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TK161-06F01 Traffic Noise Assessment (r2).docx

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Wollar Solar Farm - Traffic Noise Assessment for Proposed Traffic Modification

1 Introduction

Renzo Tonin & Associates has been engaged to review noise impacts associated with the potential traffic modifications associated with the construction of the Wollar Solar Farm in NSW. Due to the ongoing detailed design of the project, changes to the construction processes have been identified, which have resulted in changes to the traffic movements required to facilitate the construction of the project.

2 Proposed Modifications

Information on the proposed modifications for the project are detailed in the Modification Report prepared by NGH Consulting (ref. 20-907). In summary, the proposed modifications are as follows:

- Update to the number of vehicle movements required for the Project during construction, upgrading, and decommissioning to a maximum of:
  - 36 AV/B-double vehicle movements a day;
  - 72 combined medium and/or heavy rigid vehicle (MRV/HRV) movements and AV/B double movements a day; and,
  - Two (2) over-dimensional / oversize and overmass (OSOM) vehicle movements a day, with a total of 60 over-dimensional vehicle movements in total will be required during construction, upgrading and decommissioning.

- Amend the site access arrangements for the two OSOM vehicle movements required to deliver the substation transformers so as to enable these to avoid the bridges with incompatible load limits on the current approved access route.
- Update to the number of construction workers required for the Project to a maximum of 400.

For the purpose of assessing potential noise impacts, the above proposed modifications relating to the update of the number of vehicle movements and the site access arrangements for the OSOM vehicles have been reviewed and addressed accordingly.

2.1 AV/B-Double and Medium / Heavy Rigid Vehicles

To address the changes to the number of AV/B-double and MRV/HRV movements, it is proposed that Condition 1 of Schedule 3 of the Development Consent be amended from:

"The Applicant must ensure that the:

(a) development does not generate more than:

- *26 AV/B-double vehicle movements a day during construction, upgrading, and decommissioning;*
- *46 medium and/or heavy rigid vehicle movements a day during construction, upgrading, decommissioning;*

…

unless the Secretary agrees otherwise in writing."

to the following:

"The Applicant must ensure that the:

(a) development does not generate more than:

- *36 AV/B-double vehicle movements a day during construction, upgrading, and decommissioning;*
- *72 total combined medium and/or heavy rigid vehicle movements and AV/B-double movements a day during construction, upgrading, decommissioning;*

…

unless the Secretary agrees otherwise in writing."

2.2 Over-Dimensional / OSOM Vehicles

Condition 1 of Schedule 3 of the approved Development Consent stipulates the following for over-dimensional / OSOM vehicle movements:

"The Applicant must ensure that the:

(a) development does not generate more than:

…

- *5 over-dimensional vehicle movements during construction, upgrading, decommissioning;*

…

unless the Secretary agrees otherwise in writing."

Following the detailed design of the construction methods for the project, the following amended limit for over-dimensional / OSOM vehicle movements is proposed:

"The Applicant must ensure that the:

(a) development does not generate more than:

…

- *2 over-dimensional vehicle movements a day and 60 over-dimensional vehicle movements in total during construction, upgrading, decommissioning;*

…

unless the Secretary agrees otherwise in writing."

In addition to the changes in the number of OSOM vehicle movements, an alternative access route to the project site would be required for the delivery of the substation transformers. To address this alternative route for the site access, Condition 3 of Schedule 3 is proposed to be amended as follows (<u>underlined</u> text denotes changes):

*"3. <u>Subject to 3A</u>**,** all over-dimensional and AV/B-Double vehicles associated with the development must travel to and from the site via:*

(a) Golden Highway, Ulan Road, Ulan-Wollar Road, Barigan Street, Maitland Street, Wollar Road and Barigan Road; and/or

(b) Castlereagh Highway, Ulan Road, Ulan-Wollar Road, Barigan Street, Maitland Street, Wollar Road and Barigan Road; and/or

as identified in the figure in Appendix 3.

Note: The Applicant is required to obtain relevant permits under the Heavy Vehicle National Law (NSW) for the use of over-dimensional vehicles on the road network.

3A. If over-dimensional vehicles are restricted from using the above routes owing to the load rating of any bridge, then they must travel to and from the site via Golden Highway, Castlereagh Highway, Old Mill Road, Rouse Street, Station Street, Cope Road, Robinson Street, MacKay Street, Main Street, Ulan Road, Ulan-Wollar Road, Barigan Street, Maitland Street, Wollar Road and Barigan Road or any other route approved via a permit granted by the National Heavy Vehicle Regulator under the Heavy Vehicle National Law (NSW)."

3 Noise Assessment

3.1 AV/B-Double and Medium / Heavy Rigid Vehicles

Although the proposed modification to the number of AV/B-double vehicle movements increases, the total number of heavy vehicle movements will remain the same as the approved number of movements; that is, a total of 72 heavy vehicle movements.

Therefore, based on the proposed modification the maximum number of AV/B-double vehicle movements is proposed to increase from 26 to 36 per day. Furthermore, it is anticipated that a maximum of six (6) AV/B-double vehicle movements per hour would occur.

