

ANNEXURE 5

Environmental Noise Impact Assessment

prepared by
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22, 24, 171 and 220
Bolong Road, Bomaderry



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Environmental Noise Impact Assessment Shoalhaven Starches

Proposed Modification Application to MP06-0228, Shoalhaven Starches Expansion Project, Proposed New Specialty Processing Facility, New Gluten Dryer and other associated works at:-

22, 24 and 171 Bolong Road,
Bomaderry, NSW 2541

Prepared for: -

Shoalhaven Starches Pty Ltd
C/- Cowman Stoddart Pty Ltd
29-31 Kinghorn Street
Nowra NSW 2541

Attention: Mr Stephen Richardson

Reference: 1802010E-R

Prepared by: -

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31 May 2018

Document Control Page

Revision	Author	Released By	Date
Draft	MH	MH	16/05/2018
Rev A – Draft	MH	MH	31/05/2018
Rev A – Final	MH	MH	31/05/2018

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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.

In 2009 Shoalhaven Starches received Project Approval from the Minister for Planning for the Shoalhaven Starches Expansion Project (SSEP), reference 06_0228.

Subsequent to the approval of the SSEP, the expected increase in demand for ethanol to meet the demand arising from the NSW Government's mandate to increase the blending of ethanol in the total volume of petrol sold in NSW has not occurred. Consequently, Shoalhaven Starches has been investigating alternative markets for products used in the manufacture of ethanol.

Following these investigations Shoalhaven Starches now proposes to modify the approval for various components of the SSEP.

This modification comprises the following components / amendments: -

- Installation of a third Flour Mill "C" within the existing Flour Mill "B" building;
- Modifications to the ventilation systems servicing Flour Mills "A" and "B";
- Construction of a new industrial building that will contain the following activities:
 - New Product (Gluten) Dryer;
 - Specialty Product Processing Facility.
- Construct a new Baghouse associated with Starch Dryer No. 5;
- Construct a new coal-fired Co-generation plant and Boiler No. 8;
- Install new lime silos to service the co-generation plant;
- Relocate Boiler No. 7 to accommodate the new Boiler No.8;
- Install a sifter room within the existing packing building;
- Extend the existing the main sub-station;
- Construct a switch room (indoor substation);
- Relocation of car parking area to accommodate indoor substation;
- Undertake modifications to the existing rail grain intake facility;
- Conversion of two existing gluten dryers (1 & 2) to starch dryers.

A proposed site plan showing the approved and proposed proposals is shown in Figure 2 and full details can be seen in the Manildra Group's building design plans for Project No. 6531A. A detailed description of the proposed works can be seen in Cowman Stoddart Pty Ltd's Modification Application reference 16/45, dated February 2018.

The majority of works will occur within the main facility with the exception of the indoor substation and relocation of the car park which it is replacing. These modifications will occur on the northern side of Bolong Road opposite the main facility.

It is a requirement of the NSW Environment Protection Authority and Department of Planning and Environment, that an Environmental Noise Impact Assessment of the proposed modification is prepared, in accordance with the NSW Noise Policy for Industry 2017 and Interim Construction Noise Guideline 2008.

The report is to provide a description of the proposed mitigation measures and a review of the modification against the existing Environment Protection Licence Conditions and any noise reduction programs.

The main sources of noise associated with this modification application will be the plant and equipment associated with the Product Dryer, Specialty Product Processing facility and Co-generation plant.

Shoalhaven Starches operates under Environment Protection Licence Number 883 which sets noise limits for the overall operation of the complex. The noise limits within the licence are in the process of being updated to be in line with the NSW Noise Policy for Industry 2017 and the new noise limit descriptors are used in this assessment at the request of the Department. 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 ($L_{eq, 15 \text{ minute}}$) depending upon the residential receptor location.

The majority of components of the modification are in the concept design stage and noise modelling has therefore been undertaken using measured noise levels from existing indicative plant and equipment.

Recommendations are made in Section 6 of this report to reduce the level of noise emission from the overall operation of the modification to the approval to within the design noise goals. These include advice on the construction of building elements and noise reduction of certain plant and equipment, which will be achieved through the judicious selection of plant and / or acoustically treating plant if required at the time of installation.

A final assessment of required noise controls will be undertaken at the time of the Design Noise Verification process prior to construction, to ensure the noise design goals are met at all receptors.

