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Environmental Noise Impact Assessment Shoalhaven Starches

Proposed Amendments to Modification No. 17 (Amendment to Approved Specialty Products Building and New Gluten Dryer and other associated works).

At:-

22 and 24 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: 1909010E-R

Prepared by: -

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Shoalhaven Starches Pty Ltd commissioned Harwood to carry out an Environmental Noise Impact Assessment for a proposed modification to the Shoalhaven Starches Expansion Project (SSEP), approval, reference 06_0228 at their facility at 160 Bolong Road, Bomaderry, NSW.

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TABLE OF CONTENTS

1. INTRODUCTION AND SUMMARY	4
2. SITE AND DEVELOPMENT DESCRIPTION.....	7
2.1 Site Description.....	7
2.2 Description of Proposal.....	8
3. NOISE CRITERIA.....	11
3.1 NSW Department of Planning and Environment.....	11
3.1.1 Existing Project Approval.....	11
3.1.2 Existing Project Approval.....	11
3.2 NSW EPA's Environment Protection Licence	11
3.3 Shoalhaven Starches Noise Management Plan	12
3.4 Construction Noise Criteria	12
3.5 Project Specific Noise Goals	15
4. MODIFICATION PROPOSAL NOISE EMISSION	15
4.1 Plant and Equipment Source Noise Levels.....	15
4.2 Noise Level Predictions	17
4.2.1 Modelling Equations.....	17
4.2.2 Predicted Noise Levels	17
5. CONSTRUCTION NOISE EMISSION	19
6. RECOMMENDED NOISE CONTROLS	20
6.1 Buildings Construction	20
6.2 Ventilation Fans	20
6.3 Construction Noise.....	22
7. CONCLUSION	23

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 (the Department) for the Shoalhaven Starches Expansion Project (SSEP), reference 06_0228.

Subsequent to the initial approval, modified approvals have been granted for various amendments to the Expansion Project. A modification application is currently before the Department (referred to henceforth as Modification 17) relating to the following proposed amendments:-

- To modify the location of the baghouse for the No. 5 Starch Dryer – approved under Modification 16,
- To install a ‘services lift’ to allow on-going access for personnel and customers to the floors within the building.
- To modify the service conduit extending from the Shoalhaven Starches factory site on the southern side of Bolong Road to the proposed Packing Plant on the northern side of Bolong Road by elevating a section of the conduit above ground level,
- Use of woodchip in Boilers 2 and 4.

Harwood Acoustics prepared an Environmental Noise Impact Assessment dated 5 November 2019 in support of Modification 17.

It is now proposed to amend the Modification 17 application to include the following additional amendments to existing approvals:-

- Expansion of the New Product Dryer building (GD8) footprint - approved under Modification 16,
- Expansion of the Specialty Product Building (SPB) footprint - approved under Modification 16,
- Alternative location for the Chemical Storage Tanks to the rear of the SPB expansion – approved under Modification 16,
- Demolition of the Maintenance Offices and Stores Building to facilitate the expansion of GD8 building,
- Repurposing of remaining portion Maintenance Building,
- Alteration to car parking arrangements,
- Extend sifter room on interim packing plant – approved under Modification 16, and
- Inclusion of a new Product Dryer (PD9) into the approved footprint of the SPB.

Modification 16 was approved in 2019 and included, among other things:-

- Construction of a new industrial building that will contain the following activities:
 - New Product (Gluten) Dryer (GD8),
 - Specialty Product Building (SPB).

Following a series of internal design reviews and the potential for operational expansion, Shoalhaven Starches has identified the need to increase the footprint of the GD8 and SPB buildings, hence the proposed inclusion for this in the Modification 17 application.

The justification for the increase in the GD8 building is two-fold and includes:-

- A design modification to the baghouse filter in order to eliminate blockages in the bend of the ductwork, and
- The installation of new 'Wet End' processing plant and equipment comprising pumps, decanters, contrashears, screens and pipework to facilitate an increase in product demand.

As a result of the design changes the approved building will need to be wider.

As a consequence of the proposed increase in the width of the GD8 building there will be the requirement to demolish the existing Maintenance Offices and Stores Building adjoining the approved site of the GD8 building to the north east.

