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Shoalhaven Starches Pty Ltd  
160 Bolong Road  
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Reference: 1609016e-r

Attention: Mr John Studdert  
Telephone: 4423 8200  
Email: john.studdert@manildra.com.au

4 November, 2016

Dear John,

**PACKING PLANT AND CONTAINER STORAGE AREA - NIGHT TIME OPERATIONS,  
SHOALHAVEN STARCHES, BOLONG ROAD, BOMADERRY**

Shoalhaven Starches has recently received draft Conditions for a Notice of Modification from the Minister for Planning, reference MP 06\_228 MOD 9 – Packing Plant, dated 2016.

Since receiving the draft conditions Shoalhaven Starches has submitted an application to the Minister seeking amendments to some of the conditions relating to noise mitigation and operational restrictions due to noise reasons.

Harwood Acoustics prepared a submission, reference 160906E-R, dated 12 September 2016 in support of the application addressing the acoustical aspects of the various draft Conditions, some of which pertained to a restriction on night time operations.

Following a review of the application the NSW EPA has requested an assessment of the potential noise emission during night time operations to support the request for an amendment to those specific conditions.

This response provides that assessment.

## DRAFT CONDITIONS

The NSW Department of Planning and Environment has provided draft Conditions for the approval of the Modification Application, with reference specifically to noise emission and operational restrictions during night time hours in conditions 14G, which are as follows:-

*“Design, Operation and Noise Validation MOD 9*

### Operating Conditions

*14G. The Proponent shall:*

- a) ensure roller door openings on the south-western facade remain closed when containers are not being loaded in this location;*
- b) locomotive shunting does not occur whilst trains are being unloaded or loaded;*
- c) no train movements or loading of trains occur on the rail spur lines during the night-time period (10pm – 7am); and*
- d) stacking of containers is limited to a maximum of two containers high within 10 m of the noise walls and one container high more than 10 m from the noise walls.”*

## ACCEPTABLE NOISE LIMITS

### Environment Protection Licence 883

Shoalhaven Starches operates under Environment Protection Licence 883 (EPL) which sets prescribed noise limits at various receptor locations within the vicinity of the site.

The noise licence limits (see Section L5.1 of the EPL) are stated in terms of  $L_{A10, 15 \text{ minute}}$  sound pressure levels in decibels and apply during any time of the day, evening or night.

The acceptable limits do not vary at each respective receptor location during these hours, and are as follows:-

“L5.1 the  $L_{A10 (15\text{min})}$  sound pressure level contribution generated from the premises must not exceed the following levels when measured at or near the boundary of any residential premises:

- a) 38 dBA at locations in Terara on the south side of the Shoalhaven River;
- b) 38 dBA at locations in Nowra on the south side of the Shoalhaven River;
- c) 42 dBA at locations in Merroo Street, Bomaderry;
- d) 40 dBA at other locations in Bomaderry.”

These noise limits apply to the overall operation of the Shoalhaven Starches complex.

### NSW Industrial Noise Policy 2000 & Sleep Disturbance

Shoalhaven Starches in consultation with the NSW EPA are in the process of transitioning towards a change in the noise limits set in their Environment Protection Licence. It is intended that the licence noise limits, in time, will more closely reflect the noise criteria and assessment methodology set out in the EPA’s Industrial Noise Policy 2000 (INP).

This will likely see a change from the  $L_{A10}$  (15 min) noise limits to an energy average ( $L_{eq, 15 \text{ minute}}$ ) noise limit, in line with the INP Intrusiveness criteria and possibly include an  $L_{eq, \text{period}}$  Amenity criteria. In addition to this it is likely that the EPL noise limits will also reflect a noise goal to address the potential for sleep disturbance during night time hours (10 pm to 7 am Monday to Saturday and 10 pm to 8 am on Sundays and Public Holidays). This may typically be an external noise limit expressed in terms of  $L_{1, 1 \text{ minute}}$  or  $L_{max}$ , at the residential receptor locations to account for peak noise level events (e.g. shipping container ‘clanging’).