The construction works will consist of piling, pouring of concrete slabs for the buildings, boiler and silos, construction of the industrial buildings and the installation of all plant and equipment.

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 for the majority of the construction phase. There is potential for the noise management levels to be exceeded during piling works at the nearest receptors. This is not considered to be a significant impact, however it is recommended that piling works are carried out during day time hours only, as recommended in the Project Approval. Construction noise mitigation measures are included in the Construction Safety & Environmental Management Plan that will be prepared by Shoalhaven Starches.

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 1400 metres to the south east
- Location 2 – Riverview Road, Nowra approximately 940 metres to the south west;
- Location 3 – Meroo Street, Bomaderry approximately 620 metres to the north west;
- Location 4 – Coomea Street, Bomaderry approximately 675 metres to the north west;

Locations are listed in keeping with the order shown in Environment Protection Licence number 883, as detailed in Section 3.2 of this report.

Distances are based on the location of the proposed Co-generation plant as a reference only, as various noise producing aspects of the proposal are at varying distances from each receptor, as is considered in all calculations. The Shoalhaven Starches site and receptor locations are shown in Figure 1 along with some of the main components of the proposal.



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

2.2 Description of Proposal

In 2009 Shoalhaven Starches received Project Approval from the Minister for Planning for the Shoalhaven Starches Expansion Project (SSEP), reference 06_0228.

Subsequent to the approval of the SSEP, the expected increase in demand for ethanol to meet the demand arising from the NSW Government's mandate to increase the blending of ethanol in the total volume of petrol sold in NSW has not occurred. Consequently, Shoalhaven Starches has been investigating alternative markets for products used in the manufacture of ethanol.

Following these investigations Shoalhaven Starches now proposes to modify the approval for various components of the SSEP.

This modification comprises the following components / amendments: -

- Installation of a third Flour Mill "C" within the existing Flour Mill "B" building;
- Modifications to the ventilation systems servicing Flour Mills "A" and "B";
- Construction of a new industrial building that will contain the following activities:
 - New Product (Gluten) Dryer;
 - Specialty Product Processing Facility.
- Construct a new Baghouse associated with Starch Dryer No. 5;
- Construct a new coal-fired Co-generation plant and Boiler No. 8;
- Install new lime silos to service the co-generation plant;
- Relocate Boiler No. 7 to accommodate the new Boiler No.8;
- Install a sifter room within the existing packing building;
- Extend the existing the main sub-station;
- Construct a switch room (indoor substation);
- Relocation of car parking area to accommodate indoor substation;
- Undertake modifications to the existing rail grain intake facility;
- Conversion of two existing gluten dryers (1 & 2) to starch dryers.

A proposed site plan showing the approved and proposed proposals is shown in Figure 2 and full details can be seen in the Manildra Group's building design plans for Project No. 6531A. A detailed description of the proposed works can be seen in Cowman Stoddart Pty Ltd's Modification Application reference 16/45, dated February 2018.

The majority of the major components of the proposed modification are in the concept design stage and noise levels of individual items of plant and equipment is not yet known. Source noise levels are provided for each noise producing aspect of the modification in Section 4 of this report. These are based on previously measured noise levels of similar plant and equipment, across the existing Site.

Where required noise design goals for certain items of plant and equipment are provided in the recommendations in Section 6 of this report. These are considered to be achievable through localised acoustical treatment.

In addition to the above, Shoalhaven Starches seeks to regularise the non-enclosure of the transfer pumps servicing the fermenters and the pumps and compressors servicing the molecular sieves. The non-enclosure of these pumps and compressors is addressed in Section 6.7 of this assessment.

