



**THE ACOUSTIC GROUP PTY LTD**  
CONSULTING ACOUSTICAL & VIBRATION ENGINEERS

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**ACOUSTICAL ASSESSMENT**  
**PROPOSED ETHANOL UPGRADE**  
**SHOALHAVEN STARCHES, BOMBADERRY**  
**38.3849.R52:ZJM**

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## 1.0 INTRODUCTION

The purpose of this report is to present the results of an acoustical assessment for the proposed ethanol upgrade at the Shoalhaven Starches premises off Bolong Road, Bomaderry.

As part of the assessment process for the proposed Ethanol Upgrade at Shoalhaven Starches (Nowra) an EIS is to be prepared. The Director General's requirements necessitated an audit of the existing plant noise emission which was undertaken in March 2008. The Acoustic Group report 38.3849.R50 dated 5th June, 2008, found compliance with noise conditions issued by the NSW EPA (now part of the DECC).

The acoustic audit nominated noise criteria for the Ethanol Upgrade project, based upon the Shoalhaven Starches Noise Reduction Program 7 (PRP7) and Chapter 12 of the EPA's *Industrial Noise Policy* (INP).

The EPA Licence issued for the subject premises requires the company to achieve specific noise contribution levels at four reference residential boundaries nominated to the south and north as:

*The  $L_{A10}$  (15 minute) sound pressure level contribution generated from the site must not exceed the following levels when measured at or near the boundary of any residential premises:*

- 38 dB(A) at locations in Terara on the south side of the Shoalhaven River;
- 38 dB(A) at locations in Nowra on the south side of the Shoalhaven River;
- 42 dB(A) at locations in Meroo Street, Bomaderry; and
- 40 dB(A) at other residential locations in Bomaderry.

To ensure any new plant does not increase the overall noise emission from the site one needs to specify a noise contribution at least 10 dB below the Licence target.



The acoustic assessment for the Pollution Reduction Program 7 (PRP7) project utilised an acoustic design goal of 10 dB below the EPA Licence conditions. The PRP7 acoustical assessment evaluated noise propagation from the site to reference residential locations under various wind and temperature conditions and determined an effective sound power level for the proposed upgrade with respect to the nominated monitoring areas.

The use of weather data obtained from the site and assessing noise propagation in accordance with the EPA's Industrial Noise Policy document, for this site the PRP7 noise assessment did not require an assessment in terms of wind or temperature inversions, and that the design goals were to be assessed for neutral weather conditions. This assessment considers neutral weather conditions.

The Ethanol Upgrade involves additional plant on the current Shoalhaven Starches site, a packing plant on the vacant site north of the Shoalhaven Starches site and additional truck and rail movements.

We have been instructed that there are four major routes that can be utilised by trucks to/from from the site. Route 1 is west along Bolong Road and then north along the Princess Highway (19% of the traffic). Route 2 is north along Railway Street then north along Meroo Road (58% of the traffic). Route 3 is north along Railway Street then west along Canbewarra Road (16% of the traffic). Route 4 is along Bolong Road then south along the Princess Highway (7% of the traffic).

We are instructed that during the night time (10pm to 7 am) there will be a maximum of 19 additional truck movements in the night which averages out to 2 per hour. Therefore the most affected residential location will be on Railway Street which can have a maximum of 2 truck movements per hour during the night time.

With respect to the day time (7am to 10pm), we are instructed that there will be a maximum of 19 additional movements in the day which averages out to 1 per hour.



With respect to train movements, there are currently at most two train movements during the night time period (one movement before midnight and one after midnight). On a weekly basis there are nine night time train movements per week (six movements before midnight and three movements after midnight) but not equally distributed throughout the week, i.e. not all days of the week have the two train movements during the night time period. The proposal will not result in more than the current maximum of two train movements for each night time period. The proposal will generate a maximum of two train movements during the night time period for every day of the week. This will result on a weekly basis fourteen night time train movements per week.

## 2.0 ETHANOL UPGRADE ACOUSTIC DESIGN TARGETS

For the ethanol upgrade project the residential noise emission target has been set at 15 dB(A) below the EPA Licence noise limits at the reference location targets so as to ensure the upgrade does not increase the site noise emission levels:

*The  $L_{A10}$  (15 minute) sound pressure level contribution generated from the Ethanol Upgrade must not exceed the following levels when measured at or near the boundary of any residential premises:*

- 23 dB(A) at locations in Terara on the south side of the Shoalhaven River;
- 23 dB(A) at locations in Nowra on the south side of the Shoalhaven River;
- 27 dB(A) at locations in Meroo Street, Bomaderry; and
- 25 dB(A) at other residential locations in Bomaderry.

The noise design target, if taken as a  $L_{eq}(15 \text{ minutes})$  goal 15 dB(A) below the EPA Licence criteria, reveals that the INP intrusive noise goal is satisfied with a significant safety margin.



As the above noise limit is 15 dB below the License Conditions then compliance with that criterion will result in the INP amenity noise target automatically being satisfied.

The INP covers truck and rail movements whilst on the subject land, but such traffic movements when external to the site fall under different criteria.

For road traffic one refers to the NSW EPA's *Environmental Criteria for Road Traffic Noise* ("ECRTN"). The critical location with respect to additional traffic is the residences on Railway Street which in acoustic terms can be classified as a collector road (whilst Cambewarra Road and Meroo Road would be classified as arterial/sub-arterial). Development type 8 (identified as developments with potential to create additional traffic on collector road) in Table 1 of the ECTN has a day time criterion of  $L_{eq(1hr)}$  60 dB(A) and a night time criterion of  $L_{eq(1hr)}$  55 dB(A). Under the technical notes to the table, notes vii and ix proposes that traffic from the development should not lead to an increase in existing noise levels of more than 2 dB.

Existing rail traffic is assessed under the noise control guideline Chapter 163 of the NSW EPA's *Environmental Noise Control Manual* ("ENCM"). This guideline sets out noise levels in relation to rail movements as they may impact upon residential receivers. The criterion specifies a 24 hour  $L_{eq}$  level of 60 dB(A) for existing operations with a maximum passby level of 85 dB(A).