At the time of writing this response, these changes have not yet been finalised and the noise limits remain as per the current EPL. However, with respect to the night time operations at the container yard and packing plant, the EPA would like to see an assessment against current Sleep Disturbance criteria and best practice management noise levels.

The following sections outline the current guidelines in relation to the assessment of the potential for sleep disturbance from peak noise level events.

#### NSW Industrial Noise Policy 2000

In an application note the INP, the NSW EPA states:-

*“Peak noise level events, such as reversing beepers, noise from heavy items being dropped or other high noise level events, have the potential to cause sleep disturbance. The potential for high noise level events at night and effects on sleep should be addressed in noise assessments for both the construction and operational phases of a development. The INP does not specifically address sleep disturbance from high noise level events.”*

#### Noise Guide for Local Government

The EPA’s Noise Guide for Local Government 2013 states in Section 2.2.4

*“That where sleep disturbance is being assessed, the  $L_{A1, 1 \text{ minute}}$  or  $L_{Amax}$  noise level is most appropriate, and the measurement position should be outside the bedroom window. Sleep may be disturbed if the source noise level exceeds the background noise by more than 15 dB.”*

#### EPA’s Road Noise Policy 2011

Section 5.4 of the NSW EPA’s Road Noise Policy 2011, states:-

*“Further studies by the enHealth Council (2004) and the guidelines published by the World Health Organisation (1999) were reviewed and analysed in terms of the guidance on noise exposure and sleep disturbance. The enHealth report states that:*

*‘as a rule for planning for short-term or transient noise events, for good sleep over 8 hours the indoor sound pressure level measured as a maximum instantaneous value should not exceed approximately 45 dB(A)  $L_{Max}$  more than 10 or 15 times per night’.”*

#### Environmental Criteria for Road Traffic Noise 2009

Appendix B5 of the NSW EPA’s Environmental Criteria for Road Traffic Noise (ECRTN) reviews the current level of knowledge and concludes...

*“... that maximum internal noise levels below 50–55 dBA are unlikely to cause awakening reactions, and that one or two noise events per night with maximum internal noise levels of 65–70 dBA are not likely to affect health and wellbeing significantly.”*

### Assessment Specific Noise Levels

In order to provide an assessment of the potential for sleep disturbance from the operation of the container yard and packing plant at night, consideration is given to an external noise trigger level for further assessment and internal noise levels, as follows:-

#### *External*

- a) 48 dBA ( $L_{\max}$ ) at locations in Terara on the south side of the Shoalhaven River;
- b) 48 dBA ( $L_{\max}$ ) at locations in Nowra on the south side of the Shoalhaven River;
- c) 52 dBA ( $L_{\max}$ ) at locations in Meroo Street, Bomaderry;
- d) 50 dBA ( $L_{\max}$ ) at other locations in Bomaderry."

The above external trigger levels are derived directly from the EPL noise limits + 10 dB (i.e. assumed background noise level + 15 dB).

#### *Internal*

- 50 – 55 dBA  $L_{\max}$  – initial assessment level;
- 45 dBA  $L_{\max}$  – ideal goal

### **PREDICTED NOISE LEVELS**

The highest noise producing peak noise level events associated with the operation of the container yard and packing plant are typically the metal-on-metal noises associated with the operations. These include loading and unloading of shipping containers from the train as well as the manoeuvring and stacking of containers in the storage area using either forklift trucks with traditional tines or reach stackers.

The author visited the existing Shoalhaven Starches facility on Wednesday 12 October 2016 to measure the noise level of various activities associated with forklifts loading and unloading a container train as well as manoeuvring and stacking containers around the site.

Measurements were taken of the maximum noise levels produced during each activity ( $L_{\max}$ ) and these have been used to calculate the highest 'A' frequency weighted,  $L_{\max}$  sound power levels, in decibels re: 1 pW, shown in Table 1 below.

