

Energy Centre Noise Assessment

Phase 6 A
Green Park Village
Reading



On Behalf of AES Sustainability Consultants
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1 Executive Summary

An Energy Centre is to be installed in the under-croft under Block 5 and AES Sustainability Consultants have instructed Acoustic Associates SW Ltd to assess whether noise from the plant will be sufficiently controlled that it will comply with Condition No. 31 of the planning consent.

The Energy Centre includes a CHP plant with fresh air inlet and warm air exhausting via louvres and general ventilation is provided by a further wall louvre and louvres in the double and single access doors to the plant room.

Blocks 5, 6 and 7 are each built off a continuous podium slab and none of the flats will have direct line of sight of the plant room or its louvres on the ground floor car park. The shortest transmission route for noise, getting to the flats, will be through the car park and its slatted louvres, onto the piazza, then up a level and back to the windows down either side of Block 5.

The data provided by the Centrica shows that the noisiest element of equipment in the Energy Centre, is the CHP, with noise levels quoted 70 dB $L_{A,p}$ (breakout from the CHP enclosure within the plant room). The CHP will be ventilated with a fan and silencer in the outlet duct, discharging via a wall louvre. Fresh air for the CHP will be drawn in to the plant via an attenuated duct/louvre.

There will also be boilers and pumps inside the plant room and it can be expected that internal plant room noise should be no more than 70 dB $L_{A,p}$.

Noise breakout & transfer calculations are set out in this report showing that noise from the Energy Centre will be no more than 30 dB $L_{A,p}$ outside the closest flat windows.

Condition No. 31 of the planning consent limits plant noise to be 10 dB below background. RSK's Acoustic Report for Phase 6A records a background sound level of 43 dB L_{A90} at night. This would give a target of $43 - 10 = 33$ dB $L_{A,p}$ outside the windows on the 1st floor of Block 5 above the Energy Centre.

In this way the requirements of Condition No. 31 can be seen to have been met.

2 Planning Condition No. 31 (mechanical plant noise)

Planning permission has been granted by Reading Borough Council for the *residential led mixed-use development comprising the construction of 339 residential apartments (Class C3), 556 sqm (GIA) local retail units (Use Classes A1, A2, A3, A4, A5), residents' gym and associated car parking, pedestrian and cycle routes, services and infrastructure, landscaping and other associated works (Phase 6A) (amended)* at Green Park Village, Reading (planning reference 171019).

The consent is subject to a number of Conditions, No. 31 refers to mechanical plant noise, namely;

*No mechanical plant shall be installed until a noise assessment of the proposed mechanical plant has been submitted and approved by this Council.
The assessment shall be carried out for in accordance with BS4141:2014 methodology. The predicted specific sound level ($L_{Aeq,TR}$) as measured at a point 1 metre external to sensitive facades shall be at least 10dB below the existing background sound level, $LA_{90,T}$ when all plant/equipment (or any part of it) is in operation. The predicted rating level, $L_{Ar,Tr}$ (specific sound level plus any adjustment for the characteristic features of the sound) as measured at a point 1 metre external to sensitive facades shall not exceed the existing background sound level, $LA_{90,T}$ when all plant/equipment (or any part of it) is in operation.
The plant shall thereafter only be installed in accordance with the assessment.*

3 Proposed Energy Centre

The Energy Centre will be located on the ground floor (under-croft) under Block 5 as shown on Bookes Architects drawing No. G259-BAL-XX-00-DR-A-10-0050 B and in detail on Pinnacle Power's drawing G259-PP-5-00-DR-M-50-2101 P01, copies of which are included at the rear of this report.

The noise data provided for the plant within the Energy Centre is set out in Appendix 1.

