iAcoustics
INTEGRATED ACOUSTIC SOLUTIONS

Unit A1,
Kingswood Business Park,
Baldonnel, Dublin 22, Ireland

00353 1 452 1133
info@iacoustics.net
www.iacoustics.net

Lexington House Generator Noise Impact Assessment

6 Bettysford Terrace, Monastery Road, Clondalkin, Dublin 22.

Report Issued: 15/11/2022

Glossary of Terms

Airborne Sound Insulation:	The property of a material in a wall which determines how much airborne sound energy will be transmitted through the wall into the adjacent space, e.g., from one cellular office to another. The greater the measurement/calculation, the greater the levels of sound insulation.
Attenuator:	Device that reduces noise, particularly plant noise and crosstalk – often colloquially (and incorrectly) known as a silencer.
Background Noise (L90):	The in-situ, or ambient level of noise in the environment
Competent Person:	Someone with appropriate training, qualifications, experience, and skill. The person will normally have a diploma or degree in acoustics or a related subject.
Crosstalk:	Noise transfer between rooms, often via ventilation ductwork.
Decibel (dB):	The decibel is used as a measure of acoustic units.
dB(A):	A single-figure rating to a sound, which represents the human-ear frequency response.
DnT,w:	Used to indicate the on-site airborne sound insulation between rooms in a building. Typically, 7dB less than the often-quoted Rw rating, depending on the structure (e.g., stud wall, masonry). The higher the measurement, the greater the performance.
Frequency (Hz):	The number of sound waves to pass a point in one second. Correlated to the perceived pitch of a sound.
Impact Sound:	Structure borne sound caused by footfall or moving furniture.
Impact sound insulation:	The reduction of sound created by impacts (for example footfalls) on floors over a room. Lower measurement/calculated values represent better levels of sound insulation.
LAeq:	Commonly regarded as the A-weighted "average" noise level over a period of time.
Leq:	The linear (not A-weighted) equivalent continuous sound pressure level.
Mechanical-service noise:	Noise generated by mechanical and electrical services.
Noise intrusion:	Noise from external noise sources.
Noise rating (NR) curves:	A set of curves based on the sensitivity of the human ear. Used to give a single figure for noise levels at a range of frequencies. In this document, NR is intended to be defined between 63 Hz and 4 kHz.
Octave bands:	A convenient division of the frequency scale, identified by their centre frequency. Typically, 63, 125, 250, 500, 1000, 2000, 4000, 8000 Hz.
Reverberation time:	The time taken for sound in a space to decrease by 60 dB i.e., the time it takes for sound to decay within an enclosed space. A long reverberation time means the room is echoic. A short reverberation time means the room is acoustically dead. The reverberation time is dependent on how absorbent the internal finishes are. The more absorbent the space, the lower the number of (sound) reflections that occur and the shorter the reverberation time.
Rw:	Single figure descriptor of the sound insulation performance of a partition measured under laboratory conditions.
Speech intelligibility:	How easily speech can be understood. Rated with values between 1 and 10. Measurements above 7 represent good levels of speech intelligibility.

Project:	Lexington House
Author:	Eoghan Tyrrell
Title:	Generator Noise Impact Assessment
Reference Code:	J2033
Version Number:	2

Revision Tracker				
Version	**Date issued**	**Revision by**	**Reviewed by**	**Section(s) affected**
V.1	15/11/2022	E. Tyrrell	-	-
V.2	15/11/2022	E. Tyrrell	-	3.1, 3.4, 3.5

Table of Contents

1. Introduction

iAcoustics have been assigned by CQA Design and Build to undertake an environmental noise assessment regarding an emergency backup generator located at the rear of the Lexington House nursing home, 6 Bettysford Terrace, Monastery Road, Clondalkin, Dublin 22. In assessing a request for retention, South Dublin County Council submitted a request for further information, in which the following noise-related information was requested:

> *"Having regard to the industrial generator located in the northwestern corner of the subject site, the Applicant is requested to provide an Acoustic Assessment which must be undertaken by a suitably qualified acoustic consultant describing and assessing the impact of noise emissions from the generator, to include the accumulative noise impact from existing on-site activities. The investigation must include, but not be necessarily limited to, the following:*
>
> *a) The identification of any neighbouring noise sensitive receivers who may be potentially impacted by the proposal.*
> *b) The purpose and operating hours of the generator and the likelihood that it could give rise to a public nuisance for the neighbouring noise sensitive receivers.*
> *c) Distances between the generator and the nearest noise sensitive receiver and the predicted level of noise (LAeq, 15min) from any activities when assessed at the boundary of that receiver.*
> *d) An assessment of the existing background (LA90, 15mins) and ambient (LAeq, 15min) acoustic environment at the receiver locations representative of the time periods that any noise impacts may occur. NOTE: For the purposes of the assessment background noise includes; noise of the surrounding environment excluding all noise sources currently located on-site.*
> *e) A statement outlining any recommended acoustic control measures that should be incorporated to ensure the use of the generator will not create adverse noise impacts on the occupiers of any neighbouring noise sensitive properties."*

1.1 Professional Competency

This report, including the noise survey element, has been undertaken and drafted by Eoghan Tyrrell, an Associate Member of the Institute of Acoustics (AMIOA), an accreditation gained through the completion of the Post-Graduate Diploma in Acoustics & Noise Control and MSc in Applied Acoustics. These qualifications comply with the requirements of a 'competent tester' under the EPA Guidance NG-4.

2. Site Description and Identification of Noise Sensitive Neighbours

The generator under examination is currently situated at the rear of the Lexington House nursing home in the northwest corner of the subject site. Figures 1 and 2 illustrate the location of the generator. The nearest noise sensitive neighbour has been identified as No. 5 Bettysford Terrace, Monastery Road. There is a distance of 23 meters between the generator and this nearby noise sensitive neighbour.

No. 4 Bettysford Terrace is 25 meters from the generator and No. 1 Castle Park is 33 meters from the generator. There is a direct line of sight from the generator to all above listed neighbours.

The background noise environment at the noise sensitive locations is relatively quiet and typical of that experienced in a suburban location. The houses act as noise barriers and somewhat shield the rear gardens from the road traffic noise on Monastery Road. Furthermore, due to the speed ramps on Monastery Road, traffic is slow moving, meaning rolling noise and aerodynamic noise from the road vehicles is relatively low.