The justification for the increase in the SPB footprint includes:-

- An understanding that additional room is required to house the required plant and equipment for starch modification,
- An expansion of the nearby packing plant due to forklift operations,
- A conflict between free space requirements around the associated Reaction Silos and the proposed location of bulk Chemical Storage Tanks.
- To facilitate the expansion and requirements for free space access around the Reaction Silos, it is proposed to locate the Chemical Storage Tanks to the area south of the SPB,
- The SPB will therefore comprise three main components, being:-
 - The Cationic Starch plant,
 - Product Dryer 9, and
 - A packing plant
- The new Product Dryer 9 will be installed within the approved footprint of the SPB (as distinct from the proposed expansion) and will initially process gluten until GD8 is constructed and commissioned and it is envisaged that the PD9 will then revert to processing starch.

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.

This assessment therefore addresses the potential noise emission from each of the proposed amendments to be included in the Modification 17 application and, where applicable, any resultant changes to the noise mitigation measures approved under Modification 16.

This assessment should be read in conjunction with the previous Noise Impact Assessment prepared by Harwood Acoustics in support of Modification 17 dated 5 November 2019.

The main sources of noise associated with this modification application will be the additional plant and equipment associated with the expansion of the GD8 building and the SPB expansion.

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 ($L_{eq, 15 \text{ minute}}$) 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, if need be, 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.

It is worth noting that recommendations in relation to the construction of the external walls of the processing area within the Specialty Product Building supersede the recommendations for this building under Modification 16.

The construction works will consist of piling, pouring of concrete slabs for the buildings, demolition of the maintenance building, the construction of the 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 1530 metres to the south east
- Location 2 – Riverview Road, Nowra approximately 965 metres to the south west;
- Location 3 – Merroo Street, Bomaderry approximately 460 metres to the north west;
- Location 4 – Coomera Street, Bomaderry approximately 550 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 GD8 building 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: -

- To modify the location of the baghouse for the No. 5 Starch Dryer – approved under Modification 16,
- To install a 'services lift' in the SPB to allow on-going access for personnel and customers to the floors within the building,
- To modify the service conduit extending from the Shoalhaven Starches factory site on the southern side of Bolong Road to the proposed Packing Plant on the northern side of Bolong Road by elevating a section of the conduit above ground level,
- Use of woodchip in Boilers 2 and 4,
- Expansion of the New Product Dryer building (GD8) footprint - approved under Modification 16,
- Expansion of the Specialty Product Building (SPB) footprint - approved under Modification 16,
- Alternative location for the Chemical Storage Tanks to the rear of the SPB expansion - approved under Modification 16,
- Demolition of the Maintenance Offices and Stores Building,
- Repurposing of remaining portion Maintenance Building,
- Alteration to car parking arrangements,
- Extend sifter room on interim packing plant, and
- Installation of a new Product Dryer (PD9) within the approved footprint of the SPB.

A proposed site plan showing the approved and proposed expansions for the GD8 and SPB is shown in Figure 2 and full details can be seen in the Manildra Group's building design plans for Project No. 6966. A detailed description of the proposed works can be seen in Cowman Stoddart Pty Ltd's Statement of Environmental Effects and the Addendum Submission which supports this Modification Application and which this Environmental Noise Impact Assessment supports.

The following summarises each of the aspects of the modification with respect to potential noise emission in the order they appear in the bullet points above.

- *Baghouse Location*

The baghouse servicing starch dryer number 5 was included in the NIA prepared for Modification 16 and the assessment addressed noise arising from the pneumatic pulse. The proposed new location is not significantly different from the approved location. There will

therefore be no appreciable change to previously predicted noise levels from the baghouse based on the new location compared with the approved location. The noise level predictions previously made therefore remain valid for this amendment.

- *Service Lift & Service Conduit*

There are no significant noise producing items of plant and equipment associated with the service lift or service conduit and the level of noise from the operation of the Site will not be increased by these proposed modifications.

- *Conversion of Boilers to Woodchip*

The level of noise from the operation of the Site will not be increased by this proposed modification.

- *Expansion of the GD8 Building and SPB, (including the installation of PD9 within the approved footprint of the SPB building) and Relocation of Chemical Storage Tanks*

These proposed modifications are the main subject of this noise assessment. Noise sources associated with the expansion of the footprint of these buildings include new plant and equipment, including PD9. However, a review of the overall level of noise emission from the operation of GD8 and the SPB is also undertaken.