In 2003 the Rail Infrastructure Corporation and the State Rail Authority issued an Interim Guideline For Councils which has a internal day time criterion of an  $L_{eq(1hr)}$  40 dB(A) and an internal night time criterion of an  $L_{eq(1hr)}$  35 dB(A) with all windows and doors closed. A typical attenuation from an external space into an internal space with all windows and doors closed is 20-25 dB(A). On a conservative basis utilising the 20 dB(A) attenuation will result in the external goal of an  $L_{eq(1hr)}$  60 dB(A) for the day time and an  $L_{eq(1hr)}$  55 dB(A) for the night time.



### 3.0 ACOUSTIC ASSESSMENT

The majority of the equipment that are of a high noise emission are house in concrete rooms with the external building envelope in colourbond or composite wall/roof system. The overall design concept identifies different areas of equipment which may be classified as:

- 1 x Product Dryer (and its associated equipment)
- 3 x Fermenters (with its associated pumps and motors)
- 6 x Additional Fermenter cooling towers
- 1 x Molecular Sieve and associated 2 x cooling towers
- 8 x Additional DDG cooling towers
- 6 x DDG Dryers (and its associated equipment)
- 1 x DDG Pellet Plant
- 1 x Odour Scrubber
- 1 x Evaporator
- 1 x Co-Generator
- 1 x Gas Fired Boiler
- 1 x Packing Plant
- Container Loading area (Forklift)
- 9 x Blowers at the Manildra Environmental Farm
- 2 x Emergency Fire System pumps

For the purpose of assessing the noise controls associated with the nominated plant we have run the EM computer model for Shoalhaven Starches under neutral weather conditions to establish in-plant shielding and the attenuation to the reference residential locations.



At the EIS stage the manufacturer's noise data for the various plant times has been expressed generally in a dB(A) format rather than octave bands. For this ENM assessment we have utilised a broadband spectrum to derive the attenuation to residential reference locations.

From our analysis of the proposed plant items set out in Appendix B the provision of buildings without any additional noise control measures would exceed the overall EPA noise limits and obviously the more stringent criteria nominated for the project.

As a result of our analysis in order to meet compliance with the residential design goals the noise control measures that are required are set out below.

### **3.1 PRODUCT DRYER**

The majority of the equipment will be housed in a building that will be constructed of Ultrapanel having an Rw of not less than 35. The upper 3 floors of the building and the roof is to be constructed of material having an Rw of not less than 17 (colorbond or similar).

Any equipment that has a sound power level above 80 dB(A) is to be enclosed in a separate room with the walls and ceiling/floor having an Rw of not less than 40.

### **3.2 FERMENTERS**

With respect to the fermenter pumps and motors associated with the Ethanol Upgrade no additional noise control measures are necessary except for the transfer pumps which are to be enclosed with material having an Rw of not less than 15.

### **3.3 FERMENTERS – COOLING TOWERS**

During the night time period, the fan speed of the 6 cooling towers is to be reduced to 60% of full fan speed. The fan speed reduction is to be automatically adjusted (computer or time clock controlled) rather than by manual controls.





### **3.4 MOLECULAR SIEVE**

The molecular sieve pumps and compressors associated with the Ethanol Upgrade are to be enclosed with material having an Rw of not less than 35.

### **3.5 MOLECULAR SIEVE – COOLING TOWERS**

During the night time period, the fan speed of the 6 cooling towers is to be reduced to 60% of full fan speed. The fan speed reduction is to be automatically adjusted (computer or time clock controlled) rather than by manual controls.

### **3.6 DDG – COOLING TOWERS**

During the night time period, the fan speed of the 6 cooling towers is to be reduced to 60% of full fan speed. The fan speed reduction is to be automatically adjusted (computer or time clock controlled) rather than by manual controls.

Water pumps numbers 1-4 are to have noise control measures (or replaced) in order to have a sound pressure level of 68 dB(A) at 1 metre.

### **3.7 DDG DRYERS**

The majority of the equipment will be housed in a building that will be constructed of Ultrapanel having an Rw of not less than 35.

Any equipment that has a sound power level above 90 dB(A) is to be enclosed in a separate room with the walls and ceiling/floor having an Rw of not less than 40.

### **3.7 DDG PELLET PLANT**

The majority of the equipment will be housed in a building that will be constructed of Ultrapanel having an Rw of not less than 35.



Any equipment that has a sound power level above 90 dB(A) is to be enclosed in a separate room with the walls and ceiling/floor having an Rw of not less than 40.

### **3.8 ODOUR SCRUBBER**

The equipment will be housed in a building (walls and ceilings/roof) that will be constructed of material having an Rw of not less than 35 such as Ultrapanel.

### **3.9 EVAPORATOR**

The majority of the equipment will be housed in a building (walls and ceilings/roof) which has to be constructed of material of an Rw of not less than 25.

The two turbo fans are to be enclosed in a separate room with the walls and ceiling/floor having an Rw of not less than 40.

### **3.10 CO-GENERATOR**

At this stage of the development application, sound level data for the Co-Generator is not available. However the maximum sound power level of 93 dB(A) from all discharges from the Co-Generator building has been derived to maintain compliance with the design criteria.

### **3.11 GAS FIRED BOILER**

We have been provided with the sound power level of the discharge duct of the boiler. To maintain compliance with the design criteria the discharge of the duct is to achieve an attenuation of 25 dB(A) so that the sound pressure level from the discharge duct does not exceed 72 dB(A) at 1 metre.



### **3.12 PACKING PLANT**

All walls and the roof/ceiling of the packing plant is to be constructed of material having an  $R_w$  of not less than 35 dB(A).

### **3.12 CONTAINER LOADING AREA**

The forklift (new item) that is used for the loading and stacking of containers is to have a maximum sound pressure level of 80 dB(A) at 1 metre.

The northern end of the container loading area is to have a solid masonry wall not less than 8.5 metres in height and the western and eastern end of the container loading area is to have a solid masonry wall not less than 8 metres in height.

We have been instructed that there will be no train movements on the spur line that forms part of the container loading area between the night time period of 10 pm to 7 am.

