

REPORT



MS Therapy Centre

Berkshire

Noise Impact Assessment

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Issued to: Pippa Vincent-Cooke by email

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1.0 Introduction

Clear Acoustic Design have been appointed to carry out a noise impact assessment to support a planning application at the MS Therapy Centre Berkshire. The planning application involves the externally located plant used for oxygen generation and the pressurised storage of the produced oxygen.

It is understood that the rix booster is the noisiest piece of plant located within the enclosure. However, the booster is only understood to operate in the daytime, when the demand for oxygen occurs during sessions for patients. When the high-pressure oxygen storage cylinders are full, the booster turns off. There are understood to be 3 sessions per day, following these sessions the rix booster will typically turn on to re-pressurize the high-pressure storage cylinders for approximately 40 minutes.

There is also a compressor inside the enclosure, which is ducted externally and provides compressed air which is stored in a large storage tank outside of the enclosure. The compressed air is used to pressurize the oxygen chamber inside the building. The compressed air is also used by the oxygen generator, which produces and stores oxygen in a separate storage tank within the enclosure.

During the night time (2300-0700) the booster should never operate as the high-pressure cylinders are not in use. The only potential night time noise would be from the oxygen generator, as there is a sample test tube that tests the quality of the oxygen. When this happens the oxygen generator might turn on to replenish the oxygen storage tank, and the compressor may turn on to replenish the compressed air storage tank.

As the source of potential noise is considered industrial by nature, the common standard BS4142:2014, which is typically used to assess industrial noise in residential areas, is seen to be appropriate.



This report has been approved and issued by Stefan Hannan of Clear Acoustic Design. Stefan is a Company Director with 14 years of acoustic consulting experience. Stefan is also a full corporate member of the Institute of Acoustics (MIOA).

2.0 Relevant Performance Standards

2.1 IEMA Guidelines for Environmental Noise Impact Assessment

The IEMA 'Guidelines for Environmental Noise Impact Assessment' is a design guide prepared by the Institute of Environmental Management and Assessment. This document provides guidance on assessing all forms of environmental noise and evaluating the effect and impact.

TABLE 7-12 EFFECT DESCRIPTORS

Very Substantial	Greater than 10 dB LAeq change in sound level perceived at a receptor of great sensitivity to noise
Substantial	Greater than 5 dB LAeq change in sound level at a noise-sensitive receptor; or a 5 to 9.9 dB LAeq change in sound level at a receptor of great sensitivity to noise
Moderate	A 3 to 4.9 dB LAeq change in sound level at a sensitive or highly sensitive noise receptor; or a greater than 5 dB LAeq change in sound level at a receptor of some sensitivity
Slight	A 3 to 4.9 dB LAeq change in sound level at a receptor of some sensitivity
None/Not Significant	Less than 2.9 dB LAeq change in sound level and/or all receptors are of negligible sensitivity to noise or marginal to the zone of influence of the proposals

TABLE 7-14 IMPACT FROM THE CHANGE IN SOUND LEVELS
(Source HS2 Phase 1 Environmental Statement)

Long-term Impact Classification	Short-term Impact Classification	Sound level change dB LpAeqT (positive or negative) T = either 16hr day or 8hr night
Negligible	Negligible	≥ 0 dB and < 1 dB
	Minor	≥ 1 dB and < 3 dB
Minor	Moderate	≥ 3 dB and < 5 dB
Moderate	Major	≥ 5 dB and < 10 dB
Major		≥ 10 dB

Figure 2.2 Extract from IEMA document showing effect of change in noise level

2.2 BS4142:2014

BS4142:2014 is a method of assessing the noise impact of new sources of industrial noise. This is done by comparing the proposed new sources of industrial noise (Rating Level L_{Aeq}) against the existing level of background noise (L_{A90}).

BS4142:2014 suggests that new sources of noise (rating noise level) should be designed to not exceed the existing background noise level, depending on the context. If this is achieved, it is a positive indication that the noise impact will be low.

