



Bioenergy Development Toongabbie, Gippsland

Noise Assessment Summary

8 December 2023
Reference ID: 301-2

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Contents

Background	4
Criteria.....	5
Planning Scheme	5
Environment Protection Act and Regulations.....	5
The Noise Protocol.....	6
Preliminary Assessment	7
Noise Data Inputs.....	7
Operational Assumptions.....	7
Predicted Noise Levels	8
Discussion.....	9
Stage 2 (Scope & Fee).....	10
Scope.....	10
Cost.....	10
Exclusions.....	11
Schedule.....	11
References	12
Figures	
Figure 1 Development and Closest Receivers.....	4
Tables	
Table 1 Protocol Noise Criteria.....	6
Table 2 Predicted Noise Levels dB(A).....	8

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Abbreviations

The Act	<i>Environment Protection Act 2017</i>
Assessment	<i>Echo Noise Assessment Summary 301-2 8 December 2023</i>
CHP	Combined Heat and Power Unit
dB(A)	Noise level in A-weighted decibels
Development	15,000 tonnes per annum (1.1MW) baseload renewable energy project with downstream micro-algae cultivation system in Toongabbie, Gippsland
EPA	Victorian Environment Protection Authority
ERS	<i>Environment Reference Standard</i>
Low Frequency Guidelines	<i>EPA publication 1996 Noise guidelines: Assessing low frequency noise for more information on low frequency noise</i>
OEM	Original Equipment Manufacturer
Protocol	<i>EPA Publication 1826.4: Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues 20 May 2021</i>
Regulations	<i>Environment Protection Regulations 2021</i>
Scheme	<i>Wellington Planning Scheme, VC241 dated 17 October 2023</i>

Glossary

A-weighting	A mathematical adjustment to the measured noise levels to represent the human response to sound. An <i>A-weighted noise level</i> is presented as dB(A).
Ambient noise level	The noise level in the environment in the absence of the project
Background noise level	Minimum ambient noise level, evaluated as the level exceeded for 90 per cent of sample period ($L_{A90, period}$)
Decibels	The logarithmic unit of measurement to define the magnitude of a fluctuating air pressure wave. Used as the unit for <i>sound</i> or <i>noise level</i>
Equivalent noise level	The A-weighted noise level which is equivalent to a noise level which varies over time
Frequency	The number of pressure fluctuation cycles per second of a sound wave. Measured in units of Hertz (Hz)
Noise	An interchangeable term with sound but which is most often described as <i>unwanted sound</i> .
Octave Band	The segregation of sound into discrete frequency components. For example, the 2000 Hz <i>octave band</i> is a high frequency component of sound/noise. The one-third (or 1/3) octave is more finite segregation (1/3 rd) of each octave band
Sound	An activity or operation which generates a fluctuating air pressure wave. The ear drum can perceive both the frequency (pitch) and the magnitude (loudness) of the fluctuations to convert those waves to sound

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Sound pressure level	The magnitude of sound (or noise) at a position. The sound pressure level can vary according to location relative to the noise source, and operational, meteorological and topographical influences
Sound power level	The amount of sound energy an activity produces for a given operation. The sound power level is a constant value for a given activity. The sound power level is analogous to the power rating on a light globe (which remains constant), whereas the lighting level in a space (sound pressure level in this analogy) will be influenced by the distance from the globe, shielding and different locations within the space
Tonality	Noise containing a perceptible pitch component as objectively identified using a one-third octave band test described

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Background

C-Loop Power and Thermal propose to develop a 15,000 tonnes per annum (1.1MW) baseload renewable energy project with downstream micro-algae cultivation system in Toongabbie, Gippsland (the **development**). The development will produce electricity via a 1.1MW Combined Heat and Power Unit (**CHP**).

Noise sources at the development include the CHP, a gas treatment plant, pumps, agitators, delivery and collection trucks, and a telescopic handler.

The development is located in a *Farming Zone* of the *Wellington Planning Scheme*. A preliminary environmental noise assessment (**assessment**) of the development has been conducted against the *Environment Protection Act 2017* (the **Act**) and the *Environment Protection Regulations 2021* (the **Regulations**).