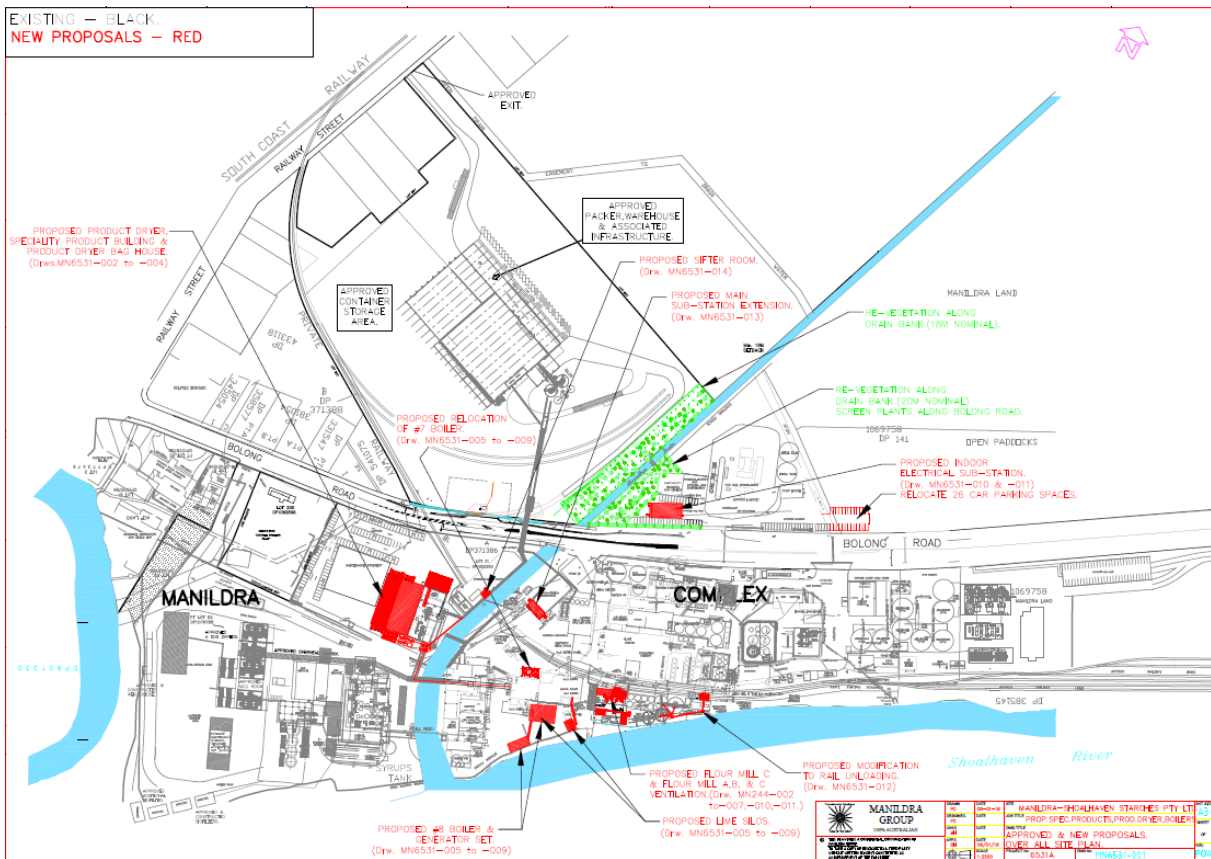


Figure 2. Overall Site Plan – Shoalhaven Starches, Bomaderry, NSW

(source: Manildra Group’s building design plans for Project No. 6531A)

3. NOISE CRITERIA

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

3.1 NSW Department of Planning and Environment

3.1.1 Existing Project Approval

Project Approval for Application No. 06_0228, provided by the Minister for Planning, dated January 2009, Schedule 2, Condition 2, 'Terms of Approval' states:-

"The proponent shall carry out the project generally in accordance with the:

- a) EA and associated site plans (see Appendix 2);*
- b) Statement of commitments; and*
- c) Conditions of this approval."*

The original Project Approval incorporates noise mitigation measures recommended in the 'Acoustical Assessment, Proposed Ethanol Upgrade, Shoalhaven Starches' – prepared by The Acoustic Group Pty Ltd, ref 38.3849.R52:ZJM, dated 26 June 2008. This document forms part of the EA and statement of commitments and it is implicit that the noise control recommendations within this document are required to be implemented as part of the Project Approval.

Schedule 3, Conditions 11 to 14 inclusive of the Project Approval, also refer to noise emission and are summarised as follows:-

Condition 11 relates to restricted hours of construction activities. Condition 12 reiterates the noise limits contained with Environment Protection Licence 883. Condition 13 requires that all feasible and reasonable noise mitigation measures must be implemented during the construction phase of the project. Condition 14 required the preparation of a noise management plan (see Section 3.3 below).