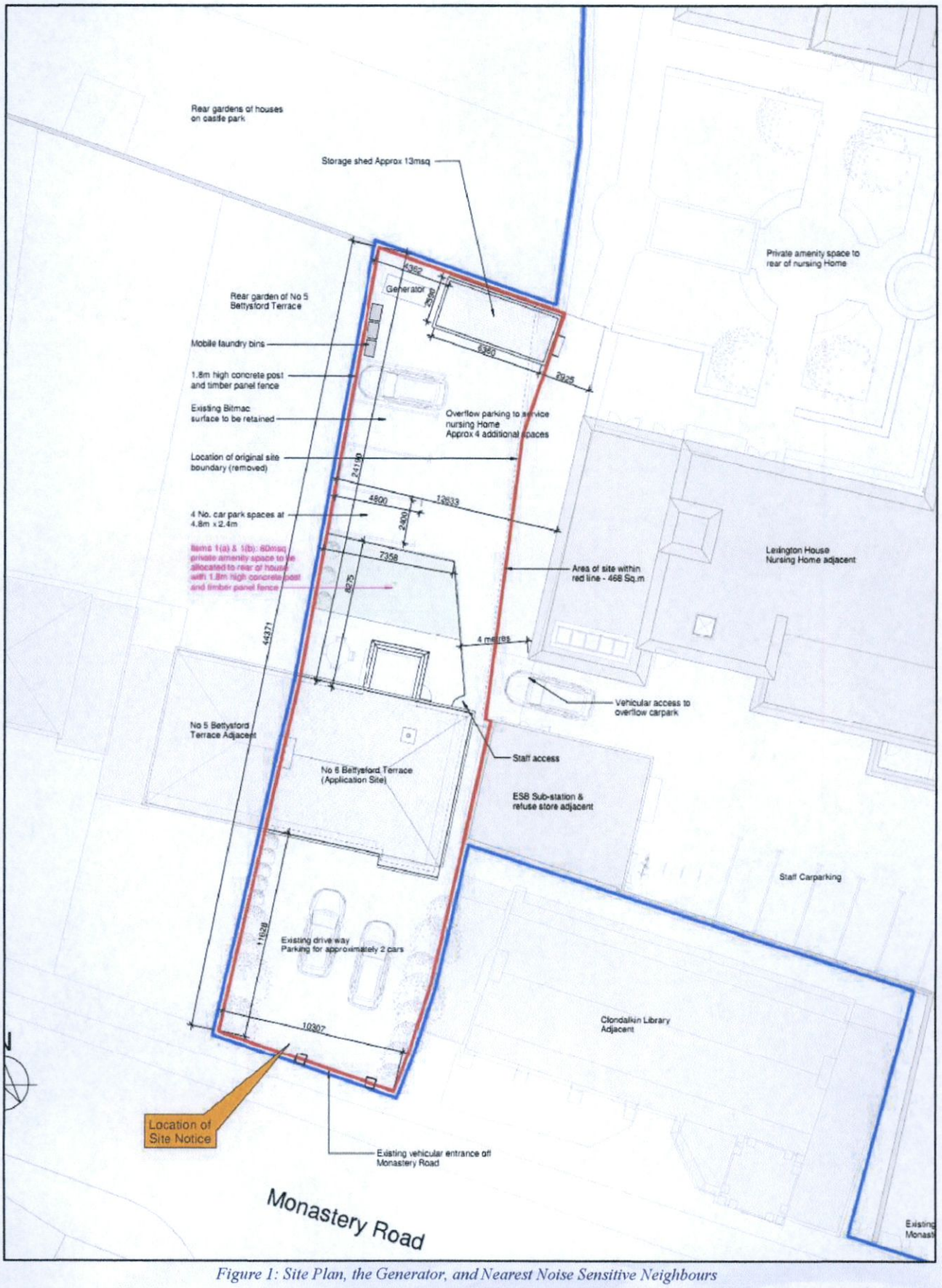

Figure 1: Site Plan, the Generator, and Nearest Noise Sensitive Neighbours

3. Noise Impact Assessment

3.1 Generator Operating Times and Noise Nuisance Definition

As defined by the Environmental Protection Agency Act 1992, a noise nuisance is that which is "*so loud, so continuous, so repeated, of such duration or pitch or occurring at such times as to give reasonable cause for annoyance to a person in any premises in the neighbourhood or to a person lawfully using nay public place.*"

The generator under examination is an emergency back-up diesel generator (Kohler KD110). To test the generator and ensure it operates properly, it is activated once a week at midday for a duration of 30 seconds. In the event of a power outage, the back-up generator will be called upon to run for longer durations, potentially during nighttime and early morning hours until mains power to the nursing home is fully restored. Note that the nursing home has been operational since December 2020 and has yet to rely on the back-up generator for power, demonstrating that such use of the generator is expected to be occasional, in a worst-case scenario.

Prior to an examination of the generator's noise magnitude, based on a review of the generator's potential operational times, it is clear that the noise produced would not qualify as a nuisance as defined by the EPA Act 1992.

3.2 Baseline Noise Survey

On 9th November 2022, iAcoustics carried out a baseline noise measurement of the prevailing noise environment at the site location with and without the generator in operation. Measurements were taken with calibrated precision grade, Type Approved (Class 1) sound level meters as per *IEC 61672-1:2013*. All equipment has calibration certificates traceable to the relevant standard. Measurements were captured in line with *ISO 1996-1:2016 Acoustics — Description, measurement and assessment of environmental noise — Part 1: Basic quantities and assessment procedures.*

The meter was calibrated before the measurements to ensure an accurate capture. With the generator in operation, measurements were captured at a distance of 2 meters from the generator. Pictures of the noise monitor and generator are presented in the appendix of this report.