The preliminary assessment is based on the available noise data from manufacturers of CHP units, and consists of developing a three-dimension noise model and predicting indicative noise levels at the closest receivers. A Stage 2 assessment will be conducted once validated manufacturers data are available and a practicable extent of the development can be incorporated. A Stage 2 scope of works and fee are included as part of this report.

Noise is assessed at the closest receivers to the development, being the residences identified as 1 to 10 in Figure 1. The development is highlighted in Figure 1.

Figure 1 Development and Closest Receivers



Criteria

Planning Scheme

The development and all nearby receivers are located in a *Farming Zone* of the *Wellington Planning Scheme*, VC241 dated 17 October 2023 (the **Scheme**).

The following provisions within the Scheme are considered relevant to the preliminary environmental noise assessment.

Noise Management

Objective

To assist the *management of noise effects on sensitive land uses*.

Strategy

Ensure that development is not prejudiced and *community amenity and human health is not adversely impacted by noise emissions*.

Minimise the impact on human health from noise exposure to occupants of sensitive land uses (residential use, child care centre, school, education centre, residential aged care centre or hospital) near the transport system and other noise emission sources through suitable building siting and design (including orientation and internal layout), urban design and land use separation techniques as appropriate to the land use functions and character of the area.

Policy guidelines

Consider as relevant:

- The noise requirements in accordance with the Environment Protection Regulations under the *Environment Protection Act 2017*.

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Environment Protection Act and Regulations

The *Environment Protection Act 2017* (the **Act**) states that a person must not *emit an unreasonable noise or permit an unreasonable noise to be emitted*.

A *General Environmental Duty* is also required to be achieved by any activity that emits pollution or waste.

The *General Environmental Duty* requires that any person conducting an activity giving rise to pollution (including noise) must minimise so far as is reasonably practicable, the *risk of harm to human health or the environment*.

The *Environment Protection Regulations* (the **Regulations**) assist in satisfying the *General Environmental Duty*

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Part 5.3 of the Regulations relates to noise. Regulation 113 requires the prediction, measurement, assessment and analysis of noise to be in accordance with the *Noise Protocol (EPA Publication 1826.4: Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues 20 May 2021, the Protocol)*. The Protocol sets out assessment methodologies and noise limits for noise generating activities, as discussed in the following section.

The Noise Protocol

The Protocol defines noise criteria that apply to commercial and industrial premises. If background noise levels have not been measured, then the criteria are the higher of the *distance-adjusted levels* and the *base noise level in Regulation 118(2)(b)*.

A background noise level assessment in accordance with the Protocol would only increase the criteria where there are existing high (and constant) noise levels in the environment. A background noise level assessment would not result in lower noise levels the other Protocol methods. Given the rural environment, existing background noise levels are expected to be low, and have not been measured.

The distance adjusted level has been determined based on the development and the receivers being in the Farming Zone of the Scheme. The distance adjusted level and base noise levels under Regulation 118 are provided in Table 1, with the resulting project noise criteria.

Table 1 Protocol Noise Criteria

	Effective Noise Level (dB(A))		
	Distance Adjusted Level (Farming Zone)	Base Noise Level (Regulation 118(2)(b))	Project Noise Criterion
	L _{Aeq}	L _{Aeq}	L _{Aeq}
Day – (Monday to Saturday 7.00am to 6.00pm)	46	45	46
Evening (All other times)	41	37	41
Night (10.00pm to 7.00am any day)	36	32	36

The *effective noise level* under the Protocol is a 30-minute equivalent sound pressure level.

Under the Protocol, consideration is to be given to:

1. other commercial and industrial premises that may contribute to noise levels at receivers, and
2. any adjustments for duration or noise character. Potential noise characters include tonality, impulse, and intermittency.

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Preliminary Assessment

Noise Data Inputs

Manufacturers noise level data for CHP units are not readily available in a format which enables an accurate prediction. The data will vary depending on the level of noise attenuation that is incorporated by the Original Equipment Manufacturer (**OEM**). The units will incorporate varying levels of enclosure and muffler performances.