As part of the management plan of the container loading area during the night time period (10 pm to 7 am) the forklift trucks will only stack two containers high at locations within 10 metres from the wall and only one container high above the ground for locations more than 10 metres from the wall. No loading of the train in the proposed container loading area will take place during the night time period.

### **3.13 BLOWERS AT MANILDRA ENVIRONMENTAL FARM**

With respect to the blowers, we are instructed that they will have enclosures that result in a sound pressure level of 70 dB(A) at 1 metre.



### 3.14 EMERGENCY FIRE SYSTEM

The fire pumps are only utilised for emergency and a maximum of 1 hour per week during the day time for testing purposes only , and do not form part of the EPA criteria under normal plant operations.

With the above noise control measures, the noise contribution from the Ethanol Upgrade will meet the design goals as shown in Table 1.

**TABLE 1: Noise Emission Contributions**

	<b>Riverview Rd</b>	<b>Nobbers Ln</b>	<b>Meroo Rd (town)</b>	<b>Meroo Rd (hill)</b>
Product Dryer	-7	-15	1	17
Fermenters	7	5	17	17
Fermenters - Cooling Towers	5	3	15	15
Molecular Sieve	8	9	22	20
Molecular Sieve - Cooling Towers	3	4	17	14
DDG - Cooling Towers	19	6	4	-1
DDG Dryers	8	-17	3	-6
DDG Pellet Plant	2	-23	-3	-12
Odour Scrubber	-12	-37	-17	-25
Evaporator	12	-13	7	-1
Co-Generator	17	-8	12	4
Gas Fire Boiler	3	-5	7	2
Packing Plant	3	0	17	14
Container Loading Area	9	6	22	22
Blowers at Environmental Farm	15	13	15	17
<b>Contribution</b>	<b>23</b>	<b>16</b>	<b>27</b>	<b>27</b>
<b>Criteria</b>	<b>23</b>	<b>23</b>	<b>27</b>	<b>27</b>



### 3.15 ROAD TRAFFIC

With respect to road traffic noise, associated with the proposal the critical acoustic issue would relate to truck movements during the night time period of 10pm to 7 am.

Figure 1.3.3 of the traffic impact assessment report prepared by Christopher Stapleton Pty Ltd nominates four traffic routes (see Appendix C). Section 2.7 of the traffic report identifies the percentage break up of truck movements whilst section 4.2 identifies that the proposed Ethanol Upgrade could generate up to an additional 19 heavy vehicles per day (38 movements). We are instructed by Shoalhaven Starches that their planning regime has the additional truck movements evenly distributed throughout the day and night with the majority of the trucks seeking to travel to and from the north.

Ambient noise levels were carried out in the PRP7 project by the use of unattended loggers located adjacent to the truck routes and revealed the ambient traffic Leq in the day time period is significantly greater than that during the night time period. As the trucks will be evenly distributed throughout the day and night, then any traffic noise contribution arising from the proposed Ethanol Upgrade would not approach the EPA's ECRTN criteria for the different road classifications in the day time period, whilst the night time movements are expected to generate some minor increases in the traffic/ambient Leq levels.

With respect to road traffic movements, the EPA has a separate noise policy identified as Environmental Criteria for Road Traffic Noise ("ECRTN"). Table 1 of the ECRTN nominates criteria for different road classifications for both the noise emission level for daytime and night time operations. Category 7 covers the matter of land use developments with potential to create additional traffic on existing freeway/arterials and nominates a daytime criteria of 60 dB(A)  $L_{eq}$  and a night time criterion of 55 dB(A). If the either criterion is already exceeded, the EPA place a specification that traffic arising from the development should not lead to an increase in existing noise levels of more than 2 dB.



EPA Road Traffic Development Category 8 is identified as a land use development with potential to create additional traffic on collector roads, where the daytime criteria is expressed as an  $L_{eq}$  60 dB(A) for a one hour period and night time criterion of  $L_{eq}$  55 dB(A) (one hour). Again if either criterion is already exceeded, the traffic arising from the development should not lead to an increase in existing levels more than 2 dB.

A guide to the terms used in Table 1, as set out in the ECRTN, indicates that an existing freeway/arterial road is a road that includes sub-arterial roads is a road that handles through traffic, with characteristically heavy and continuous traffic flows during peak periods, where through traffic is passing through a locality bound for another locality. A collector road is defined as a road situation in a built-up area that collects local traffic leaving a locality and connects to a sub-arterial road. In the PRP7 application it was concluded that from the aerial maps for the area that Railway Street leading up to Cambewarra Road could be considered as a collector road or a sub-arterial road, but that Cambewarra Road, Meroo Road and Bolong Road (west of the development) having being identified as sub-arterial roads, then would be classified as freeway/arterial roads by the ECRTN.

Therefore the criterion applied for the assessment of road traffic will vary upon the road classification and the need to consider whether the EPA criterion is already exceeded or not, and whether as a result of the subject development the criteria would then be exceeded.

By examination of the map in Appendix C, Railway Street would experience the majority of night time traffic (14 movements during the night) and does not influence/impact residential dwellings until the intersection of Railway Street and Cambewarra Road at the railway overpass. For an equitable distribution of heavy vehicles, the residential dwellings north of the railway bridge could experience an additional 14 truck movements during the night or 1.56 truck movements per hour.



Ambient logger measurements conducted on the property immediately south of Cambewarra Road, but between Meroo Road and the railway line obtained a night time  $L_{eq(9\text{ hr})}$  of 54.6 dB(A) thereby leading to an overall EPA noise limit for trucks of 56.6 dB(A).

Attended measurements during the day time found  $L_{eq(1\text{ hr})}$  levels greater than that recorded for the PRP7 project but individual truck movements similar to the values identified in the PRP7 assessment.

Attended measurements of heavy vehicle operations at the intersection of Cambewarra Road and Railway Street found a mean sound exposure level (SEL) 85.3 dB(A) at the nearest residential boundary. If Railway Street is considered to be a collector road on the basis of two vehicle movements in any one hour would result in a sound level contribution of 49.2 dB(A) at the residential facade which when added to the existing night time ambient  $L_{eq(9\text{ hr})}$  of 54.6 dB(A) would result in an overall  $L_{eq}$  level of 55.7 dB(A) which complies with the EPA design target.