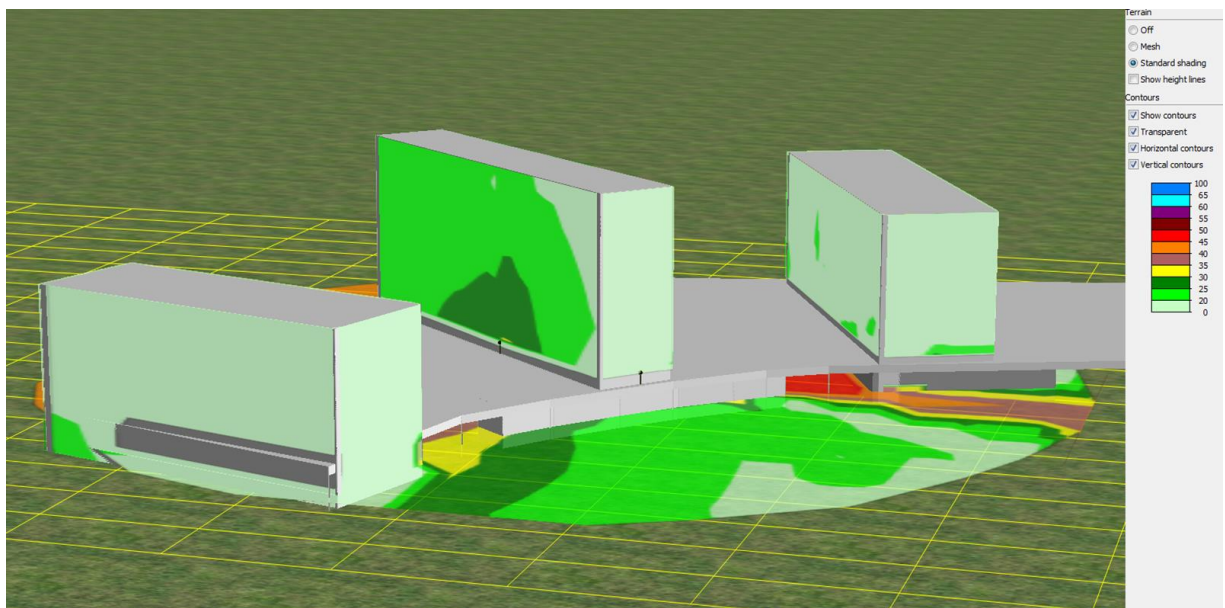
The data provided by the Centrica shows that the noisiest element of equipment in the Energy Centre, is the CHP, with noise levels quoted 70 dB $L_{A,p}$ (breakout from the CHP enclosure within the plant room). The CHP will be ventilated with a fan and silencer in the outlet duct, discharging via a wall louvre. Fresh air for the CHP will be drawn in to the plant via an attenuated duct/louvre.

There will also be boilers and pumps inside the plant room and it can be expected that internal plant room noise should be no more than 70 dB $L_{A,p}$.

4 External Sound Levels

The level of sound created by the Energy Centre plant running at full duty simultaneously has been calculated using Wolfe IMMI implementing the requirements of ISO9613 Part 2¹ and assuming the podium slab runs continuously without openings right across the foot print of Blocks 4, 5, 6 & 7.

The image below shows the colour contours, representing the predicted noise levels, across the development and the highest noise levels (dark green) 25 to 30 dB L_{Aeq} on the facades of Block 5;