The preliminary assessment is based on indicative information to determine the likelihood of being able to achieve the project noise criteria. The data includes manufacturers information provided by *Clarke Energy* for a potential CHP¹ arrangement and from *JCB* for the telescopic handler. Other publicly available environmental noise assessment reports have been reviewed for information relating to gas treatment (chiller, compressor and blower), and previous noise measurements by *Echo Acoustics* of pumps and electric motors that are similar to those expected to be used for the project have also been used as inputs to the preliminary predictions.

The noise from all project equipment should be confirmed during the design stage when making final selections, with guarantees from the manufacturers and suppliers that the noise levels will not exceed the levels in this report or in an updated (Stage 2) version. The need for any acoustic treatment will be subject to a review of the proposed system (once designed).

Operational Assumptions

The preliminary assessment has been based on the following activities occurring in a 30-minute assessment period, as defined under the Protocol:

- (1) Continuous operation of two enclosed *Clarke Energy* CHP units, with a sound level of no more than 65 dB(A) at 10m. The noise level is inclusive of all ventilation openings, fans (ventilation and cooling), heat exchangers, pumps and exhaust systems (resulting in a total sound power level of 96 dB(A) from the combined CHP systems)
- (2) Continuous operation of pumps and agitators associated with the supporting tanks and supply system for the CHP (the digester), with a combined sound power level of 97 dB(A) (the equivalent of 22 items of equipment, each with a sound power level of 83 dB(A))
- (3) Continuous operation of gas treatment plant, including chillers, blowers and compressors, with a combined sound power level of no more than 95 dB(A)
- (4) A single B-Double truck accessing the development to deliver waste or collect materials, with a sound power level of 100 dB(A) when driving at low speed and 104 dB(A) when tipping waste

¹ *Clarke Energy C-Loop Power & Thermal Toongabbie Bioenergy Development C3293-T1-CQ-01 Budgetary Proposal, 4 September 2023*

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- (5) Use of a JCB telescopic handler to move material and load the CHP process, with a sound power level of 107 dB(A). It has been assumed that use of the telescopic handler will be restricted to the day and evening periods only.

The sound power level data for each major item of equipment should be confirmed to initiate the Stage 2 (final assessment) phase. It will be beneficial to seek specific data from the OEMs and the format of that data (for both the Stage 2 assessment and future procurement specifications can be discussed and confirmed).

Predicted Noise Levels

The noise from the development has been predicted using the noise calculation method provided by the *International Standard ISO9613-2:1996 "Acoustics - Attenuation of sound during propagation outdoors - Part 2 General method of calculation"*, topographic information available through the *Geoscience Australia ELVIS* website, and the operational assumptions summarised above. The results of the noise predictions are summarised in Table 2 for the closest receivers (identified in Figure 1).

Table 2 Predicted Noise Levels dB(A)

Receiver	Predicted Noise Level (dB(A))			Compliance
	Day (Monday to Saturday 7.00am to 6.00pm)	Evening (All other times of day)	Night (10.00pm to 7.00am any day)	
	L _{Aeq,30min}	L _{Aeq,30min}	L _{Aeq,30min}	
Criterion	46	41	36	
1	38		30	Yes
2	34		26	Yes
3	22		16	Yes
4	23		17	Yes
5	27		22	Yes
6	26		21	Yes
7	25		19	Yes
8	26		20	Yes
9	28		21	Yes
10	28		21	Yes

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Discussion

When predicting noise levels for comparison with the Protocol, the noise levels are to be adjusted (increased) where the activities exhibit specific noise characters (dominant tonal, impulsive, intermittency).

In the absence of specific data from the manufacturers of the indicative equipment, the noise levels in Table 2 are presented without adjustments for noise character. An adjustment does not apply to equipment that operates continuously, without intermittent or impulsive character, and the final selection of equipment should ensure that tonality is not a dominant character, including reversing alarms. Therefore:

- Truck paths should be designed for forward in, forward out movements, such that they are not required to reverse
- If reversing alarms are fitted to site equipment, including the JCB telescopic handler, they shall be a broad band alarm (as distinct to a high pitched alarm).

The predicted noise levels in Table 2 have been based on indicative one-third octave band data from previous measurements of mobile plant and engines. Notwithstanding, data is not available for one third octave bands down to 10 Hz and it is therefore not possible to compare predicted noise levels against low frequency noise character criteria. Such data will be sought as input to Stage 2.