3.0 Site Description

The site is shown below in the overhead images. The main sources of noise affecting the general area are the local residential streets directly adjacent to the centre and the nearby school.

Buildings in direct adjacency to the nursery are mainly residential. The nearest residential receptor is seen to be approximately 55 metres away to the North.

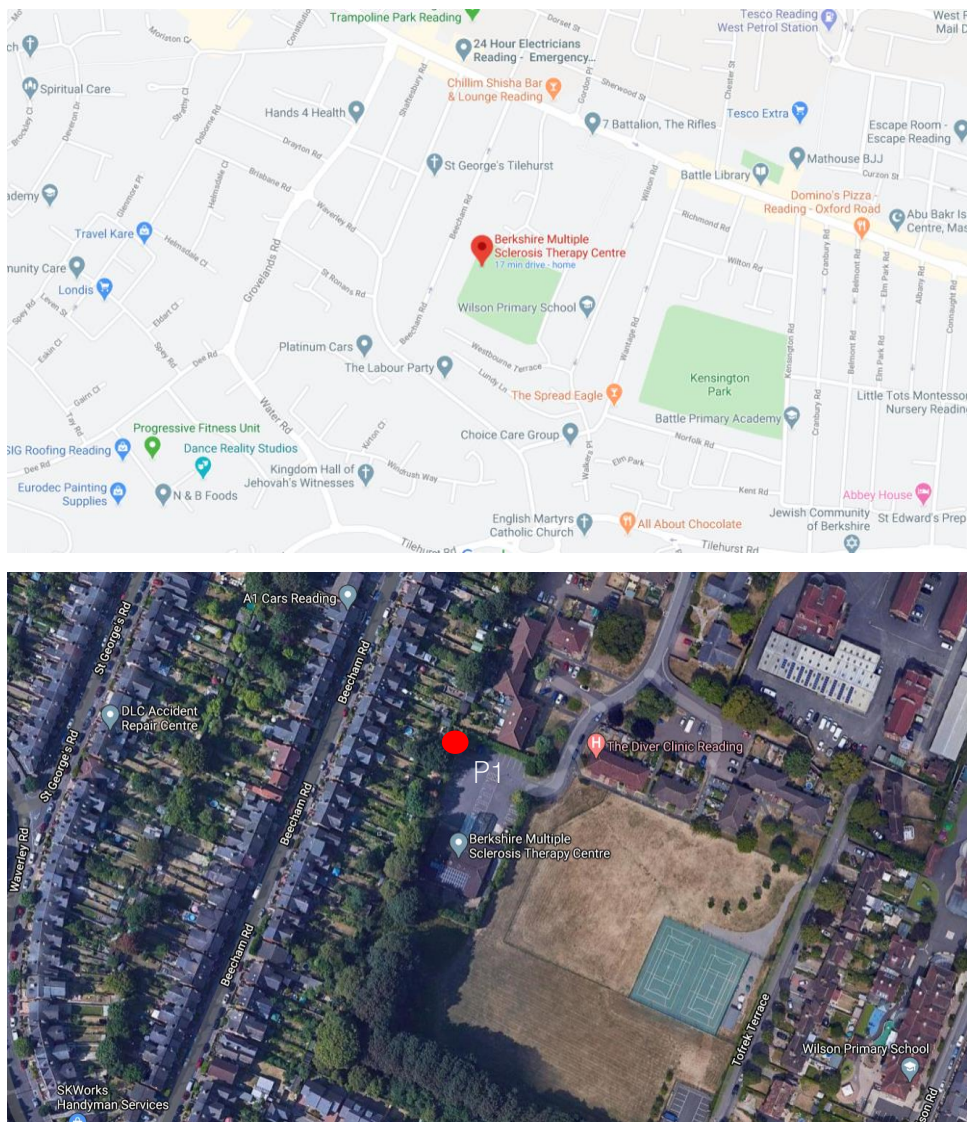


Figure 3.1 Aerial images of general area

4.0 Existing Noise Measurements

A long-term noise survey was carried out between 17/03/20 and 18/03/20 to establish the level of existing noise in the area. Measurements of the ambient noise (L_{Aeq}) and background noise (L_{A90}) were taken using 5-minute samples.

