ANNEXURE 5

Environmental Noise Impact Assessment

prepared by

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ANNEXURE 5

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Environmental Noise Impact Assessment Shoalhaven Starches – Proposed Boiler Modifications (MP 06_0228)

Bolong Road,

Bomaderry, NSW 2541

Prepared for:-

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Reference: 1702003E-R

Document Control Page

Revision	Author	Released By	Date
Draft	MH	MH	16/05/2017
Final	MH	MH	17/05/2017

TABLE OF CONTENTS

1. INTRODUCTION AND SUMMARY 4
2. SITE AND DEVELOPMENT DESCRIPTION 5
2.1 Site Description 5
2.2 Description of Proposal 6
3. NOISE CRITERIA 7
3.1 NSW EPA's Industrial Noise Policy 2000 7
3.2 Shoalhaven Starches Noise Management Plan 7
3.3 Construction Noise Criteria 7
3.4 Project Specific Noise Goals 10
4. BOILER UPGRADES OPERATIONAL NOISE EMISSION 11
4.1 Mechanical Plant and Equipment Source Noise Levels 11
4.2 Noise Level Predictions 11
4.2.1 Modelling Equations 11
4.2.2 Predicted Noise Levels 12
5. CONSTRUCTION NOISE EMISSION 12
6. RECOMMENDED NOISE CONTROLS 13
6.1 Fan Noise Level 13
7. CONCLUSION 14

1. INTRODUCTION AND SUMMARY

Shoalhaven Starches Pty Ltd is part of the Manildra Group of companies and their existing facility is located on the southern side of Bolong Road, Bomaderry, NSW, on the northern side of the Shoalhaven River. The surrounding area is a mix of commercial, industrial and residential premises. The nearest residences are located in the township of Bomaderry to the north-west and across the Shoalhaven River in Nowra to the south and Terara to the south-east.

Shoalhaven Starches supplies domestic and export markets with a range of gluten, starch, glucose, ethanol and stock feed products. Shoalhaven Starches have undertaken a review of their energy supply requirements for their operations. As a result of the review it is proposed to undertake modifications to existing boilers located within the existing factory site. It is proposed to convert Boiler No. 4 from gas to coal fired, Boiler No. 2 from woodchip fired back to coal fired and to increase the efficiency of Boiler No. 6 which is currently coal fired.

The main sources of noise associated with the modification will be fans to provide air flow to the furnaces, baghouse pneumatic cleaning pulses and conveyor motors. Noise sources associated with the delivery and movement of coal form part of existing operations in this location. These activities form part of the existing level of noise emission from the overall operation of the site and are included in 6 monthly noise compliance assessments to date. There will be no significant increase in these activities as a result of this modification application.

Shoalhaven Starches operates under Environment Protection Licence Number 883 which sets noise limits for the overall operation of the complex.

The noise goals for any new plant are typically a minimum 10 dB below the EPL noise limits in accordance with Shoalhaven Starches Noise Management Plan originally prepared 31 October 2009 and revised 7 September 2010 under the Project Approval conditions for the Shoalhaven Starches Expansion Project.

Noise goals have been designed for the proposal so as to ensure existing noise levels are not increased by the introduction of the new plant and equipment. These range between 28 dBA and 32 dBA depending upon the residential receptor location.

Noise modelling has been undertaken using manufacturer's noise data as well as measured noise levels from existing plant and equipment that is similar to that proposed.

Recommendations are made in Section 6 of this report to reduce the level of noise emission from the overall operation of all three Boilers to within the design noise goals. These include stipulating maximum allowable noise levels for the new fans and equipment.

Providing the recommendations are satisfactorily implemented the level of noise emitted by the proposed modification will comply with the Shoalhaven Starches Environment Protection Licence noise limits.

The construction works will consist of the removal of existing items of plant and the installation of new items as well as the construction of baghouses and the repair of emission stacks. Construction works are not likely to generate significant noise levels and calculations show that the level of noise emission from the construction phase will be within noise

management levels set by the NSW EPA's *Interim Construction Noise Guideline* at all receptor locations.

2. SITE AND DEVELOPMENT DESCRIPTION

2.1 Site Description

The Shoalhaven Starches complex is located on the southern side of Bolong Road across the Shoalhaven River from Nowra.

The area surrounding Shoalhaven Starches is a mix of commercial, industrial and residential premises with vacant land, owned by the Manildra Group, to the north.