If however the above intersection is to be ranked as a sub-arterial road, then one is required to assess the resultant  $L_{eq}$  level from the passage of 14 movements during the night that would result in an  $L_{eq(9\text{ hr})}$  contribution of 48.2 dB(A). This contribution when added to the existing  $L_{eq(9\text{ hr})}$  of 54.6 dB(A) would realise a total  $L_{eq}$  level of 55.5 dB(A). This level satisfied the ECRTN requirements.

Similarly, traffic movements on Meroo Road north of Cambewarra Road (route 2) would be subject to an additional 11 truck movements throughout the night. Route 2 is designated as a sub-arterial road and therefore under the ECRTN falls into the freeway/arterial road classification. From an average SEL of 83.8 dB(A) at the residential boundary, the  $L_{eq}$  9 hour contribution determined at the residential facade from the 11 truck movements would be 45.6 dB(A). When added to a night time  $L_{eq}$  level of 54.6 dB(A) results in a  $L_{eq}$  level of 55.1 dB(A) which satisfies the ECRTN requirements.



Similarly, traffic movements on Cambewarra Road (route 3) would be subject to an additional 3 truck movements throughout the night. Route 3 is designated as a sub-arterial road and therefore under the ECRTN falls into the freeway/arterial road classification. From an average SEL of 83.5 dB(A) at the residential boundary, the Leq 9 hour contribution determined at the residential facade from the 3 truck movements would be 39.7 dB(A). When added to a night time Leq level of 55.8 dB(A) results in a Leq level of 55.8 dB(A) which satisfies the ECRTN requirements.

### **3.16 RAIL TRAFFIC**

With respect to the additional rail traffic noise, a rail traffic noise assessment was carried out for the PRP7 project and the measurement results were presented in the PRP7 acoustic assessment report prepared by Steven Cooper Acoustics (report number 32.3849.R17:NSC dated December 2002).

For the critical night time period, the subject proposal doesn't use the packing plant spur line at night. The additional train movements arising from the proposed Ethanol Upgrade and the existing train movements will for the night time period not exceed 2 movements (one departure and one arrival).

The trains (when arriving from the north) would move onto the existing spur line (i.e. does not go into Bombaderry Station), crossing Railway Street and continues round at a slow speed to enter the site. Then for departing, the train would cross Railway Street and then along the spur line out onto the main line. The train then reverses back down the main line to a siding at Bombaderry Station where the train remains until its scheduled departure to Sydney.





At the nearest residence to the railway line (Railway Street) the following sound exposure levels from the different train activities were derived:

<u>Activity</u>	<u>SEL dB(A)</u>	<u>L<sub>eq(1 hr)</sub> dB(A)</u>
Train crossing Bolong Road	77.7	42
Train up onto main line and reverse to station	88.4	53
Train arrived on main line	87.0	52
Train departure on main line	81.2	46

All the above activities would not occur in a one hour period and the activities that could fit into one hour would be a train arriving on the main line and crossing Railway Street or the train crossing Railway Street and up to the main line and reversing to the station. On a worst case basis, the activities in one hour would be for the train crossing Railway Street and up to the main line and reversing to the station resulting in an SEL of 88.4 dB(A) which is an external L<sub>eq(1hr)</sub> of 53 dB(A). This external level would for closed window situation reduce an L<sub>eq(1hr)</sub> of 28-33 dB(A) and is below the Interim Guidelines for Rail Traffic Noise.

#### 4.0 CONSTRUCTION NOISE

Construction noise is not part of the EPA Licence and utilises different noise indices to that for the operating plant.

The current EPA Licence conditions relate to criteria derived from night time ambient measurements and the EPA Environmental Noise Control Manual (the “ENCM”) that utilised the concept of an average maximum (L10) noise level versus the average minimum (L90 background) level.

Contained in the ENCM are a set of Noise Control Guidelines for various types of noise emission sources. A Construction Site Noise Guideline is set out in Chapter 171 of the ENCM and indicates the following criteria may be specified in a development consent or building application:



*The  $L_{A10,T}$  noise levels emanating from the construction site shall not exceed the background levels by the following criteria, in the interval specified:*

- 20 dB(A) for construction activity period up to 4 weeks
- 10 dB(A) for construction activity period over 4 weeks and up to 26 weeks.
- 5 dB(A) for construction activity period over 26 weeks.

*Time Restrictions of Monday to Friday, 7am to 6pm, and Saturday 7am to 1pm if audible on residential premises and no construction work to take place on Sundays or Public Holidays.*

The ENCM indicates the  $L_{A10,T}$  sound pressure levels shall be measured or computed at any point within one metre of the boundary of the nearest affected residential premises. Measurements shall be made over a 10 to 15 minute interval (T), using the “fast” response of the sound level meter. The  $L_{A10,T}$  is the A-weighted sound pressure level which is exceeded for 10 percent of the time over the measurement interval T.

As the sites associated with the Ethanol Upgrade are already level cleared ground the principal noise emission construction activities for the erection of the buildings are associated with the piling and foundation works associated with the proposed concrete slabs, and pouring of the slabs. This work is carried out on an infrequent basis. The construction of the buildings proper and fit out of the buildings generates significantly lower noise levels.

Based on other construction projects at Shoalhaven Starches there will be piles driven throughout the site of the various slabs, where such piles are driven by a pile driving rig.

The total works associated with all the slabs will take a period of up to 4 months, being 3 months for all the pile driving operations (occurring on an infrequent basis) and 1 week for the preparation/pouring of the slabs. The actual pouring of all the slabs will be conducted over a month.



This same form of construction (including the driving of piles) has occurred on the Shoalhaven Starches site over the last eleven years without receipt of any noise complaints.

Due to the location of the various plant items being significantly removed from residential premises and the existing ambient levels, primarily as a result of traffic in the area, normal construction activities are not envisaged to create a noise impact. However, the proposed concrete foundation slabs requires the driving of piles (by a pile rig) into the ground, which creates a greater level of noise than for normal building and excavation works.

On past experience it is not envisaged there would be any noise disturbance in relation to the piling operations for the proposed concrete slabs, if such operations were restricted to the daytime period.