The sound level meter was fixed to a mast, approximately 3 metres high in the corner of the car park, close to the nearest residential receptor. This measurement height gives a good representation of existing noise levels at the nearest residential receptors. The measurement location P1 is marked on the overhead photograph in Figure 3.1.

4.1 Measurement Equipment

The following equipment was used for the survey.

Equipment	Serial Number	Calibration Date
NTi XL2 sound level meter	A2A-16925-E0	28/11/2019
NTi Microphone Capsule - MC230A	A17732	28/11/2019
NTi Preamplifier - MA220	8657	28/11/2019
Cirrus Class 1 Calibrator – CR:515	91539	18/12/2019

Table 4.1 Measuring equipment used for survey

4.2 Weather Conditions

The weather was fine and dry for the duration of the survey with light wind speeds of less than 10 mph.

4.3 Measured Noise Levels

The measured noise levels are provided in Table 4.2 and in graphical form in Figure 4.1. The ambient noise level (L_{Aeq}) and the background noise level (L_{Amax}) for each measurement period are shown.

Time Period	Measured Ambient Noise Level, dB L_{Aeq}	Representative Background Noise level, dB L_{A90}
Day (0700-2300)	49 dB	41 dB
Night (2300-0700)	47 dB	30 dB

Table 4.2 Summary of noise levels measured on site

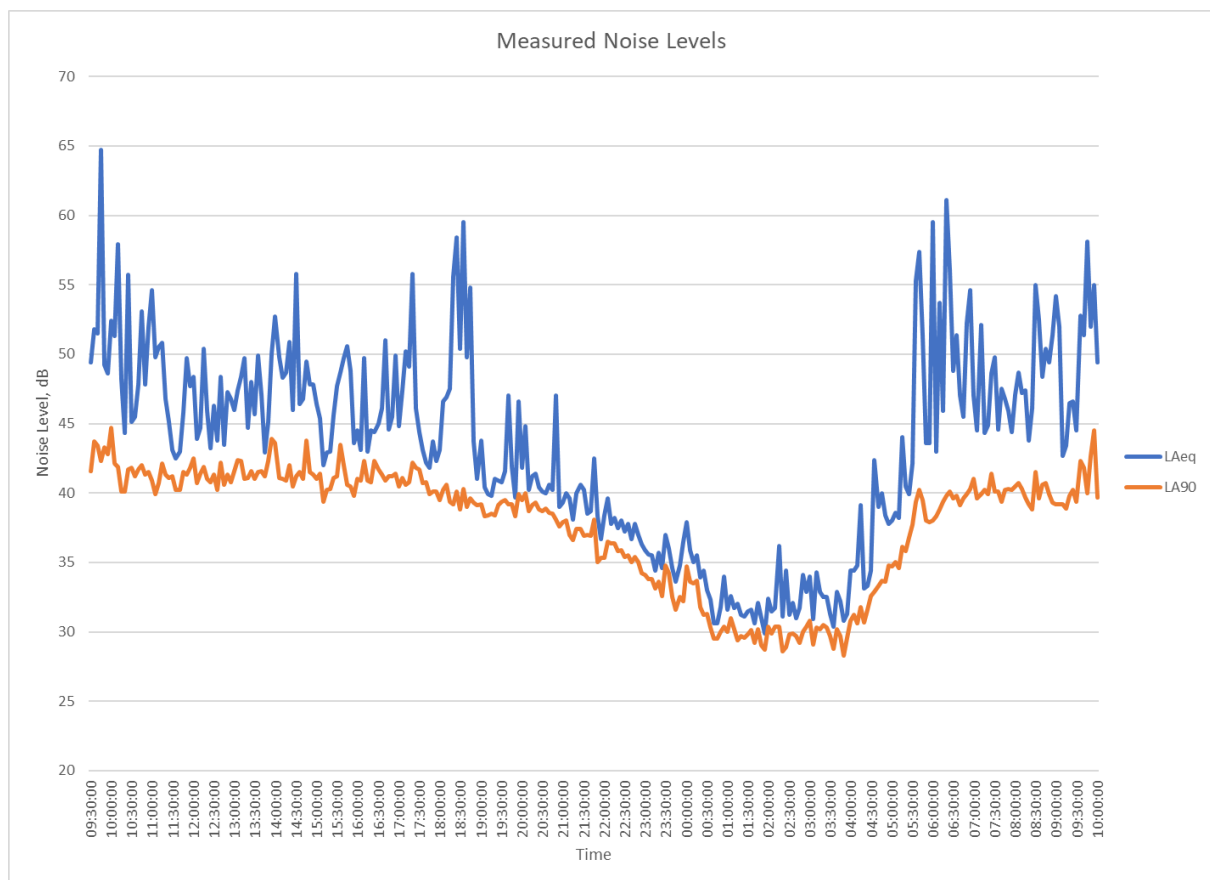


Figure 4.1 Graph showing continuous external noise levels measured on site

5.0 Assessment of Plant Noise Levels

It is proposed that noise from the new external plant (Rating Level L_{Aeq}) does not exceed the existing background noise level (L_{A90}) at the nearest residential receptor. The representative existing L_{A90} is deemed to be 41 dB L_{A90} during the day and 30 dB L_{A90} during the night. Based on this, the new sources of noise should not exceed 41 dB $L_{Aeq, 1-hour}$ at the receptor during the day, and 30 dB $L_{Aeq, 15min}$ during the night. This design target would be in line with BS4142:2014 recommendations and mean that the noise impact would be low.

The average existing ambient noise levels (L_{Aeq}) measured on site were 49 dB L_{Aeq} during the day and 47 dB L_{Aeq} during the night. The proposed design target would therefore be approximately 8-17dBA below the existing ambient noise level. This would result in no changes in ambient noise at the receptor and negligible impact when assessed in line with IEMA guidelines, see section 2.2.