The nearest residential receptor locations to the proposal are as follows:-

- Location 1 – Nobblers Lane, Terara approximately 1450 metres to the south east
- Location 2 – Riverview Road, Nowra approximately 960 metres to the south west;
- Location 3 – Meroo Street, Bomaderry approximately 600 metres to the north west;
- Location 4 – Coomea Street, Bomaderry approximately 690 metres to the north west;

Locations are listed in keeping with the order shown in Environment Protection Licence number 883, as detailed in Section 3.1 of this report.

The Shoalhaven Starches site, surrounding area and receptor locations are shown in Figure 1.

Figure 1. Location Plan – Shoalhaven Starches, Bomaderry, NSW *(source: Google Maps © 2016)*

2.2 Description of Proposal

The Shoalhaven Starches plant at Bomaderry primarily converts industrial grade wheat flour into wheat gluten and starch. The starch fraction is further processed into premium grade starch, modified starches, glucose syrups, ethanol and bottled carbon dioxide.

An existing boiler house is located on the southern side of the Site and houses a mix of coal fired, gas fired and woodchip fired boilers.

It is proposed to convert Boiler No. 4 from gas to coal fired, Boiler No. 2 from woodchip to coal fired and to increase the efficiency of the coal fired Boiler No. 6.

The conversion and upgrade of the boilers will comprise the following works:-

- Boiler No. 4 – Construction of a baghouse on top of the boiler house building, installation of various fans and repairs and an extension to the existing emissions stack;
- Boiler No. 2 – Construction of a baghouse adjacent to the boiler, installation of a new ID fan and construction of a new emissions stack; and
- Boiler No. 6 – Construction of a new baghouse and associated ducting and replacement of the ID fan to increase air flow through the furnace.

The majority of infrastructure including, for example, screw conveyors, cold ash conveyor and water bath will be retained and utilised following the upgrades.

Noise sources associated with the modification therefore comprise the new fans, baghouses and some smaller motors for any additional conveyors required as part of the conversions.

The construction phase of the modification will include the removal of existing components no longer required, construction of the baghouses and installation of the fans and motors.

3. NOISE CRITERIA

This section outlines the noise guidelines applicable to this proposal and establishes the project specific noise goals.

3.1 NSW EPA's Industrial Noise Policy 2000

Shoalhaven Starches operates under Environment Protection Licence 883 issued by the NSW Environment Protection Authority.

Section L5 'Noise Limits' of the licence states:-

"L5.1 the $L_{A10\ (15min)}$ 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 Meroo Street, Bomaderry;

d) 40 dBA at other locations in Bomaderry."

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

3.2 Shoalhaven Starches Noise Management Plan

Previous approval for the Shoalhaven Starches Expansion Project, required the preparation of a Noise Management Plan for addressing and managing noise emission from the expansion project.

The Shoalhaven Starches Noise Management Plan originally prepared 31 October 2009 and revised 7 September 2010 addresses, among other things, acoustic criteria relating to the Shoalhaven Starches complex and any new developments. Section 3 of the plan lists noise limits from the Environmental Protection Licence as shown in Section 4.1 above and states:-

"Compliance testing conducted on a regular basis on behalf of the Mill [Shoalhaven Starches complex] *has found noise emission from the premises satisfies the EPA criteria as a result of works on the Shoalhaven Starches site. In order to ensure that there is no increase in noise emission from the subject premises, with respect to the noise criteria nominated by the EPA in License Condition 6.3* [now 5.1]*, the design goal for such additional plant should be at least 10 dB below the criteria nominated by the EPA."*

3.3 Construction Noise Criteria

The NSW EPA published the *Interim Construction Noise Guideline* in July 2009. While some noise from construction sites is inevitable, the aim of the Guideline is to protect the majority of residences and other sensitive land uses from noise pollution most of the time.

The Guideline presents two ways of assessing construction noise impacts; the quantitative method and the qualitative method.

The quantitative method is generally suited to longer term construction projects and involves predicting noise levels from the construction phase and comparing them with noise management levels given in the guideline.

The qualitative method for assessing construction noise is a simplified way to identify the cause of potential noise impacts and may be used for short-term works, such as repair and maintenance projects of short duration.

Consideration is given to the potential for noise impact from construction activities on residential receptors in Section 6 of this report.