The Company has an ongoing building works program that has not given rise to any noise complaints and as such the forming and pouring of the slab and any other site works associated with the subject application is not envisaged to generate any noise impacts.

## 5.0 NOISE EMISSION FROM CONSTRUCTION OF THE PLANT

In order to consider the likelihood of noise emission from the proposed construction, we have utilised noise data from previous projects, as set out in Table 2 below.

**Table 2: Sound Power Noise Emission Levels of Plant Items – dB(A)**

ITEM	TYPICAL PLANT OR EQUIPMENT	MAX. NOISE LEVEL L <sub>10</sub> at 7 metres	SOUND POWER LEVEL
Bulldozer	Caterpillar D7	88	113
Front End Loader	Wheeled	90	115
Crane	Truck Mounted	85	110
Piling Hammer	for piles	93	118



The piling operations occur on an infrequent basis and is spread over a period of time which reduces the noise impact from the operations.

Therefore other than the piling operations for the packing plant, all other construction activities would not exceed background +10 dB(A) and therefore would satisfy the EPA secondary criterion of background +10 dB(A) for construction works less than 26 weeks.

## 6.0 CONCLUSION

An acoustical assessment of the proposed Ethanol Upgrade at the Shoalhaven Starches plant has been undertaken with reference to the INP requirements and the EPA Licence for the plant.

A site noise audit was carried out in March 2008 and found compliance with noise conditions issued by the EPA.

For the proposed Ethanol Upgrade a design target of 15 dB(A) below the EPA Licence conditions at the residential reference locations has been used so as to ensure the upgrade does not increase the current site noise emission levels.

Other than for day time construction activities, the critical period for noise assessment is the night time period of 10 pm to 7 am where the ambient approaches the EPA Licence limits.

Various noise control measures (in terms of construction and management) are set out in the report above.

An assessment of rail traffic movements during the night time period revealed compliance with the EPA rail traffic noise guidelines and the RIC Interim Guidelines.



An assessment of the additional truck movements as a result of the Ethanol Upgrade project has revealed compliance with the EPA's ECRTN requirements.

We trust this meets with your immediate requirements.

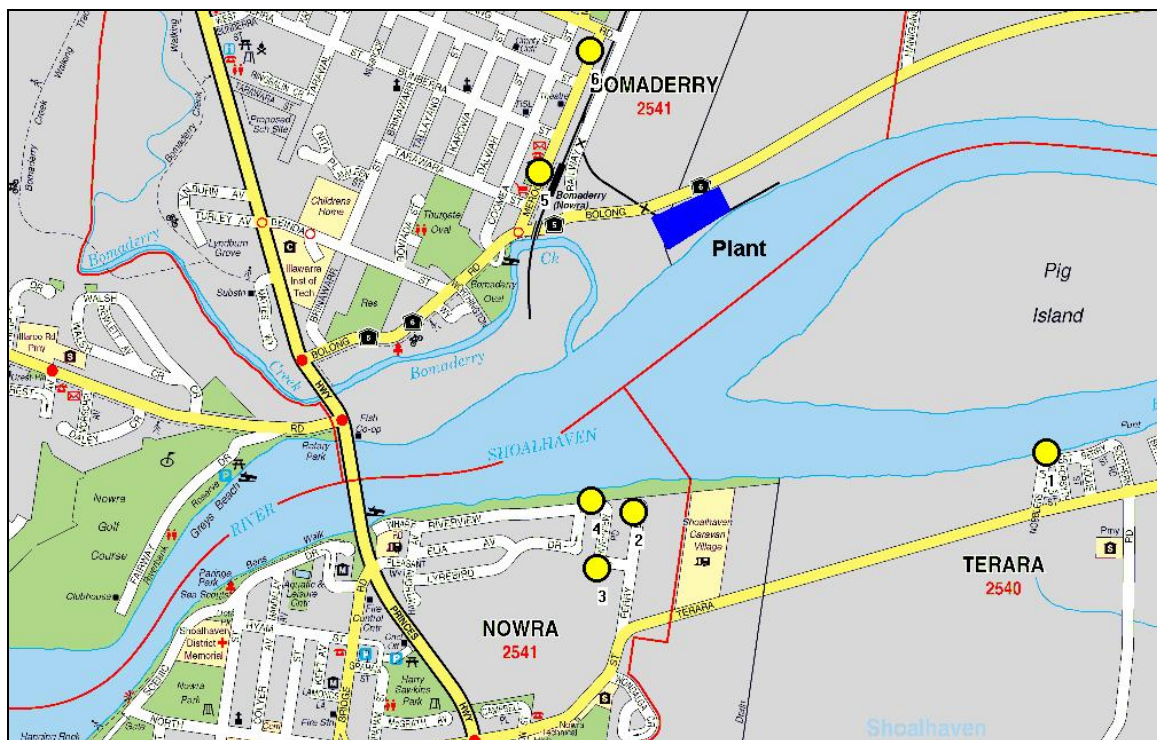
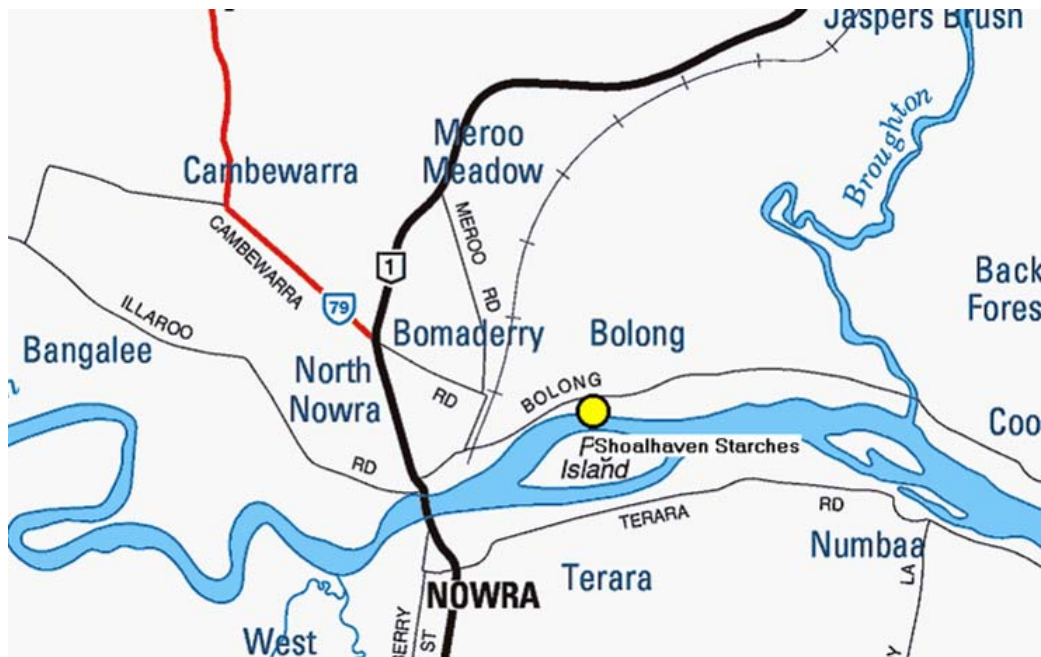
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**APPENDIX A: Site and Reference Measurement Locations**



