Sustainable Acoustics
FORMERLY THE ENGLISH COGGER LLP

BACTON LOW RISE DEVELOPMENT

Temporary boiler plant – Acoustic Assessment

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1 INTRODUCTION

Phase 1 of the Bacton Low Rise development requires a temporary boiler to serve the four residential blocks, A, B1, B2 and C in this development phase. The temporary heating unit will be located outside the site for approximately 2 years until the main boiler room situated in Phase 2 basement is installed and commissioned. The temporary unit will then be decommissioned and taken of site with Phase 1 district heating being connected on to Phase 2 system.

Following discussions with the Client London Borough of Camden an agreement was made to relocate the temporary boiler location to an area outside the phase 1 site in a secure metal container

2 PLANNING REQUIREMENTS:

The planning permission for the Bacton Site, which was issued on 25th April 2013, reference 2012/6338/P, contains two conditions that relate to noise and vibration. Condition 17, which is relevant for the temporary boilers, is presented here:

"Condition 17 Noise levels at a point 1 metre external to sensitive facades shall be at least 5dB(A) less than the existing background measurement (LA90), expressed in dB(A) when all plant/equipment (or any part of it) is in operation unless the plant/equipment hereby permitted will have a noise that has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses (bangs, clicks, clatters, thumps), then the noise levels from that piece of plant/equipment at any sensitive façade shall be at least10dB(A) below the L_{A90}, expressed in dB(A)".

2.1 Noise measurements to establish background noise

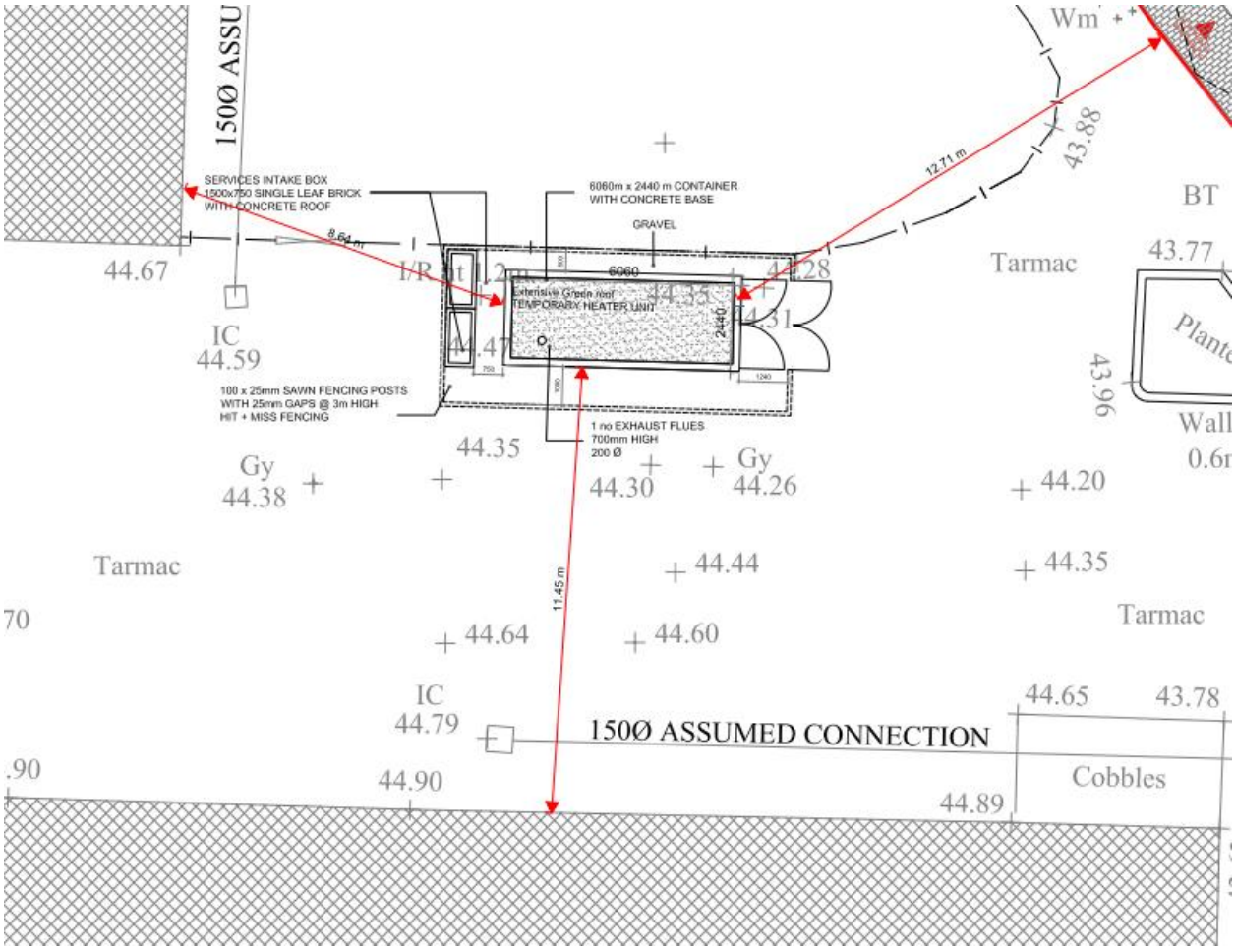
A baseline noise survey was undertaken on 6th and 7th September 2012 to establish the ambient noise climate at and around the site. Full details of the survey are available if required. At the location relevant to the temporary boilers, daytime background noise measurements of 42 dB $L_{A90,\ 16\ hours\ (0700\text{-}2300)}$ were measured and night-time background noise measurements of 38 dB $L_{A90,\ 8hours\ (2300\text{-}0700)}$ were recorded. With reference to the planning requirement, the following criteria have been established:

Predicted noise levels @ 1m from the façade of a residential property shall be 37 dB $L_{Aeq,\,T}$ during daytime and 33 dB $L_{Aeq,\,and\,T}$ during night-time operations. For the purpose of designing the sound insulation for the temporary boiler, the lower limit has been set as the target.

2.2 Context

The heating unit will be fully self-contained within a secure container positioned as far away from Bacton High Rise Tower and Block A new building on Phase 1.

The following is an extract from the planning drawing, presenting the approximate distances from each side of the temporary boiler to the noise sensitive receptor. Measured nearest distances to the facades of the nearest residential properties are 8.6 metres to the west, 11.5 metres to the South and 12.7 metres to the east.



The heating unit will be located within a secure fenced / pair of gates with the fence being the same height as the container. The fencing is specified in section A.2 of this document as acoustic fencing, to act as an acoustic barrier between the container and the residential properties.

The container will have a Bauder green roof to both improve the sound insulation of the container and also to be more aesthetically pleasing when looked down upon from Bacton High Rise Tower.

To allow the necessary air intake (see the mechanical services section), the unit will have three acoustic louvres fitted, to the minimum acoustic specification in section 3.1.

The container will be lined with 15 mm thick plyboard to improve the sound insulation afforded by the steel container with an additional liner of 50 mm mineral wool or similar, held behind perforated metal casing. This lining will be to minimum the reverberant noise build up in the container to therefore further enhance the sound insulation performance.

Access to the plant will be via double doors at the end of the unit. The doors will be fitted with acoustic compression seals to the base /head and jambs. Where a double door arrangement is necessary for access there will be a rebated meeting stile, with a suitable seal. Each door will have an inner lining and one door leaf will be fixed and bolted to maximise the potential sound insulation through this potentially weaker element.

All equipment within the container will be mounted on appropriate anti- vibration mounting, with resiliently hung ductwork and pipework to minimise any potential container and or ground-borne vibration from the unit.

3 CALCULATIONS

The following presents the calculated noise levels for the temporary boiler.

The plant within the temporary boiler room comprises:

1 x Hamworthy Fleet Model 250V/750 3 module preassembled vertical gas fired condensing boiler. The manufacturer's technical data presents this boiler as having a maximum noise emissions of 53 dB (A) @ 1 metre from the plant. No octave band data was available for this

1 x standalone circulation pump. The pump is specified as a ….. model pump, with an estimated (from data on similar models) noise emission of 60 dB (A) @ 1 metre.

3.1 The plant room

The plant room comprises a 6060 mm x 2440 mm x 2540 mm high container. The steel container will be boarded out with plywood with 30mm insulation between the ply and steel. A further absorptive lining will be added to the container comprising typically 50 mm mineral wool, held in place behind perforated metal/lining plate.

Element	Plant room description Sound insulation / Insertion loss, dB Specification-	Octave Centre band frequency, Hz 63	125	250	500	1k	2k	4 K	
Container	Sound insulation of plywood lined metal container, dB	14	18	18	37	50	49	54	36
Acoustic Louvres	Slimline acoustic louvres, 150 mm deep-size to meet mech services requirements: Insertion Loss	6	6	8	10	14	18	16	15
Green roof	Sound insulation of Bauder green roof, as plywood lined	14	18	18	37	50	49	54	36
Conformal Sound insulation	1.5 m2 Acoustic louvre, mounted in plywood lined container	11	13	12	22	27	31	29	28

3.2 Prediction

The extract from the spreadsheet given in A.1 below, presents a typical break- out calculation from the Container plant room at the 'nearest ' noise sensitive dwelling , taken at a horizontal distance of 8.6 metres (8.6 metres – 1.5 m for 'façade ' level) and a height of 6 metres above ground level.