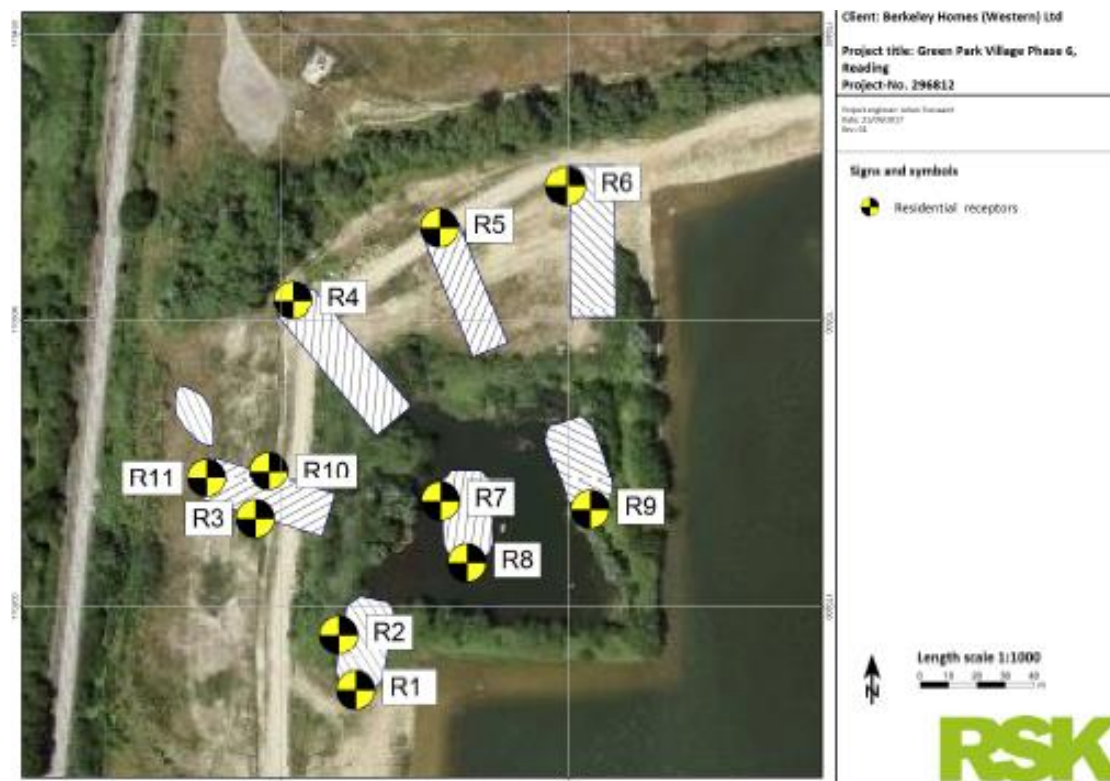
5 Background Sound Levels

The planning application was supported by an Acoustic Assessment provided by RSK, entitled *Noise and Vibration Assessment Report*, ref: 296812-00(03), dated May 2017. This reports the results of their on-site sound survey and predicted sound levels around the seven apartment blocks which form Phase 6A of this large development.

RSK observe that the soundscape is dominated by the noise of traffic passing along the M4 motorway 1.2 km to the south and a railway line running north-south on the western boundary of the site.

In Table 3-8 of RSK's report are detailed the recorded background sound levels recorded at R4 (Block 5) with a night-time level of 43 dB $L_{A90,T}$, as shown in the image over page and the table in Appendix 2;

¹ ISO 9613-2:1996 (Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation) including ISO/TR 17534-3:2015 (Acoustics - Software for the calculation of sound outdoors - Part 3: Recommendations for quality assured implementation of ISO 9613-2 in software according to ISO 17534-1).



To comply with Condition 31, noise, from the Energy Centre, will need to be limited to no more than $43 - 10 = 33$ dB $L_{A,T}$ (*specific sound level plus any adjustment for the characteristic features of the sound*) when measured 1m outside the nearest sensitive windows, which in this case are on the 1st floor of Block 5.

Assessment of predicted Energy Centre noise levels

BS4142:2014 + A:2019² provides a methodology for determining whether and what penalties need to be added to the predicted $L_{Aeq,T}$ levels to account for any tonal, intermittency or impulsivity.

Here the noise from the Energy Centre is created from plant and equipment which can be expected to run constantly, the limited data available does not suggest that any tonality will be present.

The predicted overall plant level is 12 dB below the night time background sound level and therefore its noise is not likely to be sufficiently distinct to attract penalties for intermittency or impulsivity.

² BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

The predicted noise level of 25-30 $L_{Aeq,T}$ can therefore be considered representative of the assessed $L_{A,T}$ namely 25-30 dB.

This is more than 10 dB below the night time background sound level and therefore demonstrates compliance with the requirements of Condition 31.

The site plan illustrates the layout of the University City Center development. It features seven distinct building blocks, each labeled with its floor count and unit count. The blocks are arranged around a central area, with parking lots and pedestrian paths interspersed. The plan also shows the building's proximity to major roads and a community hub. Red lines and labels are used to identify specific blocks and the community hub.

- Block 1: 15 floors, 40 units
- Block 2: 15 floors, 40 units
- Block 3: 15 floors, 40 units
- Block 4: 15 floors, 40 units
- Block 5: 15 floors, 40 units
- Block 6: 15 floors, 40 units
- Block 7: 15 floors, 40 units
- Community Hub

CALL FOR ENROLLMENT IN THE COMPANY
PROGRAM
 The Company is currently seeking individuals who are interested in becoming members of the company. The program is designed to provide a comprehensive overview of the company's operations and to provide a hands-on experience in the field. The program is open to individuals who are currently employed by the company or who are interested in joining the company. The program is open to individuals who are currently employed by the company or who are interested in joining the company. The program is open to individuals who are currently employed by the company or who are interested in joining the company.

FOR CONSTRUCTION		FOR CONSTRUCTION	
NO.	DESCRIPTION	UNIT	QUANTITY
1	CEMENT CONCRETE (1:2:4)	M ³	100
2	CEMENT CONCRETE (1:1.5:3)	M ³	50
3	CEMENT CONCRETE (1:1:2)	M ³	20
4	CEMENT CONCRETE (1:2:4)	M ³	10
5	CEMENT CONCRETE (1:1.5:3)	M ³	5
6	CEMENT CONCRETE (1:1:2)	M ³	2
7	CEMENT CONCRETE (1:2:4)	M ³	1
8	CEMENT CONCRETE (1:1.5:3)	M ³	0.5
9	CEMENT CONCRETE (1:1:2)	M ³	0.2
10	CEMENT CONCRETE (1:2:4)	M ³	0.1
11	CEMENT CONCRETE (1:1.5:3)	M ³	0.05
12	CEMENT CONCRETE (1:1:2)	M ³	0.02
13	CEMENT CONCRETE (1:2:4)	M ³	0.01
14	CEMENT CONCRETE (1:1.5:3)	M ³	0.005
15	CEMENT CONCRETE (1:1:2)	M ³	0.002
16	CEMENT CONCRETE (1:2:4)	M ³	0.001
17	CEMENT CONCRETE (1:1.5:3)	M ³	0.0005
18	CEMENT CONCRETE (1:1:2)	M ³	0.0002
19	CEMENT CONCRETE (1:2:4)	M ³	0.0001
20	CEMENT CONCRETE (1:1.5:3)	M ³	0.00005
21	CEMENT CONCRETE (1:1:2)	M ³	0.00002
22	CEMENT CONCRETE (1:2:4)	M ³	0.00001
23	CEMENT CONCRETE (1:1.5:3)	M ³	0.000005
24	CEMENT CONCRETE (1:1:2)	M ³	0.000002
25	CEMENT CONCRETE (1:2:4)	M ³	0.000001