3.1.2 Existing Project Approval

In response to a request for information relating to noise emission from the proposed modification, the NSW Department of Planning and Environment requires an assessment of the potential for noise impact.

3.2 NSW EPA's Environment Protection Licence

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.

* The EPA and Shoalhaven Starches are currently in the process of updating the Environment Protection Licence Noise Limits contained in Section L5 to better reflect the current Noise Policy for Industry 2017 assessment criteria, referred to within the 2018 Policy as the Project Noise Trigger Levels.

The noise descriptor will be amended from to $L_{10, 15 \text{ minute}}$ to an energy average $L_{eq, 15 \text{ minute}}$, otherwise the noise limit levels will remain the same.

At the request of the Department of Planning in its email dated 14 March 2018, the new L_{eq} descriptor will be used in this assessment as the EPL will be updated shortly.

3.3 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.”

3.4 Shoalhaven City Council

Shoalhaven City Council in its email dated 14 May 2018, states:-

“Environmental Health Comments/Requirements:

Compliance is required with the recommendations of the Noise Impact Assessment by Harwood Acoustics Pty Ltd (dated December 2017).”

The Noise Report dated December 2017 was provided for Modification 14, being the use of the former Paper Mill Site in conjunction with Shoalhaven Starches’ factory operations. This current assessment refers to different modifications and a different section of the Shoalhaven Starches Site. As such the recommendations in this report are not relevant to the modification application addressed in the December 2017 assessment.

However, Council’s typical noise assessment requirements are addressed in this assessment as it is carried out in accordance with the Noise Policy for Industry 2017 methodology and assessed against the noise limits contained within EPL 883.

Providing noise control recommendations made in this assessment are implemented and adhered to, the proposed modifications considered as part of this proposal will be compliant with those provisions.

3.5 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.

In this instance the entire construction phase may take several months although significant noise producing aspects, such as piling, if required, will last a total of approximately two weeks. 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)	43 dBA (33 + 10)	<p>The noise affected level represents the point above which there may be some community reaction to noise.</p> <ul style="list-style-type: none"> ▪ 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.
Location 2 (Nowra)	50 dBA (40 + 10)	
Locations 3 & 4 (Bomaderry)	48 dBA (38 + 10)	
	Highly noise affected 75 dB(A)	<p>The highly noise affected level represents the point above which there may be strong community reaction to noise.</p> <ul style="list-style-type: none"> ▪ 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"> 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.

3.6 Project Specific Noise Goals

The most relevant criteria are as follows:-

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

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

Construction Phase Noise Management Levels

- 43 dBA ($L_{eq, 15 \text{ minute}}$) at locations in Terara;
- 48 dBA ($L_{eq, 15 \text{ minute}}$) at locations in Bomaderry; and
- 50 BA ($L_{eq, 15 \text{ minute}}$) 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. MODIFICATION PROPOSAL NOISE EMISSION

4.1 Plant and Equipment Source Noise Levels

The main components of the modification proposal with respect to noise generation are in the concept design stage and manufacturer's sound data for individual items of plant and equipment are not yet known.

The main components of the proposal with respect to noise generation, are as follows:-

- Product (Gluten) Dryer;
- Specialty Product Processing Facility;
- Co-generation Plant (coal fired Boiler No. 8);
- Associated Lime Silos;
- Ventilation Fans for Flour Mills "A, B & C";
- Grain Intake Additions.

The author has carried out several noise assessments at Shoalhaven Starches and the majority of plant and equipment associated with this proposal is similar to existing plant and equipment on Site.