The predicted noise levels in Table 2 achieve the noise levels under the Protocol by at least 3 dB(A), without any specific engineering noise control measures, other than those committed to by the CHP manufacturer for an enclosed unit. Therefore, with the noise level data that is available, the predictions indicate that there is an allowance for other commercial and industrial premises in the vicinity to also contribute to noise levels at receiver locations, whilst not exceeding the criteria (being a broader requirement).

As noted in the Operational Assumptions section of this preliminary assessment, the predicted noise levels are reliant on the noise level data that has been provided and it is important that manufacturers confirm that these noise levels can be achieved by their plant and equipment.

A Stage 2 assessment will update the assessment for the development application, and will be reliant on manufacturer guarantees, or additional sound power level data that supports the assumptions in the preliminary assessment. The Stage 2 assessment and report will ensure that the equipment most likely to be chosen for the development can achieve the legislative requirements.

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Stage 2 (Scope & Fee)

As described in Echo Acoustics Proposal 301-1, works have been divided into two distinct stages, consisting of:

- *Stage 1:* Review of project data, development of a noise model and feedback on preliminary results
- *Stage 2:* Subject to the outcomes of Stage 1, refinement of the noise model, determination of acoustic treatments and a noise specification for the tender process, and preparation of a report that is suitable for submission to the authority for the Development Application.

Scope

- Meet with C-Loop and the potential suppliers of equipment for the Development Application layout. Discuss the outcomes of the Stage 1 noise modelling and limitations, and determining the ability to achieve the noise levels specified in the Stage 1 report
- Provide a detailed request for information that can be provided to the potential supplier. The request will aim to return a guarantee that the noise levels in the Stage 1 report can be practically achieved, or additional information will be provided by the supplier that will enable the noise model to be accurately updated.
- Review any additional sound power level data for each noise source as provided by the potential supplier and update the 3-dimension noise model.
- Update the predicted noise levels at the surrounding receiver locations
- Compare the predicted noise levels with the assessment criteria, including the Act, Regulations, Protocol, and Low Frequency Guidelines, and if necessary determine if additional noise control measures are needed for the changes to the noise model
- Prepare a report that summarises the assessment, including legislation, noise criteria, data inputs and noise prediction methodology, suitable for submission with the Development Application to the authority.

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Cost

A fixed lump sum fee of \$4,600 (\$5,060 including GST) is proposed for the Stage 2 works.

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Exclusions

The Stage 2 works do not include:

1. a site inspection or physical attendance at a meeting outside of Metropolitan Adelaide
2. background noise level measurements in the vicinity of the development
3. the measurement of comparable plant and equipment in the case that insufficient input data are available to prepare the final report for the Development Application
4. the design of noise reduction measures for the CHP or gas treatment plant without input from the manufacturers.

The scope also does not include works following the submission of the (Stage 2) report such as:

1. response to representations
2. response to Wellington Shire Council or EPA requests for further information
3. meeting with the Wellington Shire Council or EPA to discuss the noise assessment approach or treatments
4. preparation for or attendance at the responsible authority hearing.

If required, works outside of the scope or on an as needs basis can be conducted on a time basis at an hourly rate of \$300 (\$330 including GST).

Schedule

Availability is confirmed to complete the Stage 2 works within 4 weeks of the receiving confirmation from manufacturer/supplier that noise levels will not exceed that presented in this report.

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References

Clarke Energy C-Loop Power & Thermal Toongabbie Bioenergy Development C3293-T1-CQ-01 Budgetary Proposal, 4 September 2023

*Noise Protocol (EPA Publication 1826.4: Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues 20 May 2021, the **Protocol**).*

EPA Publication 1826.4: Noise Limit and Assessment Protocol for the Control of Noise from Commercial, Industrial and Trade Premises and Entertainment Venues 20 May 2021

EPA publication 1996 Noise guidelines: Assessing low frequency noise for more information on low frequency noise

Environment Protection Act 2017

Environment Protection Regulations 2021

International Standard ISO9613-2:1996 "Acoustics - Attenuation of sound during propagation outdoors - Part 2 General method of calculation"

Wellington Planning Scheme, VC241 dated 17 October 2023

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