The Specialty Products Building will essentially comprise three components, being:-

- A Cationic Starch plant,
- Product Dryer 9 (initially a gluten dryer which will revert to a starch dryer in the future), and
- A packing plant
- *Demolition of the Maintenance Offices and Stores Building*

This modification is considered in the construction noise section of this assessment.

- *Repurposing of remaining portion Maintenance Building*

The level of noise from the operation of the Site will not be increased by this proposed modification.

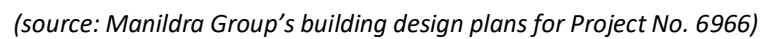
- *Alteration to car parking arrangements,*

The level of noise from the operation of the Site will not be increased by this proposed modification.

- *Extend sifter room on interim packing plant.*

There are no significant noise producing items of plant and equipment associated with the extension of the sifter room and the level of noise from the operation of the Site will not be increased by these proposed modifications.

GD8 and SPB are in the concept design stage. Source noise levels are provided for each potential noise producing aspect of GD8 and SPB in Section 4 of this report. These are based on previously measured noise levels of similar plant and equipment, across the existing Site.



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, 'Terms of Approval' states:-

"Condition 2

The applicant shall carry out the development generally in accordance with the:

- a) EA and associated site plans (see Appendix 2).*

Condition 2A

The applicant shall carry out the development generally in accordance with the:

- a) Statement of commitments,*
- b) Conditions of this consent, and*
- c) Revised statement of commitments for Appendix 6."*

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 $L_{Aeq (15min)}$ * 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 Merroo Street, Bomaderry;*
- d) 40 dBA at other locations in Bomaderry.”*

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

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 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 2010	July	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"> 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) 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.

3.5 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 Dryer (GD8) equipment with new proposed Wet Area building and associated plant and equipment,
- Specialty Product Building (SPB) processing plant and equipment,
 - Including the installation of new product Dryer (PD9) within the approved footprint of the SPB,
- Packing plant (associated with SPB) plant and equipment.

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 **L_{eq} Sound Power Levels – Plant and Equipment**

Description	L _{eq} , 15 minute Sound Power Level (dBA)
<i>External Plant & Equipment</i>	
Baghouse Pulse	100
Silo Motors (SPB)	82
Chemical Storage Bin Motors (rear of SPB & GD8)	82
<i>Internal Plant & Equipment</i>	
ID Fan (GD8 & PD9)	94
Centrifuge (GD8 & PD9)	88
Disintegrator (GD8 & PD9)	88
Small Motors / Screw Conveyors / Pumps (GD8, PD9 & SPB)	87 – 93
Mixers (SPB)	104
Dryer (SPB)	107
Hammer / Pin Mill (PD9 & GD8)	112
Blowers (GD8 & PD9)	100
Sieving Equipment / Sifter (in packing plant)	94
Contra Shears (Wet End)	102
Dough Mixer (Wet End)	106
Gluten Pump (Wet End)	101
Grinder (SPB)	110
Grinding Screen (SPB)	95

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 GD8 Building, SPB and Wet End building 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.

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:-

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

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
GD8	<15	16	22	22
Cationic Starch (in SPB)	<15	17	24	23
PD9 (in SPB)	<15	15	23	21
Packing Plant (in SPB)	<10	<10	15	<15
Wet End	15	16	22	20
Combined	22	25	30	29
Complies	Yes	Yes	Yes	Yes
Additional components of Mod 16*	18	23	22	22
Combined	23	27	30	30
Complies	Yes	Yes	Yes	Yes

* This considers the cumulative impact of additional aspects of Mod 16 as the GD8 building and SPB were approved under that Modification originally and designed to ensure that the overall level of noise emission from all aspects of the that modification met the noise design goals.

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,
- 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
Noise Design Goal ($L_{eq, 15 \text{ minute}}$)	43	50	48	48
Construction Activity*	37 – 41	41 – 45	48 – 52	46 – 50
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

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 Buildings Construction

Specialty Products Building (SPB)

Walls

- The majority of external walls will be constructed using either tilt up concrete panels or in situ concrete (minimum 150 mm thick) which will be acceptable,
- Non-masonry external wall sections will be restricted to the following:-
 - Southern wall of the cationic starch section, and
 - Southern end of the eastern wall of the cationic starch section.
- Non-masonry wall sections should achieve minimum weighted sound reduction index (R_w) rating of 24:-
 - for example 'Kingspan' Architectural Wall Panelling system AWP 80 or equivalent*
 - * to be confirmed prior to construction.

