

ANNEXURE 4

Environmental Noise Impact Assessment

prepared by

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Environmental Noise Impact Assessment Shoalhaven Starches & Supagas – Proposed CO₂ Plant Modification to MP 06_0228

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Bomaderry, NSW 2541

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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 and includes the former Dairy Farmers site at 220 Bolong Road.

Shoalhaven Starches has been approached by Supagas Pty Ltd to construct a Carbon Dioxide (CO₂) plant on land adjacent to the former Dairy Farmers Site.

Essentially Supagas seeks to establish a plant on the subject land so as to take CO₂ from the Shoalhaven Starches operations and to then process this to food grade quality for the food and beverage market.

The surrounding area is a mix of commercial, industrial and residential premises. The nearest residences are located in the township of Bomaderry to the west and across the Shoalhaven River in Nowra to the south and Terara to the south-east.

The Department has confirmed that this proposal may be treated as a modification to the existing Project Approval for the overall Shoalhaven Starches operations. Following discussions with Ms Janine Goodwin of the NSW EPA, South East Region, it is understood therefore that this Noise Impact Assessment should consequently be carried out in accordance with Shoalhaven Starches Environment Protection Licence 883 with respect to assessment methodology and the establishment of project specific noise goals although the proponent and operator will be Supagas. This ensures that the noise emission from proposed CO₂ plant will not increase the overall level of noise emission from the entire operation of the Shoalhaven Starches facility.

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

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

The main sources of noise associated with the proposal will be the fixed process plant comprising cooling tower, reboilers, refrigeration motors, pumps and compressors as well as truck movements on occasion. Similar plant is currently operated by BOC Gasses, located opposite the Shoalhaven Starches main facility on Bolong Road.

Noise modelling has been undertaken using previously measured noise levels from similar plant and equipment as well as noise measurements taken in proximity to the BOC Gasses plant on Bolong Road.

Calculations show that the level of noise emission from the ongoing operation of the CO₂ plant will be within the design noise goals at all receptor locations without the need for additional noise controls.

The construction works will consist of potential piling work, pouring of concrete slabs and erection of the fixed process plant.

Calculations show that the level of noise emission from the construction phase will be within noise management levels set by the NSW EPA's *Interim Construction Noise Guideline* at all receptor locations.

2. SITE AND DEVELOPMENT DESCRIPTION

2.1 Site Description

The former Dairy Farmers site, now owned by Shoalhaven Starches is located at 220 Bolong Road, Bomaderry, NSW on the southern side of Bolong Road across the Shoalhaven River from Terara and Nowra.

The area surrounding the Site is a mix of 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 1600 metres to the south west;
- Location 3 – Meroo Street, Bomaderry approximately 1100 metres to the north west;
- Location 4 – Coomea Street, Bomaderry approximately 1080 metres to the north west;

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

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



Figure 1. Location Plan – Shoalhaven Starches, Bomaderry, NSW (source: Google Maps © 2017)

2.2 Description of Proposal

Supagas proposes to establish a Carbon Dioxide (CO₂) plant on the Site to take CO₂ from the Shoalhaven Starches operations and to then process this to food grade quality for the food and beverage market. CO₂ will be taken directly from Shoalhaven Starches operations reducing emissions from their operations by up to 100 tonnes per day when the plant is fully operational.

Noise sources associated with the proposal will comprise the fixed process plant including cooling tower, reboilers, refrigeration motors, pumps and compressors as well as truck movements on occasion.

The construction phase of the modification will include the pouring of concrete slabs for skids, or hardstand areas with the potential for piling works and the installation of fixed plant.

3. NOISE CRITERIA

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

The Department has confirmed that this proposal may be treated as a modification to the existing Project Approval for the overall Shoalhaven Starches operations.

This Noise Impact Assessment is consequently carried out in accordance with Shoalhaven Starches Environment Protection Licence 883 with respect to assessment methodology and the establishment of project specific noise goals although the proponent and operator will be Supagas.

This ensures that the noise emission from proposed CO₂ plant will not increase the overall level of noise emission from the entire operation of the Shoalhaven Starches facility.