To address the noise impacts due to the changes in the number of AV/B-double vehicle movements, traffic noise levels for the approved AV/B-double movements and the proposed modified movements were predicted at the nearest affected residences along the proposed routes and results were compared.

It is noted that the predicted noise levels represent the traffic noise contribution from the AV/B-double vehicle movements only and does not take into account existing traffic noise levels as existing traffic volumes along the proposed routes are unknown.

Furthermore, the roads along the proposed routes consists of arterial, sub-arterial and local roads. Therefore, the traffic noise assessment is based on these road classifications.

Table 1 – Predicted Road Traffic Noise Levels Along Public Roads due to AV/B-Double & MRV/HRV

Road Classification	Criteria (external)	Max AV/B-Double Vehicle Movements	Speed (km/h)	Approx. Distance to Road	Predicted Noise Level dB(A)	Exceed?
Arterial and Sub-Arterial Roads	$L_{Aeq,15hr}$ 60	26 per day (approved)	60	15m [1]	56	No
		36 per day (modified)			58	No
Local Roads	$L_{Aeq,1hr}$ 55	4 per hour (approved)	50	25m [2]	55	No
		6 per hour (modified)			57	**Yes**

Note: 1. Approximate distance of nearest residences to the edge of arterial / sub-arterial roads along the proposed routes
2. Approximate distance of nearest residences to the edge of local roads along the proposed routes
3. Only the day period assessed as AV/B-double vehicles are expected to travel during the day period only

From the above table, it can be seen that predicted road traffic noise level contributions from the approved and modified AV/B-double vehicle movements required during the construction, upgrading and decommissioning of the Wollar Solar Farm comply with the applicable noise criterion at the nearest affected receivers along arterial and sub-arterial roads.

For receivers located along local roads, the approved AV/B-double vehicle movements comply with the applicable noise criterion, while an exceedance is predicted with the modified vehicle movements. However, it is noted that an increase of up to 2dB(A) is predicted between the modified and approved vehicle movements. Reference is made to the NSW 'Road Noise Policy' (RNP – EPA 2011), which states the following:

> "*In assessing feasible and reasonable mitigation measures, an increase of up to 2 dB represents a minor impact that is considered barely perceptible to the average person.*"

Therefore, based on the RNP, the increase in traffic noise level between the modified and approved AV/B-double vehicle movements along the local roads would be barely perceptible to the average person and no further feasible and reasonable noise mitigation measures would be required.

3.2 Over-Dimensional / OSOM Vehicles

Based on the proposed modification to the number of OSOM vehicle movements, a maximum of two (2) OSOM vehicle movements per day or one (1) OSOM vehicle movement per hour will travel to and from site during the daytime period.

Therefore, based on the proposed number of OSOM vehicle movements per day and per hour, and the haulage routes presented in the proposed modification, an assessment of traffic noise impacts associated with the OSOM vehicle movements has been undertaken. The predicted traffic noise levels at the nearest affected residences along the proposed routes due to the OSOM vehicle movements are presented in the following table.

It is noted that the predicted noise levels represent the traffic noise contribution from the OSOM vehicle movements only and does not take into account existing traffic noise levels as existing traffic volumes along the proposed routes are unknown.

Furthermore, the roads along the proposed routes consists of arterial, sub-arterial and local roads. Therefore, the traffic noise assessment is based on these road classifications.

Table 2 – Predicted Road Traffic Noise Levels Along Public Roads due to OSOM Vehicle Movements

Road Classification	Criteria (external)	Max OSOM Vehicle Movements	Speed (km/h)	Approx. Distance to Road	Predicted Noise Level dB(A)	Exceed?
Arterial and Sub-Arterial Roads	$L_{Aeq,15hr}$ 60	2 per day	60	15m [1]	45	No
Local Roads	$L_{Aeq,1hr}$ 55	1 per hour	50	25m [2]	49	No

Note: 1. Approximate distance of nearest residences to the edge of arterial / sub-arterial roads along the proposed routes
2. Approximate distance of nearest residences to the edge of local roads along the proposed routes
3. Only the day period assessed as OSOM vehicles are only allowed to travel during daylight hours in regional areas

From the above table, it can be seen that predicted road traffic noise level contributions from the OSOM vehicle movements required during the construction, upgrading and decommissioning of the Wollar Solar Farm comply with the applicable noise criteria at the nearest affected receivers along the proposed routes.

Document Control

Date	Revision history	Non-issued revision	Issued revision	Prepared	Instructed	Reviewed / Authorised
11/03/2022	Generate technical memo	-	0	M. Chung	-	M. Chung
04/04/2022	Update technical memo	-	1	M. Chung	-	M. Chung
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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: 0dB The faintest sound we can hear 30dB A quiet library or in a quiet location in the country 45dB Typical office space. Ambience in the city at night 60dB CBD mall at lunch time 70dB The sound of a car passing on the street 80dB Loud music played at home 90dB The sound of a truck passing on the street 100dB The sound of a rock band 115dB Limit of sound permitted in industry 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.