Roof / Ceiling

The minimum required acoustical performance (R_w ratings) for each of the sections of the SPB is as follows:-

- Cationic Starch Plant – R_w 24, for example 'Kingspan' Architectural Roof Panelling system 'K-Dek (KS 1000 KD)'
- Product Dryer 9 – R_w 45, 150 mm thick (minimum) concrete
- Packing Plant section – R_w 19, for example 0.42 mm thick corrugated sheet steel
- All penetrations in the roof should be acoustically sealed.

Product Dryer Building GD8 & Wet End Building

Walls

- The western wall of the GD8 building which is a parting wall between GD8 and the Wet End will be constructed from minimum 150 mm thick tilt-up concrete panels which will be acceptable,
- A portion of the northern wall will be constructed using minimum 150 mm thick tilt-up concrete panel (or in situ concrete) to a minimum height of 6 metres,
- All non-masonry external walls should achieve minimum weighted sound reduction index (R_w) rating of 35:-
 - for example 'Kingspan' Architectural Wall Panelling system AWP 80 with an internal layer of 13 mm thick sound rated plasterboard, or 9 mm thick fibre cement sheet fixed directly to one side*, or equivalent*
 - * to be confirmed prior to construction.

Roof / Ceiling

- The roof of the GD8 building will be of minimum 150 mm thick concrete slab construction will be acoustically acceptable,
- The roof of the Wet End building should achieve a minimum R_w rating of 35:-
 - for example 'Kingspan' Architectural Roof Panelling system 'K-Dek (KS 1000 KD)' with an internal layer of 13 mm thick sound rated plasterboard, or 9 mm thick fibre cement sheet fixed directly to one side*, or equivalent*
 - * to be confirmed prior to construction
- All penetrations in the roof should be acoustically sealed.

Ventilation Penetrations – all buildings

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

If natural ventilation is required, only the following sections of the buildings' external walls may be fitted with acoustic louvres:-

- GD8 – 32 m² in the eastern façade,
- SPB – 20 m² in the eastern façade of each of the three sections, and
- Wet End – 20 m² in the southern facade

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 the recommended maximum area of louvered sections recommended above, 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. Alternatively, ventilation may be ducted in and or out of the buildings.

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 Ventilation Fans

Noise predictions in this assessment include noise emission from exhaust fans discharging to the roof of the buildings, particularly on GD8, PD9 and the Cationic Starch Plant. Exhaust fans for the Gluten Dryers at Shoalhaven Starches are significant noise producing items of plant and require attenuation to ensure the noise design goals are not exceeded.

This will be achieved through a combination, where necessary, of acoustical silencers, orientation of the discharge duct/s and roof top acoustical screening if required. A final assessment will be undertaken at the Noise Design Verification stage, once the details of all ventilation fans and their respective sound power levels are known.

6.3 Construction Noise

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

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

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.

7. CONCLUSION

An assessment of the potential noise impact from the proposed construction and operation of the noise producing aspects of Modification 17 to MP06-0228, Shoalhaven Starches Expansion Project at Shoalhaven Starches on Bolong Road, Bomaderry, NSW has been undertaken.

Noise producing aspects of this proposed modification include the expansion of the approved product dryer building for gluten Dryer 8 including the installation of a Wet End and the proposed expansion of the approved Specialty Products Building including the installation of a new Product Dryer (PD9).

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.



Matthew Harwood, MAAS

Principal Acoustic Consultant

Attachments:-

Important Note

Appendix A – Noise Survey Instrumentation

Important Note

*All products and materials suggested by Harwood Acoustics are selected for their acoustical properties only. Recommendations made in this report are intended to resolve acoustical problems only, therefore all other properties such as aesthetics, air flows, chemical, corrosion, combustion, construction details, decomposition, expansion, fire rating, fumes, grout or tile cracking, loading, shrinkage, smoke, ventilation etc. are outside Harwood Acoustic's field of expertise and **must** be checked with the supplier or suitably qualified specialist before purchase.*

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

Description	Model No.	Serial No.
SvanTek Sound Level Meter	SVAN 957	15395
Brüel and Kjaer Acoustical Calibrator	4321	3003242

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

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 as required by the regulations.