## **APPENDIX B: Proposed Plant - Noise Data**

<b>Location</b>	<b>Lw dB(A)</b>
<b>PRODUCT DRYER</b>	
Vetter press motor cooling fan	48
Milling bag filter product rotary valve motor	48
Spare	48
Buffer hopper product rotary valve motor	48
Mill lubrication pump motor	48
Silo #1 vibrator motor	48
Hopper mill bypass rotary valve motor	48
Mill lid motor	48
Silo #1 dust collector motor	48
Diverter hopper dust collector motor	48
Silo #1 outlet rotary valve motor	48
Dryer product rotary valve motor	48
Contrashear motor	48
Spreader screw motor	73
Buffer hopper outlet screw motor	73
Effluent pump #1 motor	73
Effluent pump #2 motor	73
Combustion fan	73
Condensate pump #1 motor	73
Condensate pump #2 motor	73
Sump pump	73
Main bag filter screw #1 motor	73
Main bag filter screw #2 motor	73
Product screw motor	73
Recycle screw motor	73
Gluten feed pump motor	73
Contrashear hopper outlet pump motor	73
Vetter press motor	73
Contrashear spray water feed pump	73
Silo #1 outlet blower	74
Dry gluten blower motor	74
Classifier motor	74
Silverson mixer motor	76
Milling conveyor fan motor	83
Mill motor	110



Main fan motor (HV)	106
Disintegrator motor (HV)	109
Root blower	97
Dust collector fan	96

### **FERMENTERS**

Agitator, Fermenter 13	73
Transfer pump, fermenter 13	88
Transfer pump backup, Fermenter 13	88
Product Recovery Pump 13	73
Agitator, Fermenter 14	73
Transfer pump, fermenter 14	88
Transfer pump backup, Fermenter 14	88
Product Recovery Pump 14	73
Fermenter 14 sump pump	72
Agitator, Fermenter 15	73
Transfer pump, fermenter 15	88
Transfer pump backup, Fermenter 15	88
Product Recovery Pump 15	73
Fermenter 15 sump pump	72

### **FERMENTER - COOLING TOWER**

Cooling Tower 1 - 60%	77
Cooling Tower 2 - 60%	77
Cooling Tower 3 - 60%	77
Cooling Tower 4 - 60%	77
Cooling Tower 5 - 60%	77
Cooling Tower 6 - 60%	77

### **MOLECULAR SIEVE**

Molecular Sieves	106
Thermocompressor	106
Anhydrous Pump	102
Condensate Pump	100
Vacuum pumps	106
Regen transfer	100

### **MOLECULAR SIEVE - COOLING TOWER**





Cooling Tower 1 - 60%	77
Cooling Tower 2 - 60%	77

### **DDG - COOLING TOWER**

Cooling Tower 1 - 60%	77
Cooling Tower 2 - 60%	77
Cooling Tower 3 - 60%	77
Cooling Tower 4 - 60%	77
Cooling Tower 5 - 60%	77
Cooling Tower 6 - 60%	77
Cooling Tower 7 - 60%	77
Cooling Tower 8 - 60%	77
Cooling water pump 1	85
Cooling water pump 2	85
Cooling water pump 3	85
Cooling water pump 4	85
Cooling water pump 5	76
Cooling water pump 6	76

### **DDG DRYER**

Blender (double shaft)	73
Mixer (single shaft)	73
Feed Screw Conveyor	73
Dryer Main Drive	98
Dryer Discharge Screw Conveyor	73
Emergency Dump Screw Conveyor	73
Recirc Screw Conveyor 1	73
Recirc Screw Conveyor 2	73
Recirc Screw Conveyor 3	73
Recirc Screw Conveyor 4	73
Recirc Screw Conveyor 5	73
Recirc Screw Conveyor 6	73
Product Discharge Screw Conveyor	73
Rotary Valve	58
Pneumatic Conveying Blower	83
Scrubber Pump	72
Exhaust Gas Fan	83
Steam Condensate Pump	72



Blender (double shaft)	73
Mixer (single shaft)	73
Feed Screw Conveyor	73
Dryer Main Drive	98
Dryer Discharge Screw Conveyor	73
Emergency Dump Screw Conveyor	73
Recirc Screw Conveyor 1	73
Recirc Screw Conveyor 2	73
Recirc Screw Conveyor 3	73
Recirc Screw Conveyor 4	73
Recirc Screw Conveyor 5	73
Recirc Screw Conveyor 6	73
Product Discharge Screw Conveyor	73
Rotary Valve	58
Pneumatic Conveying Blower	83
Scrubber Pump	72
Exhaust Gas Fan	83
Steam Condensate Pump	72
Blender (double shaft)	73
Mixer (single shaft)	73
Feed Screw Conveyor	73
Dryer Main Drive	98
Dryer Discharge Screw Conveyor	73
Emergency Dump Screw Conveyor	73
Recirc Screw Conveyor 1	73
Recirc Screw Conveyor 2	73
Recirc Screw Conveyor 3	73
Recirc Screw Conveyor 4	73
Recirc Screw Conveyor 5	73
Recirc Screw Conveyor 6	73
Product Discharge Screw Conveyor	73
Rotary Valve	58
Pneumatic Conveying Blower	83
Scrubber Pump	72
Exhaust Gas Fan	83
Steam Condensate Pump	72
Blender (double shaft)	73
Mixer (single shaft)	73
Feed Screw Conveyor	73
Dryer Main Drive	98
Dryer Discharge Screw Conveyor	73