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

Table 3 Leq Sound Power Levels – Plant and Equipment

Description	Leq, 15 minute Sound Power Level (dBA)
<i>External Plant & Equipment</i>	
Screw Conveyor (Grain Intake)	89
Paddle / Chain Conveyor (Grain Intake)	86
Bucket Elevator Motor (Grain Intake & Boiler No. 8)	88
Baghouse Pulse (Gluten Dryer, Starch Dryer & Specialty Product Building)	100
Supply Air Fans (Flour Mills “A & B”)	98
Exhaust Fans (Flour Mill C)	98 – 100
Lime Truck Filling (Lime Silos)	95
Silo Motors (Specialty Product Building)	82
Fermentation Tank Pump (existing)*	90 – 92
Molecular Sieve Compressor / Pump (existing)*	90 – 92
<i>Internal Plant & Equipment</i>	
Turbine (generator set)	110
ID Fan (Gluten Dryer & Boiler No. 8)	94
OFA Fan (Gluten Dryer & Boiler No. 8)	83
SA Fan (Gluten Dryer & Boiler No. 8)	83
Centrifuge (Gluten Dryer)	88
Disintegrator (Gluten Dryer)	88
Small Motors Screw Conveyors (Specialty Product Building & Boiler No. 8)	87
Mixers (Specialty Product Building)	104
Dispersion Dryer (Specialty Product Building)	107
Hammer / Pin Mill (Specialty Product Building)	112
Blowers (Specialty Product Building)	100
Sieving Equipment / Sifters (Specialty Product Building & Sifter Room in Packing Plant)	94

* See Section 6.7

As well as measurements taken of individual items of plant across the Site over many years, noise measurements have been taken inside the recently commissioned Starch Dryer No. 5 and existing Gluten Dryer No. 6. These measurements have also been used to assist in the noise modelling undertaken as the proposed Specialty Product Building and Product (Gluten) Dryer will be similar to these existing noise sources.

Within each of these existing buildings, some of the noisier items of plant, such as the hammer mill, ID Fan, etc have been installed within acoustic enclosures or separate rooms.

Where required this will be the case in the proposed new buildings and noise control design will be finalised as part of the Design Noise Verification process prior to commencing construction.

The noise sources listed in Table 3 are associated with various noise producing aspects of this modification, with the exception of the existing pumps and compressors servicing the fermentation tanks and molecular sieves, which are addressed in Section 6.7 of this Report. The majority of components of the modification are in the concept design stage and the noise sources listed are typical for these components.

There are additional components of the modification which are not considered to produce significant noise emission that will not appreciably increase overall noise generation from the Site at distant receptor locations.

These include:-

- Conversion of existing gluten dryers 1 & 2 to starch dryers;
- Relocation of Boiler No. 7;
- Extension of the main substation;
- Construction of a switch room; and
- Relocation of the carpark.

These noise sources are either existing and their relocation, with noise controls maintained, will not increase overall noise emission from the Site; or they will not produce significant noise. Therefore, no further consideration is given to these components of the modification in this assessment.

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.

For noise sources within the proposed new buildings, the level of noise emission has been calculated from the formula:-

$$Lp_2 = Lp_1 - R_w + 10 \text{ Log}_{10} S - 20 \text{ Log}_{10} r - 14 + DI \text{ dBA}$$

Where:

- Lp_2 is the predicted noise level at the receiver;
- Lp_1 is the internal noise level;
- R_w is the weighted sound reduction index of the building element (wall, roof, windows, openings, etc);
- S is the area of the building element (m^2);
- r is the distance between the receiver and the building element;
- DI is the directivity index of the façade.

4.2.2 Predicted Noise Levels

Predicted noise levels at each receptor location are shown in Table 4 below.

The predicted noise levels assume recommendations made in Section 6 of this report have been implemented.

Table 4 Predicted Noise Levels at Receptor Locations

Description	Predicted Noise Level $L_{eq, 15 \text{ minute}}$ (dBA) at Receptor Location			
	Location 1	Location 2	Location 3	Location 4
Design Noise Goal ($L_{eq, 15 \text{ minute}}$)	28	28	32	30
External Plant	<20	23	22	22
Specialty Product Facility	<20	23	29	27
Product (Gluten) Dryer	<20	<20	25	23
Sifter Room	<20	<20	<20	<20
Co Generation Plant	<20	<20	<20	<20
Combined	23	27	31	30
Complies	Yes	Yes	Yes	Yes

The calculations and predictions in Table 4 consider distance loss to each receptor as well as the following:-

- Construction of buildings as per recommendations made in Section 6.1;
- Barrier attenuation from existing site structures for various items of plant and equipment;
- Sound power levels and sound pressure levels based on indicative plant and equipment as detailed in Section 4.1;
- Ground absorption to receptor R1 only.

5. CONSTRUCTION NOISE EMISSION

The construction works will consist of piling, pouring of concrete slabs for the buildings, boiler and silos, construction of the industrial buildings and the installation of all plant and equipment.