Table 2 in Section 4 of the Guideline sets out noise management levels at affected residences and how they are to be applied during normal construction hours. The noise management level is derived from the rating background level (RBL) plus 10 dB in accordance with the Guideline. This level is considered to be the 'noise affected level' which represents the point above which there may be some community reaction to noise.

The author has carried out numerous noise surveys in Nowra, Bomaderry and Terara and has found daytime background noise levels range between 33 and 40 dBA depending on the location, as shown in Table 1 below.

Table 1 Rating Background Levels – Nowra, Terara and Bomaderry, NSW

Location	Time of Day	Rating Background Level (L_{90})
135 Terara Road, Terara March 2012	Day (7 am to 6 pm)	**33 dBA**
55 Terara Road, Nowra February 2015	Day (7 am to 6 pm)	**36 dBA**
Cambewarra Rd, Bomaderry July 2010	Day (7 am to 6 pm)	**40 dBA**
Shoalhaven Village Caravan Park, Nowra March 2012	Day (7 am to 6 pm)	**40 dBA**

For the purpose of determining the potential for community reaction to noise emission from construction activities, previously measured background noise levels in the vicinity of each receptor location have been used to determine the noise management levels as shown in Table 2 below.

Table 2 L_{eq} Noise Management Levels from Construction Activities

Receptor Location	Noise Management Level	How to Apply
Location 1 (Terara) Location 2 (Nowra) Locations 3 & 4 (Bomaderry)	**43 dBA** (33 + 10) **50 dBA** (40 + 10) **48 dBA** (38 + 10)	The noise affected level represents the point above which there may be some community reaction to noise. ▪ Where the predicted or measured $L_{Aeq\ (15\ min)}$ noise level is greater than the noise affected level, the proponent should apply all feasible and reasonable* work practices to meet the noise affected level. ▪ 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.
	Highly noise affected 75 dB(A)	The highly noise affected level represents the point above which there may be strong community reaction to noise. ▪ 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: 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) 2. if the community is prepared to accept a longer period of construction in exchange for restrictions on construction times.

* Section 6, "work practices" of The *Interim Construction Noise Guideline*, states:- *"there are no prescribed noise controls for construction works. Instead, all feasible and reasonable work practices should be implemented to minimise noise impacts.*

This approach gives construction site managers and construction workers the greatest flexibility to manage noise".

Definitions of the terms feasible and reasonable are given in Section 1.4 of the Guideline.

The 'highly noise affected' level of 75 dBA represents the point above which there may be strong community reaction to noise. This level is provided in the Guideline and is not based on the RBL.

3.4 Project Specific Noise Goals

The most relevant criteria are as follows:-

Operational Phase (Environment Protection Licence noise limits less 10 dB) -

- *28 dBA ($L_{10,\ 15\ minute}$) at locations in Terara on the south side of the Shoalhaven River;*
- *28 dBA ($L_{10,\ 15\ minute}$) at locations in Nowra on the south side of the Shoalhaven River;*
- *32 dBA ($L_{10,\ 15\ minute}$) at locations in Meroo Street, Bomaderry;*
- *30 dBA ($L_{10,\ 15\ minute}$) at other locations in Bomaderry.*

Construction Phase Noise Management Levels

- *43 dBA ($L_{eq,\ 15\ minute}$) at locations in Terara;*
- *48 dBA ($L_{eq,\ 15\ minute}$) at locations in Bomaderry; and*
- *50 BA ($L_{eq,\ 15\ minute}$) at locations in Nowra.*

The criteria are to be assessed at the most-affected point on or within the residential property boundary or, if that is more than 30 metres from the residence, at the most-affected point within 30 metres of the residence. For upper floors, the noise is assessed outside the nearest window.

4. BOILER UPGRADES OPERATIONAL NOISE EMISSION

4.1 Mechanical Plant and Equipment Source Noise Levels

The main sources of noise associated with the modification of the three boilers are the baghouses, fans, small conveyor motors.

Coal is delivered to the coal storage area by truck and loaded into the existing coal fired boilers using a front end loader. Noise sources associated with the delivery and movement of coal form part of existing operations in this location. These activities form part of the existing level of noise emission from the overall operation of the site and are included in 6 monthly noise compliance assessments to date. There will be no significant increase in these activities as a result of this modification application and as such are not considered further in this assessment.