Table 1 presents the noise measurements of the generator in operation (LAeq,15min) and the measurements of the prevailing background noise (LA90,15min) in the absence of the generator noise.

Table 1: Site Measurement Results

	Measurement	Unweighted Spectrum									Single Figure
		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz	
1	**Generator Noise** ($L_{Aeq,15min}$ at 2m)	79	71	71	64	64	60	56	50	40	74 dB(A)
2	**Background Noise** ($L_{A90,15min}$)	60	53	53	45	45	41	41	33	28	51 dB(A)

3.3 Calculated Noise Levels and Nearby Noise Sensitive Receptors

Table 2 presents the calculated noise levels at each nearby noise sensitive receptor. These levels are also illustrated in Figure 2.

Table 2: Noise predictions at nearby noise sensitive neighbours

	Measurement	Unweighted Spectrum									Single Figure
		63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	16kHz	
1	**No.5 Bettysford Terrace** (Distance = 23m)	61	53	53	46	46	42	38	32	22	51 dB(A)
2	**No.4 Bettysford Terrace** (Distance = 24m)	60	52	52	45	45	41	37	31	21	50 dB(A)
3	**No.1 Castle Park** (Distance = 33m)	58	50	50	43	43	39	35	29	19	48dB(A)

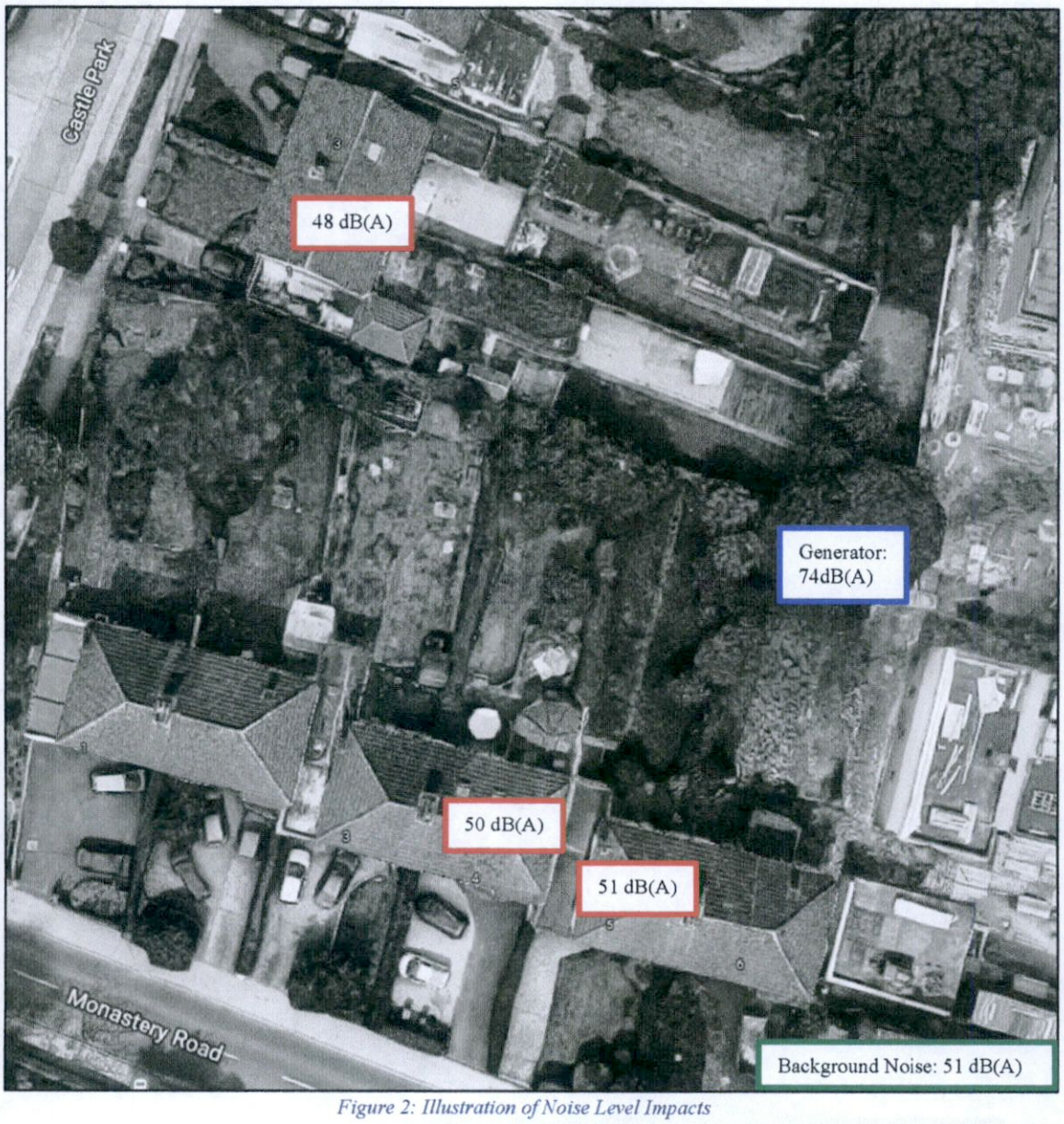

Figure 2: Illustration of Noise Level Impacts

A comparison of Tables 1 and 2 demonstrates that generator noise at the nearby noise sensitive receptors is calculated to occur at or below the prevailing background noise levels.

3.4 Likelihood of Adverse Impact (BS4142:2014)

Noise Type:	Result:	Comment:
Generator Noise:	74 dB(A)	A-Weighted Sound Pressure Measurement at 2 meters.
Ambient Sound Level:	51 dB L_{Aeq}	Calculated A-Weighted Sound Pressure Level at NNSL due to Plant Noise.
Background Sound Level:	51 dB $L_{A90\%}$	Measured background sound level.
Acoustic Feature Penalty:	+0 dB	No impulsivity or tonality.
Rating Level:	51 dB	-