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

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

Description	L_{eq} Sound Power Level (dBA)
Auger Piling (CFA Rig)	113
Mobile Crane (Diesel)	110
30 Tonne Excavator	110
Concrete Truck / Pump	105
Dump Truck	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 $L_{eq, 15 \text{ minute}}$ (dBA) at Receptor Locations			
	Location 1	Location 2	Location 3	Location 4
Construction Activity*	37 – 41	41 – 45	48 – 52	46 – 50
Acceptable Noise Limit ($L_{eq, 15 \text{ minute}}$)	43	50	48	48
Complies	Yes	Yes	No + 4 dB (during piling)	No + 2 dB (during piling)

* Range provided with and without piling activity.

Predictions include an increase in truck movements during the construction phase. Noise generated by the increase in construction worker personal vehicle movements will not be perceptible at the residential receptor locations.

6. RECOMMENDED NOISE CONTROLS

As stated previously, the majority of components of the modification are in the concept design stage and as such noise controls are based on the assumed sound levels of typical plant and equipment as outlined in Section 4.1.

A final design will be undertaken at the time of Design Noise Verification process or during construction and commissioning as required.

6.1 New Industrial Building Construction

The following applies to the main industrial building housing the product dryer and specialty product processing facility.

Walls

The walls of the buildings (housing the specialty product processing facility and product dryer) should have a minimum weighted sound reduction index (R_w) 24. In this instance calculations are based on 'Kingspan' Architectural Wall Panelling system AWP 80.

Roof / Ceiling

The roof and ceiling of the new industrial building should have a minimum weighted sound reduction index (R_w) 23. In this instance calculations are based on 'Kingspan' Architectural Roof Panelling system 'K-Dek (KS 1000 KD)'.

Ventilation Penetrations

There should be no acoustically untreated penetrations in the walls or roof. Any doors to the building must remain closed at all times the plant is in operation.

If natural ventilation is required, sections of the northern and eastern walls only may be fitted with acoustic louvres.

The required insertion loss of acoustic louvres will depend on the maximum surface area of louvered sections required to facilitate adequate ventilation.

As an example, based on a maximum 20 m² of louvered sections on each of the floors, other than the top floor, acoustic louvres should have minimum insertion losses shown in Table 7 below:-

Table 7 Example Acoustic Louvre Sound Transmission Loss

Description	Minimum Insertion Loss (dB) at Octave Band Centre Frequencies (Hz)							
	63	125	250	500	1k	2k	4k	8k
Acoustic Louvre*	5	10	14	22	27	25	21	17

* Based on Fantech SBL2 louvre

A larger area may result in a higher required insertion loss and consequently a deeper blade depth. A final assessment should be made prior to the issue of a Construction Certificate once the location and size of any openings for ventilation are finalised.

The level of attenuation required by the building structures is dependent on the level of internal noise emission from all plant and equipment combined.

The recommendations made above are based on internal noise level measurements made within the existing Starch Dryer No. 5 and Gluten dryer No. 6 on each of the floor levels.

Once the details of all noise sources are finalised the required construction materials of the building can be finalised.

Through a combination of external building materials and internal acoustical treatment of individual items of plant, if and as required, the noise design goals can be achieved at each receptor location.

6.2 Sifter Room

The proposed sifter room to be located at the existing packing plant building should be constructed using materials with a minimum weighted sound reduction index (R_w) 23, for example the same materials as recommended in Section 6.1 above.

Any openings in the sifter room should be restricted to the eastern or southern facades only and kept to a minimum. Depending on the need for openings to this room for ventilation, acoustic louvres may be required.

Alternatively the sifter room may be constructed from standard corrugated sheet steel (e.g. *Colorbond*) with a minimum R_w rating of 19 and the plant and equipment acoustically treated within the room so that the design noise goals are met at each receptor.

Any acoustical treatment of this room will not be onerous to ensure the noise design goals are met.

6.3 Roof Mounted Fans

The roof mounted ventilation fans for the respective flour mills will each be fitted with a silencer. However, selections of silencer make and model have not been finalised at this stage. Silencer should be designed and selected so that the level of noise emission from each fan does not exceed:-

- 65 dBA when measured at a distance of 3 metres from the discharge end of the fan or silencer.

This can easily be achieved through judicious selection of silencers and will be confirmed prior to construction, or during commissioning as required.