**Table 1**  $L_{\max}$  Sound Power Levels – Container Noise

Description	Leq, 15 minute Sound Power Level (dBA)
Unloading / Loading Train	<b>120</b>
Train Wagon 'Clunking'	<b>118</b>
Stacking Containers (Container on container)	<b>116</b>

For all outdoor noise sources, the external noise level at each receptor has been calculated from the formula:-

$$L_{eq} = L_w + Dc - A$$

Where:

- $L_w$  is the sound power level of the noise source;
- $Dc$  is directivity correction; and
- $A$  is the attenuation that occurs during the propagation from source to receiver.

The term A in the equation includes attenuation from geometric divergence (distance loss), atmospheric absorption, ground absorption, barrier effects and miscellaneous other effects.

This model derives from the International Standard ISO 9613-2 (1996(E)) 'Acoustic – Attenuation of sound during propagation outdoors Part 2 General method of calculation'.

The method described in the Standard is general in the sense that it may be applied to a wide variety of noise sources, and covers the major mechanism of sound attenuation. The method allows for propagation conditions with the wind blowing from the source to the receiver.

Given the location of the container yard to residences in Bomaderry, consideration is given to various locations to the west, north west and south west of the container yard site, as follows and shown in Appendix B:-

- Meroo Street (R1);
- Coomea Street (R2); and
- Tarawarra Street (R3).

Compliance at these nearest receptors will ensure compliance at residences in Nowra and Terara, which are several hundred metres further from the site.

Predicted external noise levels are shown in Table 2 at each receptor location outlined above.

**Table 2 Predicted  $L_{max}$  Noise Levels – Container Noise (External Noise Predictions)**

Description	Predicted Noise Level $L_{max}$ (dBA) at Receptor Locations		
	R1	R2	R3
Container on / off train	47	45	46
Container on container (3 high)	57	56	57
External Trigger Level ( $L_{max}$ )	52	50	50
Potential Exceedance	Up to + 5 dB	Up to + 6 dB	Up to + 7 dB

Calculations and predictions in Table 2 assume the following :-

In order to estimate the potential internal noise levels within dwellings in each of the three receptor locations considered, a typical reduction of 10 dB is assumed from outside to inside, with windows partially open.

This results in the predicted internal noise levels shown in Table 2 below.

**Table 2 Predicted  $L_{\max}$  Noise Levels – Container Noise (Internal Noise Predictions)**

Description	Predicted Noise Level $L_{\max}$ (dBA) within Receptor Dwellings		
	R1	R2	R3
Container on / off train	37	35	36
Container on container (3 high)	47	46	47
Internal Noise Goal	45	45	45
Potential Exceedance	+ 2 dB	+ 1 dB	+ 2 dB

All calculations and predictions are based on the following:-

- Distance loss to each receptor from varying locations across the site;
- Highest maximum noise levels used as a worst-case scenario;
- Approved noise barrier walls in place at 10 metres high on the western side of the site and 7.8 metres high on the south western side of the site;
- The south-western sound barrier wall is constructed on the south western side of the railway line (see Appendix C).

## DISCUSSION

It can be seen from Table 2 above that the external sleep disturbance trigger level of rating background noise level (RBL) + 15 dB is potentially exceeded outside the nearest residences in varying directions from the container storage yard.

This is based on the highest maximum noise level previously measured occurring during the stacking of containers 3 high, as a worst-case scenario.

It can be seen from Table 3 that the internal noise goal of 45 dBA  $L_{\max}$ , recommended in the EPA's Road Noise Policy 2011 is potentially exceeded by up to 2 dB during the above scenario and is met for noise peaks produced during train loading or unloading and stacking of containers one or two high.

It should be noted the internal noise goals of 50 to 55 dBA outlined in the Environmental Criteria for Road Traffic Noise 1999 are easily met for all scenarios at all receptors.