Emergency Dump Screw Conveyor	73
Recirc Screw Conveyor 1	73
Recirc Screw Conveyor 2	73
Recirc Screw Conveyor 3	73
Recirc Screw Conveyor 4	73
Recirc Screw Conveyor 5	73
Recirc Screw Conveyor 6	73
Product Discharge Screw Conveyor	73
Rotary Valve	58
Pneumatic Conveying Blower	83
Scrubber Pump	72
Exhaust Gas Fan	83
Steam Condensate Pump	72
Decanter Feed Transfer Pump 1	88
Decanter Feed Transfer Pump 2	88
Decanter Feed Tank Agitator	73
Decanter Supply Pump 1	73
Decanter Supply Pump 2	73
Decanter Supply Pump 3	73
Decanter Supply Pump 4	73
Decanter Supply Pump 5 (standby)	73
Evaporator Supply Pump 1	88
Evaporator Supply Pump 2	88
P5400 Decanter 1.1	97
P5400 Decanter 1.2	97
P5400 Decanter Oil Pump	72
P5400 Decanter Underflow Screw	73
CC505 Decanter 1.1	97
CC505 Decanter 1.2	97
CC505 Decanter Oil Pump	72
CC505 Decanter Underflow Screw	73
CA755 Decanter 1.1	97
CA755 Decanter 1.2	97
CA755 Decanter Oil Pump	72
CA755 Decanter Underflow Screw	73
Decanter Return Pump 1	73
Sump Pump 1	73
P5400 Decanter 1.1	97
P5400 Decanter 1.2	97
P5400 Decanter Oil Pump	72
P5400 Decanter Underflow Screw	73



CC505 Decanter 1.1	97
CC505 Decanter 1.2	97
CC505 Decanter Oil Pump	72
CC505 Decanter Underflow Screw	73
CA755 Decanter 1.1	97
CA755 Decanter 1.2	97
CA755 Decanter Oil Pump	72
CA755 Decanter Underflow Screw	73
Decanter Return Pump 2	73
Sump Pump 2	73
Evaporator Syrup Transfer Pump 1	73
Evaporator Syrup Transfer Pump 2	73
Evaporator Syrup Feed Pump 1	72
Evaporator Syrup Feed Pump 2	72
Evaporator Syrup Feed Pump 3	72
Evaporator Syrup Feed Pump 4	72
Evaporator Syrup Feed Pump 5 (standby)	72
C.I.P. Pump	73
Evaporator syrup pump	73
Evaporator syrup pump	73
Evaporator syrup pump	73
Mill feed screw	73
Mill feed screw	73
Mill feed screw	73
Mill feed screw	73
Mill feed recycle screw	73
Mill feed rotary valve	58
Mill feed rotary valve	58
Mill feed rotary valve	58
Mill feed rotary valve	58
Mill feed recycle blower valve	83
mill feed silo fan	83
silo vibration	48
Steam condensate pump 1	73
Steam condensate pump 2	73
Steam condensate pump 1	73
Steam condensate pump 2	73
Screw conveyor 1	73
Screw conveyor 2	73
Screw conveyor 3	73
Screw conveyor 4	73



Screw conveyor 5	73
Screw conveyor 6	73
Screw conveyor 7	73
Screw conveyor 8	73
Screw conveyor 9	73
Screw conveyor 10	73
Screw conveyor 11	73
Screw conveyor 12	73
Shed rotary screw 1	76
Shed rotary screw 2	76
Shed rotary screw 3	76
Shed rotary screw 4	73
Shed rotary screw 5	73
Shed rotary screw 6	73
Bucket elevator 1	73
Bucket elevator 2	73
Dryer Main Drive 1	107
Discharge Screw conveyor 1	73
Discharge Screw conveyor 2	73
Recirc Screw conveyor 1	73
Recirc Screw conveyor 2	73
Recirc Screw conveyor 3	73
Recirc Screw conveyor 4	73
Recirc Screw conveyor 5	73
Recirc Screw conveyor 6	73
Feed Conveyor 1	73
Blender 1	73
Kneader 1	73
Exhaust Gas Fan 1	73
Pneumatic Conveying Blower 1	83
755 Decanter 1.1	97
755 Decanter 1.2	97
Decanter Oil pump 1	72
Dryer Main Drive 1	107
Discharge Screw conveyor 1	73
Discharge Screw conveyor 2	73
Recirc Screw conveyor 1	73
Recirc Screw conveyor 2	73
Recirc Screw conveyor 3	73
Recirc Screw conveyor 4	73
Recirc Screw conveyor 5	73



Recirc Screw conveyor 6	73
Feed Conveyor 1	73
Blender 1	73
Kneader 1	73
Exhaust Gas Fan 1	73
Pneumatic Conveying Blower 1	83
755 Decanter 1.1	97
755 Decanter 1.2	97
Decanter Oil pump 1	72
Sump pump	73
Decanter feed Return pump	73

### **DDG PELLETT PLANT**

Rotary valve	58
Rotary valve	58
Rotary valve	58
Rotary valve	58
Rotary valve	58
Rotary valve	58
Screw conveyor	73
Water blender mixer	73
Bin extraction fan	83
Bin discharger	73
Bin Screw Conveyor	73
Bucket elevator	73
Screw conveyor	73
Ring main screw conveyor	73
Feed screw 1	73
Feed screw 2	73
Feed screw 3	73
Feed screw 4	73
Conditioner Screw conveyor	73
Pellet press 1	107
Press feed screw	73
Conditioner Screw conveyor	73
Pellet press 1	108
Press feed screw	73
Geelen Cooler rotary valve	58
Geelen Cooler discharge screw	73
Roller mill	74