Excess Rating Over Background Sound Level:	0dB	Potential for adverse impact unlikely.
This assessment indicates that adverse impact on nearby noise sensitive neighbours is unlikely, given that the calculated generator noise does not exceed the measured prevailing background noise level. Uncertainties associated with the calculation may result in a slightly higher impact than predicted in this report. However, given the generator's occasional use, for reasonable durations, only in the circumstances of an emergency power outage or that for the purposes of testing, the predicted impact is unlikely to change.		

3.5 Noise Control Recommendations

No physical infrastructure for the purposes of noise control is required. The nursing home should continue to test and run the generator as per the following points:

- The generator should be serviced regularly in line with the product recommendations so that the engine continues to run efficiently without any additional undue noise effects.
- Continue to activate and test the generator once a week only, after midday and for a duration of less than 1 minute.

4. Report Summary

- At a distance of 2 meters, the generator noise was measured at 74dB $L_{Aeq,15mins}$.
- Background noise in the absence of the generator noise occurred at 51dB $L_{A90,15mins}$.
- The nearest noise sensitive neighbours were identified as No. 5 Bettysford Terrace, No. 4 Bettysford Terrace and No. 1 Castle Park.
- Noise calculations show that generator noise at these noise sensitive receptors occurs at 51dB(A), 50dB(A) and 48dB(A) respectively.
- A BS4142 noise impact assessment shows that the generator noise is unlikely to cause adverse impact at the noise sensitive receptors.
- The nursing home should continue to operate the generator as they have been to date, as outlined in section 3.5 of this report.

5. Appendix I - Noise Measurement Photographs