In order to make a full assessment a series of calculations need to be undertaken to predict the noise level at the noise sensitive receptor.

5.1 Measured Noise Levels Around Enclosure

The metal enclosure has large doors that face the existing building. The doors close tightly with a good seal. There are two small open vents on the north side of the enclosure, and one ducted vent on the south side of the enclosure.

Figure 5.1 shows photographs of the enclosure.

Key Items of plant	Daytime operation	Potential Night-time operation
Compressor	✓	✓
Rix Booster	✓	
Oxygen Generator	✓	✓



Figure 5.1 Photos of enclosure

Noise measurements have been carried out around the enclosure; these are shown in Table 5.1. Noise measurements have been taken using the L_{A90} percentile as this helps to eliminate other sources of existing noise that could affect the accuracy of the measurements when using the L_{Aeq} . As the noise being measured is relatively steady and constant when running, the L_{A90} is seen to be a suitable alternative. This is in line with the Association of Noise Consultants (ANC) guide to measuring noise from building services.

Location	Rix booster state	Compressor state	Oxygen generator state	Noise Level, dB L _{A90}
1 metre in front of doors to enclosure	On	On	On	69 dB L _{A90}
1 metre from car park side of enclosure	On	On	On	66 dB L _{A90}
1 metre from other side of enclosure	On	On	On	66 dB L _{A90}
1 metre from car park side of enclosure	Off	On	On	57 dB L _{A90}
1 metre from other side of enclosure	Off	On	On	63 dB L _{A90}
1 metre from old compressor	--	--	--	66 dB L _{A90}

Table 5.1 Noise levels around enclosure

5.2 Predicted Noise Levels at the Nearest Residential Receptor

The nearest residential receptor to the new plant enclosure is approximately 50 metres to the North.

Predictions of noise at the nearest residential receptor have been undertaken using the nearfield measurements in Table 5.1 and calculating the distance losses and screening for each side of the enclosure. The sum of the contributions from all sides of the enclosure then give the predicted noise level at the receptor.