3.1 NSW EPA's Environment Protection Licence 883

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

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

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

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

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

3.2 Shoalhaven Starches Noise Management Plan

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

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

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

3.3 Construction Noise Criteria

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

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

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

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

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

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

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

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

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

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

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

Receptor Location	Noise Management Level	How to Apply
Location 1 (Terara)	43 dBA (33 + 10)	The noise affected level represents the point above which there may be some community reaction to noise.
Location 2 (Nowra)	50 dBA (40 + 10)	<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.
Locations 3 & 4 (Bomaderry)	48 dBA (38 + 10)	<ul style="list-style-type: none"> ▪ The proponent should also inform all potentially impacted residents of the nature of works to be carried out, the expected noise levels and duration, as well as contact details.
	Highly noise affected 75 dB(A)	<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.

3.4 Project Specific Noise Goals

The most relevant criteria are as follows:-

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

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

For a **residence**, the design noise goals are to be assessed at the reasonably most-affected point on or within the residential property boundary or, if that is more than 30 metres from the residence, at the reasonably most-affected point within 30 metres of the residence, but not closer than 3 metres to a reflective surface and at a height of between 1.2–1.5 metres above ground level. This should not be read to infer that the project noise trigger level (or a limit in a statutory document) applies only at the reasonably most-affected location.

For multi-storey residential buildings (greater than two storeys) where a ground floor assessment location is deemed to be unrepresentative of the exposure of upper stories, the assessment may be undertaken at a representative elevation and closer than 3 metres to a reflective surface, as agreed with the regulator. However, the assessed/measured noise level is to be suitably adjusted to reflect a 'free field' (that is, nominally no reflective signals) assessment/measurement location.

4. CO₂ PLANT OPERATIONAL NOISE EMISSION

4.1 Plant and Equipment Source Noise Levels

The main sources of noise associated with the proposal are the fixed processing plant comprising cooling tower, reboilers, refrigeration motors, pumps and compressors. There will also be truck movements associated with despatching product.

A proposed layout of the plant is shown in Figure 2 below.