6.4 Boiler No. 8 and Co Generation Plant

Generator Set

The predicted noise levels in Table 4 of this Report assume the turbine used in the Co-generation plant, which will be housed in the generator set building, has a minimum sound power level of 110 dB.

Based on this assumption, the generator set building should be constructed from materials with a minimum weighted sound reduction index R_w of 35.

For example:-

- Proprietary wall panelling system such as *Kingspan* with an internal wall and ceiling lining of minimum 9 mm thick fibre cement sheet on steel frame or furring channel; or
- Aerated concrete panel (e.g. Hebel power panel), or
- Any alternative with a minimum R_w 35.

Alternatively, the turbine may be acoustically treated or enclosed within the building and the building constructed from a material with a minimum R_w 24.

We are confident that compliance with the project specific noise goals can be achieved for the modification without onerous mitigation measures.

A final assessment will be undertaken at the time of Design Noise Verification process to determine the requirement for building elements, or acoustical treatment required to ensure the noise design goals are met.

Boiler No. 8

Based on the assumed noise generation of plant and equipment associated with Boiler No. 8, the noise sources should be acoustically treated or enclosed using materials with a minimum weighted sound reduction index R_w of 23, as detailed in Section 6.1, to meet the design noise goals at each receptor.

6.5 Rail Grain Intake

The predicted level of noise emission from noise generating plant and equipment associated with the rail grain intake expansion is within the design noise goals at each receptor without the need for additional noise controls.

6.6 Construction Noise

The Project Approval prescribes allowable operation hours for construction activities in Clause 11 and Clause 13, which states:-

“During construction, the Proponent shall prepare and implement all reasonable and feasible measures to minimise the construction noise impacts of the project.”

It can be seen from Table 6 that the construction noise management levels are likely to be met at each receptor location during general construction activity, with the exception of piling. During piling there is potential for the noise management levels to be exceeded on some

occasions. This is not considered a significant exceedance during day time hours for short and sporadic duration.

However, a Construction Noise Management Plan may be provided in accordance with NSW EPA's Interim Construction Noise Guideline and to satisfy Condition 13 of the Project Approval. Construction noise mitigation measures are included in the Construction Safety & Environmental Management Plan prepared by Shoalhaven Starches.

6.7 Existing Pumps and Compressors

As part of the application for the Shoalhaven Starches Expansion Project (SSEP) approval, reference 06_0228, an Environmental Assessment Report (EAR) was prepared in 2008 by Cowman Stoddart Pty Ltd, for the proposed ethanol production upgrade including proposed odour reduction and waste water treatment measures for existing Shoalhaven Starches operations.

The EAR included a Statement of Commitments, the commitments contained within the EAR relating to noise were derived from an Acoustical Assessment, reference 38.3849.R52:ZJM, prepared by The Acoustic Group Pty Ltd in June 2008 (AA).

The recommended noise controls in the AA and EAR included, among others, reducing noise emission from the transfer pumps servicing the fermenters and the pumps and compressors servicing the molecular sieves.

Harwood Acoustics previously undertook an assessment of the need for these previously recommended noise controls in light of the location and operation of these particular items of plant amid the current facility. Reference 1802008E-L2, dated 20 February 2018. Full details of the assessment can be seen in that Report.

The Report concluded that the level of noise emission from the operation of these pumps as they currently operate is well below the noise limits set by Environment Protection Licence 883.

Consequently, there is no need to implement the previously recommended noise controls for these items of plant.

7. CONCLUSION

An assessment of the potential noise impact from the proposed construction and operation of modifications to MP06-0228, Shoalhaven Starches Expansion Project, Proposed New Specialty Processing Facility, New Gluten Dryer and other associated works at Shoalhaven Starches on Bolong Road, Bomaderry, NSW has been undertaken.

Calculations show that the level of noise emission from the modification to this approved proposal will be within the noise design goals derived from Environment Protection Licence 883 noise limits at each receptor location based on noise control recommendations made in Section 6 of this report.

A final assessment of required noise controls will be undertaken at the time of the Design Noise Verification process prior to construction, or during commissioning, as required, to ensure the noise design goals are met at all receptors.

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* with the exception of piling activity on some occasions.

Construction noise mitigation measures are included in the Construction Safety & Environmental Management Plan prepared by Shoalhaven Starches.



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