-32 | <20-38 | <20 | <20-28 | <20 | <20-37 |
| 4 | Padfoot roller | <20 | <20-20 | <20-24 | <20 | <20-29 | <20-24 | <20 | <20-32 | <20-38 | <20 | <20-32 | <20-38 | <20 | <20-28 | <20 | <20-37 |
| 5 | Wheeled loader | <20 | <20-20 | <20-24 | <20 | <20-29 | <20-24 | <20 | <20-32 | <20-38 | <20 | <20-32 | <20-38 | <20 | <20-28 | <20 | <20-37 |
| 6 | Dump truck | <20 | <20 | <20-23 | <20 | <20-28 | <20-23 | <20 | <20-31 | <20-37 | <20 | <20-31 | <20-37 | <20 | <20-27 | <20 | <20-36 |
| 7 | 30t Excavator | <20 | <20 | <20-22 | <20 | <20-27 | <20-22 | <20 | <20-30 | <20-36 | <20 | <20-30 | <20-36 | <20 | <20-26 | <20 | <20-35 |
| 8 | Grader | <20 | <20 | <20-22 | <20 | <20-27 | <20-22 | <20 | <20-30 | <20-36 | <20 | <20-30 | <20-36 | <20 | <20-26 | <20 | <20-35 |
| 9 | Chain trencher | <20 | <20 | <20 | <20 | <20-24 | <20 | <20 | <20-27 | <20-33 | <20 | <20-27 | <20-33 | <20 | <20-23 | <20 | <20-32 |
| 10 | Water truck | <20 | <20 | <20 | <20 | <20-24 | <20 | <20 | <20-27 | <20-33 | <20 | <20-27 | <20-33 | <20 | <20-23 | <20 | <20-32 |
| 11 | Telehandler | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20-21 | <20-27 | <20 | <20-21 | <20-27 | <20 | <20 | <20 | <20-26 |
| 12 | Forklift | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 | <20 |
| **Up to 3 (noisiest) plant operating concurrently** | | **<20-23** | **<20-27** | **<20-32** | **<20** | **<20-36** | **<20-31** | **<20-21** | **<20-39** | **<20-45** | **<20-23** | **<20-40** | **<20-45** | **<20** | **<20-35** | **<20** | **<20-44** |

Notes: 1. Standard construction hours during day time are 7:00am to 6:00pm Monday to Fridays and 8:00am to 1:00pm Saturdays

2. Extended weekend hours are 1:00pm to 6:00pm Saturdays and 8:00am to 6:00pm Sundays

Based on the construction noise levels presented in the table above, the predicted construction noise levels at all receivers are within the construction noise management levels during standard construction hours. The extended weekend hours NML would be exceeded when the construction works are conducted at the closest proximity to three (3) receivers (R9, R11A and R15) by up to 5dB(A). Predicted construction noise levels at all other receivers would comply with the extended weekend hours construction NML. It is noted that receiver R9 and R11 are involved receivers which can be managed by negotiated agreements.

Furthermore, construction noise levels at all receivers are predicted to be below the highly noise affected level of 75 dB(A).

It should be noted that the exceedances predicted are based on the plant and equipment operating at a location closest to the corresponding receiver location and/or the three loudest plant and equipment operating concurrently. This scenario would not typically occur on site.

For Receiver R15, it is expected that exceedance of the noise management level would likely occur when the construction works are conducted within approximately 700m of the dwelling / building. Construction works conducted within approximately 700m of the dwelling / building would typically be completed over a few weeks. Construction works conducted within approximately 700m of the dwelling / building could be avoided during the extended weekend hours and conducted during standard construction hours where feasible and reasonable. Construction works conducted beyond 700m of the dwelling building at Receiver R15 would comply with the extended weekend hours construction noise management level. In light of the short duration of predicted noise exceedances, it is recommended that a feasible and reasonable approach towards noise management measures be applied, in consultation with the potentially affected residents.

Further details on construction noise management measures are provided in Section 3.2 below.

## 3.2 Construction Noise Management Measures

The following recommendations provide in-principle feasible and reasonable noise management measures to reduce noise impacts to sensitive receivers. Where actual construction activities differ from those assessed in this report, more detailed design of noise control measures may be required once specific items of plant and construction methods have been chosen and assessed on site.

The advice provided here is in respect of acoustics only. Supplementary professional advice may need to be sought in respect of fire ratings, structural design, buildability, fitness for purpose and the like.

Construction works conducted within approximately 700m of the dwelling / building of Receiver 15, could be avoided during the extended weekend hours and conducted during standard construction hours, where feasible and reasonable. Alternatively, potential noise exceedances to this location would be managed by implementing time restrictions and/or providing periods of repose for residents, where feasible and reasonable. For example, between 10am and 3pm (with one-hour break for lunch between

12pm and 1pm), activities that may cause an exceedance of the NML could occur with no noise level restrictions over a limited time period. Also, allowing the construction activities to proceed, despite the noise exceedance, may be the preferred method in order to complete the works expeditiously, with noise exceedances occurring over only several days. Residents would be consulted to determine appropriate respite periods and will be notified of the potential noise impact during this time period so that they can organise their day around the noisy period.