Barkley Homes (Nusa) Ltd
Green Park Village, Reading
Phase 6

GA Plans - Site
Ground Floor

10/16/2016	10:50 AM
10/16/2016	10:50 AM

Brookes Architects

1. The first step is to identify the problem. This involves understanding the symptoms and the context in which they are occurring.

Q259-BAL-X01-03-DPA-A1 0-0050 | B

The figure contains several technical drawings of the Energy Centre:

- Energy Centre 3D View:** A perspective view of the entire facility, showing the layout of buildings, piping, and storage tanks.
- Section A - CHP:** A cross-section drawing showing the internal components of the Combined Heat and Power (CHP) unit, including the engine, generator, and heat exchangers.
- Section B - Boiler:** A cross-section drawing showing the internal components of the boiler, including the furnace, heat exchangers, and piping.
- Section C - Pumps & LTHWR:** A cross-section drawing showing the internal components of the pumps and low-temperature heating water (LTHWR) system, including pumps, tanks, and piping.
- Energy Centre - Plan:** A detailed plan view of the facility, showing the layout of all equipment, piping, and structural elements.

Appendix 1 – Energy Centre plant noise data

Equipment	No.	dB(A)
Pro PDG 261	1	<75
Boiler - Modumax Mk3	6	65
Xpot	1	<40
Pump - Magna 3 32-120 f	6	<43
Pump - TPE 50-290/2-s	2	59.5
Pump -Magna 3 65-150F	1	<43
CHP	1	70
CHP fan	1	see below

2.10.1 CHP fan

The CHP fan is inside the CHP enclosure and its break out sound pressure is already included in the CHP noise calculations. The duct noise is as follows:

Sound Power

Spectrum (Hz)	63	125	250	500	1K	2K	4K	8K	dBW	dBA @ 3m
Outlet PWL (dB)	85	88	93	90	90	89	82	76	98	74
Inlet PWL (dB)	90	86	91	89	91	86	82	78	98	73

The fan is only connected to the outlet duct, the inlet duct is connected to the CHP enclosure. Centrica only supplies attenuator for the outlet of the CHP.

2.10.2 CHP attenuator

The currently specified extract fan attenuator has the following characteristics

Fan Sizes	Silencer Length	Silencer Type	Insertion Loss @ Octave Band (Hz)							
			63	125	250	500	1k	2k	4k	8k
315-560	1D	ENP	2	5	6	9	13	11	6	8
		EP	-4	-6	-8	-11	-18	-19	-17	-14
	1.5D	ENP	-3	-6	-9	-13	-18	-14	-9	-8
		EP	-5	-8	-10	-16	-22	-22	-20	-18
	2D	ENP	4	6	12	17	23	17	12	10
		EP	-7	-10	-12	-21	-26	-26	-24	-22

All the shared noise information shall be double checked with the contractor once the equipment is confirmed.

Appendix 2 - RSK Table 3-8



Table 3-8 BS4142 Assessment

Receiver	Period	Rating Noise Level $L_{Aeq,T}$ dB	Background Noise Level, $L_{A90,T}$ dB	Difference dB
R1	Day	28	45	-17
	Night	28	43	-15
R2	Day	31	45	-14
	Night	31	43	-12
R3	Day	34	45	-11
	Night	34	43	-9
R4	Day	47	45	+2
	Night	47	43	+4
R5	Day	46	45	+1
	Night	46	43	+3
R6	Day	42	45	-3
	Night	42	43	-1
R7	Day	42	45	-3
	Night	42	43	-1
R8	Day	32	45	-13
	Night	31	43	-12
R9	Day	31	45	-14
	Night	31	43	-12
R10	Day	46	45	+1
	Night	46	43	+3
R11	Day	46	45	+1
	Night	46	43	+3