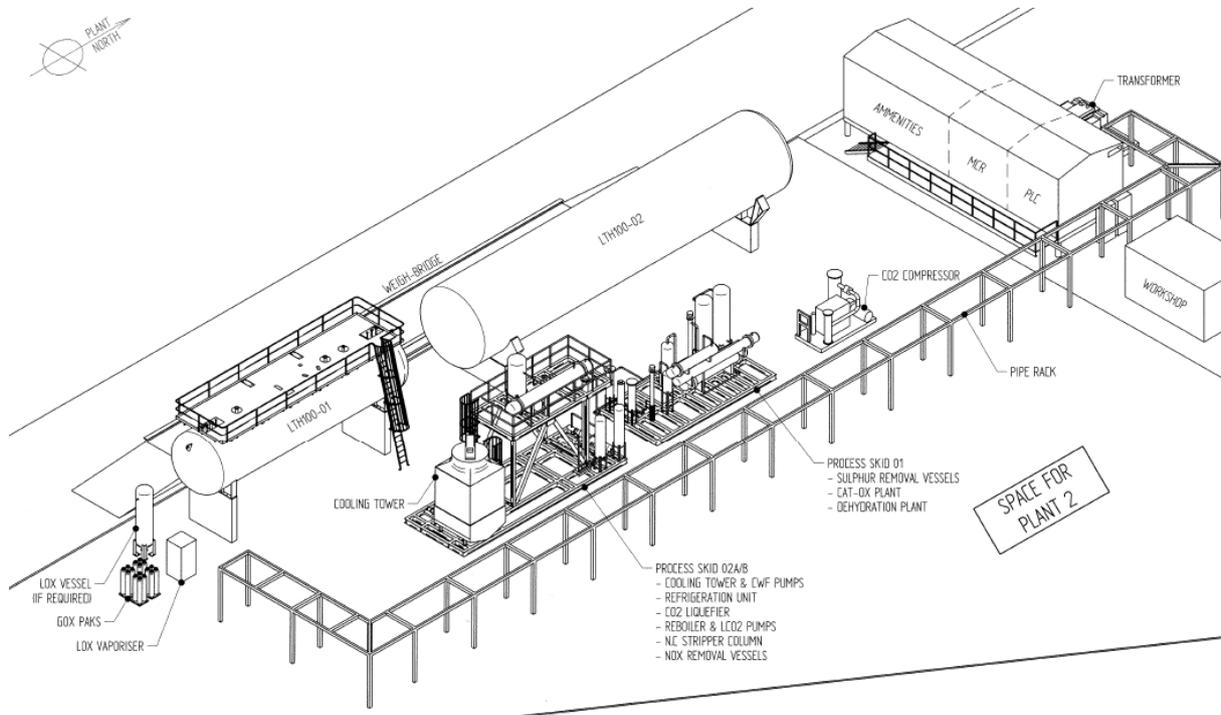


Figure 2. Proposed Plant Layout – Supagas 220 Bolong Road, Bomaderry, NSW (source: Supagas Pty Ltd GLPP16027-L1-008)

There is no noise data available from the operator or manufacturer at this stage. However, the author has carried out noise assessments of similar plant and equipment over the past 16 years. In addition, there is an existing Co₂ processing facility located on Bolong Road, Bomaderry Opposite the Shoalhaven Starches facility that is owned and operated by BOC Gasses. It is understood that this plant is similar to that proposed by Supagas.

Noise measurements of the BOC Gasses plant have been taken at varying distances from the plant and equipment and used, in conjunction with previous measurements of similar plant, to establish the schedule of overall 'A' frequency weighted sound power levels, in decibels re: 1 pW, shown in Table 3 below.

Table 3 L₁₀ Sound Power Levels – CO₂ plant

Description	L _{10, 15 minute} Sound Power Level (dBA)
Reboiler	96
Cooling tower	87
Refrigeration Units	93
Compressors	78
Pumps	78
Overall CO2 Plant	98
Truck	100

4.2 Noise Level Predictions

4.2.1 Modelling Equations

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

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

Where:

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

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

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

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

4.2.2 Predicted Noise Levels

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

Table 4 Predicted Noise Levels at Receptor Locations – CO₂ Plant

Description	Predicted Noise Level L _{10, 15 minute} (dBA) at Receptor Location			
	Location 1	Location 2	Location 3	Location 4
Design Noise Goal (L_{10, 15 minute})	28	28	32	30
CO ₂ Plant	26	26	26	26
Complies	Yes	Yes	Yes	Yes

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

- A reduction for duration of a truck operating at full sound power for 5 minutes in any given 15 minute period;
- Ground absorption at receptors R1, R3 and R4 up to a maximum 4 dB.

5. CONSTRUCTION NOISE EMISSION

The construction process will involve removal of obsolete equipment, piling work, joining of pipework, pouring of concrete slab and erection of fixed plant. The bulk of the equipment will be fabricated off site and brought to the site on skids.

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

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

Description	L _{eq} Sound Power Level (dBA)
Piling Rig	118
Mobile Crane (Diesel)	110
30 Tonne Excavator	110
Concrete Truck / Pump	105
Grinder	105
Power Saw	101

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

Table 6 Predicted Noise Levels at Receptor Locations – Construction Phase

Description	Predicted Noise Level L _{eq, 15 minute} (dBA) at Receptor Locations			
	Location 1	Location 2	Location 3	Location 4
Construction Activity	37 – 43	39 – 45	39 – 45	39 – 45
Acceptable Noise Limit (L _{eq, 15 minute})	43	50	48	48
Complies	Yes	Yes	Yes	Yes

Ranges are based on activity with and without piling.

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

It is worth noting for clarification that the similarity in predicted noise levels at each receptor location from both operational activity and construction works is due to the similar distances in this instance and the effects of ground absorption at R3 and R4 despite being slightly closer than R2 where there is no effect from ground absorption.

6. CONCLUSION

An assessment of the potential noise impact from the proposed installation and operation of a CO₂ Plant by Supagas Pty Ltd at Shoalhaven Starches Pty Ltd's site at 220 Bolong Road, Bomaderry has been undertaken.

Calculations show that the level of noise emission from the operation of the plant will be within the noise design goals derived from Environment Protection Licence 883 noise limits at each receptor location. This is based on the assumed noise generation of the fixed plant and equipment established in this report.

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*.



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