An exceedance of the more stringent internal noise goal of 45 dBA  $L_{\max}$  of 2 dB may not be considered a significant impact, however noise control recommendations are made below to reduce noise emission from peak noise events to within this noise goal.

## NOISE CONTROL RECOMMENDATIONS (NIGHT TIME OPERATIONS)

In order to reduce the predicted noise levels from container on container noise, during the stacking of containers 3 high, to within the noise goal of 45 dBA  $L_{max}$  inside any residential dwellings, we recommend the following:-

- Increase the western noise barrier wall to a minimum 11 metres in height (currently recommended at 10 metres under the draft conditions of consent);
- Increase the south western noise barrier wall to a minimum 9 metres in height (currently recommended at 7.8 metres under the draft conditions of consent);
- The south-western screen must be located on the south western side of the new rail line (see Appendix C);
- Stacking of containers should be limited to a maximum 3 high;
- The height of the noise barrier walls is relative to the finished ground level of the container storage yard;
- Sound barrier walls should be constructed from any impervious material with a minimum weighted sound reduction index ( $R_w$ ) of 20, e.g. masonry, aerated concrete (*Hebel*), timber or fibre cement sheet on both sides of steel posts; and
- Sound barrier walls should be constructed without acoustically untreated holes or gaps, other than a maximum 50 mm at the base if required.\*

Appendix C shows an example of the proposed location of sound barrier walls.

\* Harwood Acoustics and Shoalhaven Starches are currently finalising the detailed design of the noise barriers with respect specifically to acoustically addressing the train access point where the rail spur separates the two walls.

## CONCLUSION

An assessment of the potential noise emission arising from night time operations at Shoalhaven Starches approved container and storage yard facility on Bolong Road, Bomaderry, NSW has been undertaken.

Consideration has been given to the current noise guidelines in order to set sleep disturbance assessment levels.

Noise modelling is based on measured noise levels of peak noise events such as container loading, unloading and stacking, undertaken at the existing facility.

Calculations show that the level of predicted noise from the highest peak noise events has the potential to exceed the external sleep disturbance trigger levels at the nearest receptors to the site in Bomaderry.

The predicted levels are well below the recommended internal noise limits of 50 to 55 dBA  $L_{max}$ , recommended in the Environmental Criteria for Road Traffic Noise inside the nearest dwellings to the site.

The predicted levels may potentially exceed the internal maximum noise level of 45 dBA  $L_{max}$ , recommended by the EPA in their Road Noise Policy on occasion, by up to 2 dB.

This is not considered to be a significant exceedance, however increasing the approved sound barrier as outlined in this assessment will reduce internal noise levels within the more stringent noise goal.

Please do not hesitate to contact the undersigned should you require any further information or clarification.

Yours faithfully



**Matthew Harwood, MAAS**  
Principal Acoustical Consultant

### Attachments:

Appendix A – Noise Survey Instrumentation

Appendix B – Assessment Receptor Locations

Appendix C – Proposed Sound Barrier Wall Locations (showing new heights)

Noise Survey Instrumentation	Appendix A
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The instrumentation used during the noise survey consisted of:-

Description	Model No.	Serial No.
Svantek Sound Level Meter	971	39170
Svantek Acoustical Calibrator	SV 33	39580

The sound level meter conforms to Australian Standards AS IEC 61672.1-2004 : 'Electroacoustics - Sound level meters – Specifications' and AS 1259 as a Class 1 precision sound level meter.

The calibration of the meters was checked before and after the measurement period. No significant system drift occurred over the measurement period. The sound level meter and calibrator have been checked, adjusted and aligned to conform to the factory specifications and issued with conformance certificates within the last 24 months as required by the regulations.

Receptor Locations for Sleep Disturbance Assessment	Appendix B
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**Figure B1. Location Plan – Showing Residential Receptors for Sleep Disturbance Assessment from Container Yard, Bolong Road, Bomaderry. NSW** (source: Google Maps © 2016)

## Proposed Sound Barrier Locations

## Appendix C