In addition, the following noise management measures should be considered.

- Plant and equipment should be properly maintained.
- Avoid any unnecessary noise when carrying out manual operations and when operating plant.
- Any equipment not in use for extended periods during construction work should be switched off.
- Good relations with people living and working in the vicinity of a construction site should be established at the beginning of a project and be maintained throughout the project, as this is of paramount importance. Keeping people informed of progress and taking complaints seriously and dealing with them expeditiously is critical. The person selected to liaise with the community should be adequately trained and experienced in such matters.

## 3.3 Construction Road Traffic Noise

The proposed OSOM definition change does not present a material change to the construction road traffic noise assessment presented in the EIS report. The additionality for port options will not result in an increase to traffic volumes considered in the EIS report. Therefore, there is no change to the road traffic noise impacts with the proposed modifications.

# Document control

| Date | Revision history | Non-issued revision | Issued revision | Prepared | Instructed | Reviewed / Authorised |
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# APPENDIX A Glossary of terminology

The following is a brief description of the technical terms used to describe noise to assist in understanding the technical issues presented.

| | |
|---|---|
| Adverse weather | Weather effects that enhance noise (that is, wind and temperature inversions) that occur at a site for a significant period of time (that is, wind occurring more than 30% of the time in any assessment period in any season and/or temperature inversions occurring more than 30% of the nights in winter). |
| Ambient noise | The all-encompassing noise associated within a given environment at a given time, usually composed of sound from all sources near and far. |
| Assessment period | The period in a day over which assessments are made. |
| Assessment point | A point at which noise measurements are taken or estimated. A point at which noise measurements are taken or estimated. |
| Background noise | Background noise is the term used to describe the underlying level of noise present in the ambient noise, measured in the absence of the noise under investigation, when extraneous noise is removed. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L90 noise level (see below). |
| Decibel [dB] | The units that sound is measured in. The following are examples of the decibel readings of every day sounds:<br>0dB The faintest sound we can hear<br>30dB A quiet library or in a quiet location in the country<br>45dB Typical office space. Ambience in the city at night<br>60dB CBD mall at lunch time<br>70dB The sound of a car passing on the street<br>80dB Loud music played at home<br>90dB The sound of a truck passing on the street<br>100dB The sound of a rock band<br>120dB Deafening |
| dB(A) | A-weighted decibels. The A- weighting noise filter simulates the response of the human ear at relatively low levels, where the ear is not as effective in hearing low frequency sounds as it is in hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the "A" filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. |
| dB(C) | C-weighted decibels. The C-weighting noise filter simulates the response of the human ear at relatively high levels, where the human ear is nearly equally effective at hearing from mid-low frequency (63Hz) to mid-high frequency (4kHz), but is less effective outside these frequencies. |
| Frequency | Frequency is synonymous to pitch. Sounds have a pitch which is peculiar to the nature of the sound generator. For example, the sound of a tiny bell has a high pitch and the sound of a bass drum has a low pitch. Frequency or pitch can be measured on a scale in units of Hertz or Hz. |
| Impulsive noise | Having a high peak of short duration or a sequence of such peaks. A sequence of impulses in rapid succession is termed repetitive impulsive noise. |
| Intermittent noise | The level suddenly drops to that of the background noise several times during the period of observation. The time during which the noise remains at levels different from that of the ambient is one second or more. |
| $L_{Max}$ | The maximum sound pressure level measured over a given period. |
| $L_{Min}$ | The minimum sound pressure level measured over a given period. |

| | |
|---|---|
| $L_1$ | The sound pressure level that is exceeded for 1% of the time for which the given sound is measured. |
| $L_{10}$ | The sound pressure level that is exceeded for 10% of the time for which the given sound is measured. |
| $L_{90}$ | The level of noise exceeded for 90% of the time. The bottom 10% of the sample is the L90 noise level expressed in units of dB(A). |
| $L_{eq}$ | The "equivalent noise level" is the summation of noise events and integrated over a selected period of time. |
| Reflection | Sound wave changed in direction of propagation due to a solid object obscuring its path. |
| SEL | Sound Exposure Level (SEL) is the constant sound level which, if maintained for a period of 1 second would have the same acoustic energy as the measured noise event. SEL noise measurements are useful as they can be converted to obtain Leq sound levels over any period of time and can be used for predicting noise at various locations. |
| Sound | A fluctuation of air pressure which is propagated as a wave through air. |
| Sound absorption | The ability of a material to absorb sound energy through its conversion into thermal energy. |
| Sound level meter | An instrument consisting of a microphone, amplifier and indicating device, having a declared performance and designed to measure sound pressure levels. |
| Sound pressure level | The level of noise, usually expressed in decibels, as measured by a standard sound level meter with a microphone. |
| Sound power level | Ten times the logarithm to the base 10 of the ratio of the sound power of the source to the reference sound power. |
| Tonal noise | Containing a prominent frequency and characterised by a definite pitch. |