Table 5.2 shows that the predicted noise level with the rix booster on is 37 dB L_{Aeq} at the receptor. With the rix booster off, the predicted noise level drops to 29 dB L_{Aeq}.

Rix booster on	Source	Measured Distance, m	Measured Noise, dB LA90	Screening	Predicted Level, dB LAeq	
	Doors side	1	69	0	35	
	Car park side	1	66	0	32	
	Garden side	1	66	-10	22	
	Opposite to doors	1	61	-5	22	
	Roof	1	61	-5	22	
				Total Noise @ 50 metres	37	dB LAeq
Rix booster off	Source	Measured Distance, m	Measured Noise, dB LA90	Screening	Predicted Level, dB LAeq	
	Doors side	1	60	0	26	
	Car park side	1	57	0	23	
	Garden side	1	63	-10	19	
	Opposite to doors	1	52	-5	13	
	Roof	1	52	-5	13	
				Total Noise @ 50 metres	29	dB LAeq

Table 5.2 Predicted noise at nearest receptor with rix booster on and off

A subjective assessment was made at the receptor point when all plant was running. The plant was not audible with no distinguishing features. Based on this, no corrections have been made for tonality, impulsivity or intermittency as these corrections are based on the receptor point. The predicted rating noise level during the night, at the receptor, is extremely low and highly unlikely to be audible based on the absolute level. A rating level of 30 dBA or below is deemed to represent a low impact regardless of the existing background noise level.

Time Period	Existing Ambient Noise Level, dB LAeq	Predicted Noise Level, dB LAeq	Representative Background Noise level, dB LA90	Predicted Noise Level, dB LAeq
Day (0700-2300)	49 dB	-12 dB	41 dB	-4 dB
Night (2300-0700)	47 dB	-18 dB	30 dB	-1 dB

Table 5.3 Comparison of noise against existing noise levels at nearest receptor

Table 5.3 shows a comparison of the predicted noise against the existing noise measured at the receptor.

The predicted rating noise level is significantly below the existing ambient noise level during both the day and night. The rating noise level is also marginally below the background noise level in both time periods; 4dB below in the day and 1dB below in the night.

Based on the predicted rating level not exceeding the representative background noise, and the absolute noise level (total ambient noise) being equal to the residual noise level (ambient noise without specific noise), the noise impact is seen to be low.

5.3 History of Noise Levels

The oxygen generator and air booster are new pieces of plant located within the enclosure. There is however an existing compressor and a compressed air storage tank located externally that has been in use for around 20 years. This was used to pressurize the oxygen chamber inside the building.

The measured noise levels in Table 5.1 show the measured noise at 1 metre from the old compressor. This was measured at 66 dB L_{A90} when in operation. This is a similar noise level to that measured at 1 metre around the new enclosure with the new plant operational.

It can therefore be stated that the new plant noise introduced is not significantly different to the noise levels created by the facility over many years. There have not been any noise complaints in the past and therefore the noise created is part of the accepted noise climate in the general area. The new plant noise is not seen to have a detrimental impact on the existing noise climate and it is not expected that any complaints will arise.

6.0 Conclusion

A noise survey and noise impact assessment has been provided to support a planning application at the Berkshire MS Therapy Centre in Reading. This report assesses the potential impact of the proposed plant on the nearby residential housing.

The predicted noise from the new plant has been calculated based on two operating conditions, with the rix booster on, and the rix booster off.

Noise at the nearest receptor, with rix booster on, has been calculated to be in the region of 4dB below the existing background noise level in the daytime. This is seen to be a positive indication that noise disturbance is unlikely, and the noise impact is low. Internal noise within a bedroom, with a window partially open, would be expected to be around 22 dBA, which is significantly below the most onerous requirements of BS8233:2014. Internal noise, with a window partially open, from the existing ambient noise only would be in the region of 34 dBA, significantly higher than the contribution from the new plant.