Product screw conveyor	73
Bucket elevator	73
Fan	88
Bag house rotary valve	58
Water dosing pump	72
Cross over screw	73
Water blender mixer	73
Screw conveyor	73
Geelen Cooler rotary valve	58
Geelen Cooler discharge screw	73
Water dosing pump	72
Roller mill	74
Product screw conveyor	74
Bucket elevator	73
Fan	88
Bag house rotary valve	58

#### **ODOUR SCRUBBER**

Scrubber Fan	88
Standby Scrubber Fan	88
Scrubber Pump	73
Scrubber Pump	73
Scrubber Pump	73
Scrubber Pump	73

#### **EVAPORATOR**

E5 Turbo fan	118
E6 Turbo fan	118
E5 - 1st stage recirculation	73
E5 - 2nd stage recirculation	73
E6 - 1st stage recirculation	73
E6 - 2nd stage recirculation	73
Tower water booster pump	73
Tower water booster pump	73
E5 - Product transfer pump	73
E5 - condensate pot pump	73
E6 - Product transfer pump	73
E6 - condensate pot pump	73
CIP dump/transfer pump	73



Feed pump	73
Feed pump	73
Vent condenser vacuum pump	73
Vent condenser vacuum pump	73
Hot wash pump	73
Hot wash pump	73
VH5 Separator transfer pump	48
VH6 Separator transfer pump	48
Vent condenser extraction pump	48
Vent condenser extraction pump	48
Service water	48
Service water	48

### **BOILER**

Inside Duct	106
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### **PACKING PLANT**

Palletiser	100
Power Unit	95

### **CONTAINER LOADING**

Fork Lift	92
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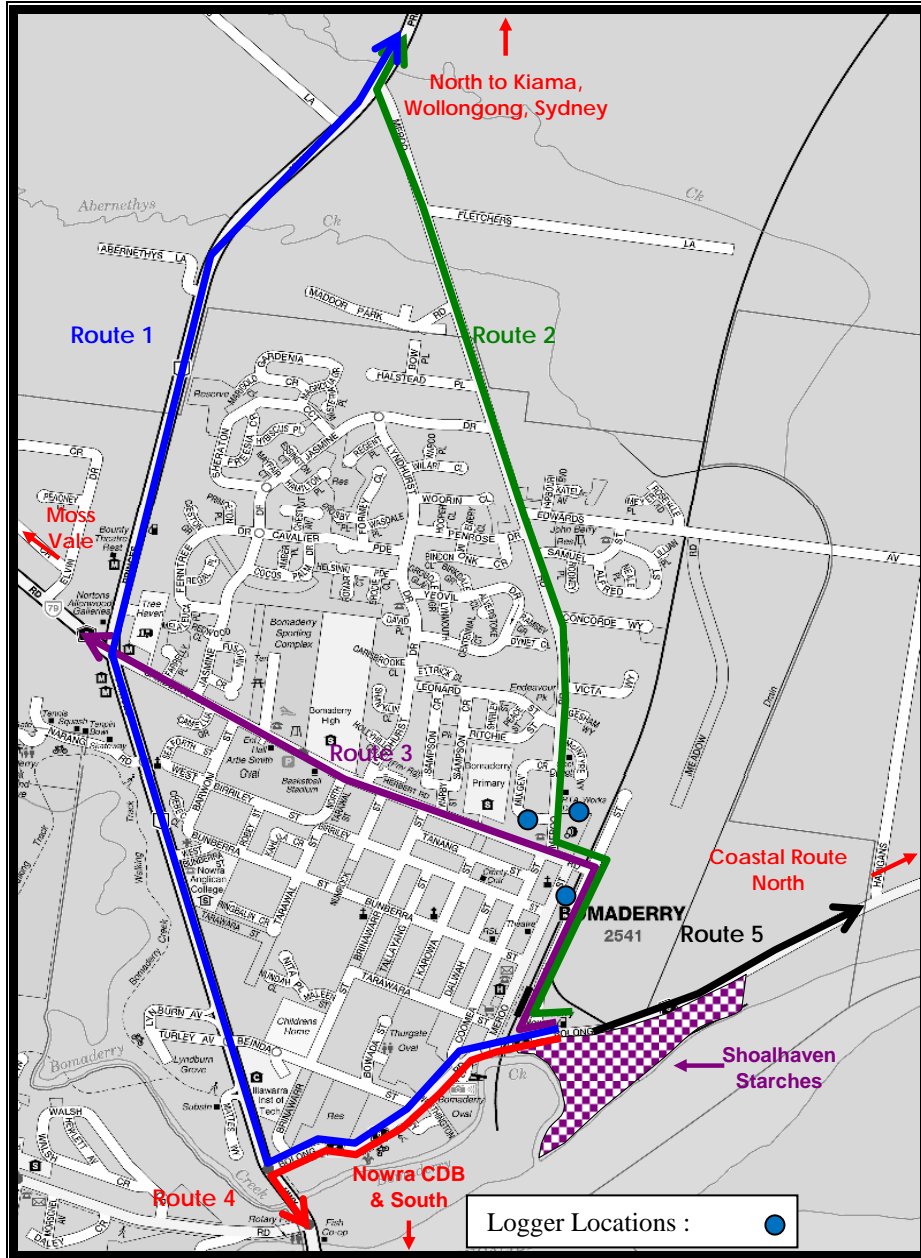
### **ENVIRNOMENTAL FARM - BLOWERS**

Blower 1 - In enclosure (70 dB(A) @ 1m)	79
Blower 2 - In enclosure (70 dB(A) @ 1m)	79
Blower 3 - In enclosure (70 dB(A) @ 1m)	79
Blower 4 - In enclosure (70 dB(A) @ 1m)	79
Blower 5 - In enclosure (70 dB(A) @ 1m)	79
Blower 6 - In enclosure (70 dB(A) @ 1m)	79
Blower 7 - In enclosure (70 dB(A) @ 1m)	79
Blower 8 - In enclosure (70 dB(A) @ 1m)	79
Blower 9 - In enclosure (70 dB(A) @ 1m)	79





**APPENDIX C: Road Traffic Route Map**



Modified map of Figure 1.3.3 from Traffic Impact Report prepared by Christopher Stapleton Pty Ltd.