The author has conducted several noise surveys at the Shoalhaven Starches' complex including noise measurements of similar plant and equipment. In addition, the manufacturers of the fans and baghouses have supplied sound data for various items of plant to be installed.

Table 3 below provides a schedule of overall 'A' frequency weighted sound power levels, in decibels re: 1 pW, of noise sources associated with boiler upgrades.

Table 3 L_{10} Sound Power Levels – Boilers 2, 4 and 6

Description	$L_{10,\ 15\ minute}$ Sound Power Level (dBA)
ID fan Boilers 2 and 4	**94**
ID fan Boiler 6	**86**
OFA Fan	**83**
SA Fan	**83**
Baghouse Pneumatic Pulse Cleaner	**100**
Small motors / screw feeds	**87**

4.2 Noise Level Predictions

4.2.1 Modelling Equations

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.

4.2.2 Predicted Noise Levels

The predicted noise levels at each receptor are shown in Table 4 below.

Table 4 Predicted Noise Levels at Receptor Locations – Boiler Upgrades

Description	Predicted Noise Level $L_{10,\ 15\ minute}$ (dBA) at Receptor Location			
	Location 1	Location 2	Location 3	Location 4
Boiler 2	19	23	27	21
Boiler 4	20	23	27	22
Boiler 6	<10	<10	<10	<10
Combined	23	26	30	24
Design Noise Goal ($L_{10,\ 15\ minute}$)	28	28	32	30
Complies	✓	✓	✓	✓

The above calculations and predictions consider distance loss to each receptor as well as the following:-

- Barrier attenuation from existing site structures;
- Prescribed sound levels as per manufacturer's data are achieved for fans and baghouse pneumatic cleaning pulse; and
- Noise controls outlined in Section 6 are implemented and adhered to.

5. CONSTRUCTION NOISE EMISSION

The construction process will involve removal of obsolete equipment, construction of the baghouses, repair of the stacks and installation of new equipment.

Table 5 below shows a schedule of sound power levels for typical construction equipment.

Table 5 Construction Equipment – L_{eq} Sound Power Levels

Description	L_{eq} Sound Power Level (dBA)
Mobile Crane (Diesel)	110
Grinder	105
Power Saw	101

Table 6 below shows the predicted level of potential noise emission from construction activities at each of the receptor locations.

Table 6 Predicted Noise Levels at Receptor Locations – Construction Phase

Description	Predicted Noise Level $L_{eq,\ 15\ minute}$ (dBA) at Receptor Locations			
	Location 1	Location 2	Location 3	Location 4
Construction Activity	<20	40	22	21
Acceptable Noise Limit ($L_{eq,\ 15\ minute}$)	43	50	48	48
Complies	✓	✓	✓	✓

It can be seen from Table 6 that the construction noise management levels will be met at each receptor location during the construction phase.

6. RECOMMENDED NOISE CONTROLS

The predictions in Section 4.2 assume the following noise controls have been implemented.

6.1 Fan Noise Level

Predicted noise levels in this report are based on the sound levels for fans and the baghouse pneumatic cleaning pulses as supplied by the manufacturer's and as shown in Table 7 below.

Table 7 Sound Pressure Levels – Fans and Equipment

Description	Sound Pressure Level (dBA) when measured at 1 metre
ID Fan Boilers 2 and 4 (two only)	**86**
ID fan Boiler 6 (one only)	**78**
OFA Fan (one only)	**75**
SA Fan (one only)	**75**
Baghouse Pneumatic Pulse Cleaner (per baghouse)	**92**

In the event that fan selections change or additional plant is required to be installed, a final assessment may be required once mechanical plant selections have been finalised.

We are confident that compliance with the project specific noise goals can be achieved for the modification without onerous mitigation measures and these may be implemented following installation if required.

7. CONCLUSION

An assessment of the potential noise impact from the proposed modification of and upgrade to Boilers 2,4 and 6 at Shoalhaven Starches on Bolong Road, Bomaderry, NSW has been undertaken.

Calculations show that the level of noise emission from the operation of modified boilers will be within the noise design goals derived from Environment Protection Licence 883 noise limits at each receptor location providing noise control recommendations made in Section 6 of this report are implemented and adhered to.

The level of noise emission from the construction phase of the project will be within the noise management levels set by the NSW EPA's *Interim Construction Noise Guideline.*

Matthew Harwood, MAAS

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