Noise at the nearest receptor, with rix booster off, will happen at night and has been calculated to be in the region of 1dB below the existing background noise level in the night time period. This is seen to be a positive indication that noise disturbance is unlikely, and the noise impact is low. Internal noise within a bedroom, with a window partially open, would be expected to be around 14 dBA, which is significantly below the most onerous requirements of BS8233:2014. Internal noise, with a window partially open, from the existing ambient noise only would be in the region of 32 dBA, significantly higher than the contribution from the new plant.

The noise levels of the new plant are not dissimilar to the existing external plant that has operated for around 20 years without issue. The accepted noise climate in the general area is therefore not seen be adversely affected. Taking into account the context of the site, the noise impact of the new plant is deemed to be very low.

Appendix A - Calibration Certificates



Manufacturer Calibration Certificate

The sound level meter submitted for testing successfully completed the periodic tests of IEC 61672-3. All tests are traceable in accordance with ISO/IEC 17025.

No pattern approval is available for this sound level meter configuration.

Sound Level Meter

Manufacturer	NTi Audio		
Type	XL2	S/N	A2A-16925-E0
Firmware	V4.20		
Reference Level Range	mid		
Microphone Model	M2230		
Preamplifier	MA220	S/N	8657
Microphone Capsule	MC230A	S/N	A17732
Performance class	Class 1		
Customer Inventory Nr.			

Customer

Issue Date 28 November 2019

Certificate FL-19-217

Results PASSED
(for detailed report see next pages)

Operator

Markus Frick



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CERTIFICATE OF CALIBRATION

ISSUED BY **Noisemeters**

DATE OF ISSUE **14 January 2020**

CERTIFICATE NUMBER **136504**

NoiseMeters

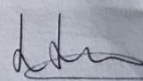
NoiseMeters
Acoustic House
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United Kingdom
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Approved signatory

J. Johnston

Electronically signed:



Sound Calibrator : IEC 60942:2003

Instrument information

Manufacturer: Cirrus Research plc

Notes:

Model: CR:515

Serial number: 91539

Class: 1

Test summary

Date of calibration: 18 December 2019

The sound calibrator detailed above has been calibrated to the published data as described in the operating manual and in the half-inch configuration. The procedures and techniques used are as described in IEC 60942:2003 Annex B – Periodic Tests and three determinations of the sound pressure level, frequency and total distortion were made.

The sound pressure level was measured using a WS2F condenser microphone type MK:224 manufactured by Cirrus Research plc.

The results have been corrected to the reference pressure of 101.33 kPa using the manufacturer's data.

The manufacturer's product information indicates that this model of sound calibrator has been formally pattern approved to IEC 60942:2003 Annex A to Class 1. This has been confirmed with the Physikalisch-Technische Bundesanstalt (PTB).

As public evidence was available, from a testing organisation responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the Class 1 requirements of IEC 60942:2003.

Notes:

This certificate provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory. The results within this certificate relate only to the items calibrated. The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%.

CERTIFICATE OF CALIBRATION

Certificate Number:
136504

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Environmental conditions

The following conditions were recorded at the time of the test:

Pressure: 100.60 kPa
Temperature: 23.2 °C
Humidity: 33.6 %

Test equipment

Equipment	Manufacturer	Model	Serial number
Acoustic Calibrator	Bruel and Kjaer	4231	1795641
Distortion Meter	Keithley	2015	1175401
Multimeter	Fluke	8845A	9440017

Results

	Expected	Sample 1	Sample 2	Sample 3	Average	Deviation	Limits	Uncertainty
Level (dB)	94.00	94.00	94.00	93.98	93.99	-0.01	±0.40	0.11 dB
Distortion (%)	< 3.00	1.16	1.16	1.29	1.20	1.20	+3.00	0.13 %
Frequency (Hz)	1000.0	1000.0	1000.0	1000.0	1000.0	0.0	±10.0	0.1 Hz

The measured quantities or deviations (as applicable), extended by the expanded combined uncertainty of measurement, must not exceed the corresponding tolerance.

End of results