The predicted noise level from the container, built to the above specification is 30 dB (A) @ 1.5 metres from the facade. This meets the planning condition target of < 33 dB (A) @ 1.5 metres from the façade.

4 CONCLUSION

There is a requirement for a temporary boiler to be installed during the phased building of the Bacton low rise development.

The boiler and associated pump equipment is to be contained within an acoustically enhanced metal container, surrounded by acoustic fencing.

Noise levels at the nearest residential property have been predicted as 30 dB (A) which is deemed to satisfy Condition 17 of the planning condition for the site.

1 A1: CALCULATION SPREADSHEET EXTRACT

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Project no:	Bacton Low Rise	**Page:**	1
Noise from temporary boiler room		**Date:**	20-May-14
Supply/extract systems propagation - external		**Made by:**	LC
		Checked:	PR

Description		dB(A)	NR	Octave band centre frequency, Hz							
				63	125	250	500	1000	2000	4000	8000
BOILER UNITS		53									
Lw of boiler unit		70		87	77	70	65	62	59	57	56
no. of units	1	0		0	0	0	0	0	0	0	0
Lw of boilers		70		87	77	70	65	62	59	57	56
PUMP UNIT		60									
Lw of pump unit		75		92.0	82.0	75.0	70.0	67.0	64.0	63.0	61.0
Lw in plant enclosure		76		93	83	76	71	68	65	64	62
Calculation of Lpr Lp rev in plant room											
f plant room (-10*logV+14)	39			-2	-2	-2	-2	-2	-2	-2	-2
+10*logRT	1			-4	-4	1	2	2	1	2	2
correction ot Lw r				-4	-6	-1	0	0	-1	0	0
Lpr		**75**		**89**	**77**	**75**	**71**	**68**	**64**	**64**	**62**
Transmission loss of enclosure with acoustic louvre				-11	-13	-12	-22	-27	-31	-29	-28
to free field				-6	-6	-6	-6	-6	-6	-6	-6
Hemispherical radiation				*-8*	*-8*	*-8*	*-8*	*-8*	*-8*	*-8*	*-8*
*-20*log distance*	*7*			*-17*	*-17*	*-17*	*-17*	*-17*	*-17*	*-17*	*-17*
eduction as point source				*-25*	*-25*	*-25*	*-25*	*-25*	*-25*	*-25*	*-25*
Assume plane source at this distance				-22	-22	-22	-22	-22	-22	-22	-22
Barrier attenuation				-4	-2	-1	0	0	0	0	
açade noise level from plant enclosure from w est side		**28**		**46**	**34**	**34**	**21**	**13**	**5**	**7**	**6**
Transmission loss of side façade of enclosures				-14	-18	-18	-37	-50	-49	-54	-36
to free field				-6	-6	-6	-6	-6	-6	-6	-6
Assume plane source radiation				-23	-23	-23	-23	-23	-23	-23	-23
Barrier attenuation				-5	-4	-2	-1	0	0	0	0
façade noise level from north side of enclosure		**20**		42	27	26	4	-11	-14	-19	-3
Transmission loss of side façade of enclosures				-14	-18	-18	-37	-50	-49	-54	-36
to free field				-6	-6	-6	-6	-6	-6	-6	-6
Assume plane source radiation				-21	-21	-21	-21	-21	-21	-21	-21
Barrier attenuation / line of sight attenuation				-10	-10	-10	-10	-10	-10	-10	-10
façade noise level from south side of enclosure		**16**		38	22	20	-3	-19	-22	-27	-11
Transmission loss of roof of enclosure				-14	-18	-18	-37	-50	-49	-54	-36
to free field				-6	-6	-6	-6	-6	-6	-6	-6
Assume plane source radiation				-22	-22	-22	-22	-22	-22	-22	-22
façade noise level from south side of enclosure		**24**		47	31	29	6	-10	-13	-18	-2
No view onto far end of enclosure											
Total noise level from all facades of enclosure		**30**		**51**	**37**	**36**	**21**	**13**	**5**	**7**	**7**
Background noise level from PBA survey		38									
Planning condition		-5		-5	-5	-5	-5	-5	-5	-5	-5
Planning limit		33									

2 A.2 ENCLOSURE BARRIER SPECIFICATION

The Barrier around the enclosure serves as both a visual and an acoustic screen. The height shall be the same height as the plant container.

Airborne Sound Insulation

The material(s) should be selected to provide a single figure sound insulation DLR of not less than 24 dB when measured and rated in accordance with BS EN 1793-2:1998, Road traffic noise reducing devices – Test method for determining the acoustic performance, Part 2 *Intrinsic characteristics of airborne sound insulation.* This requirement can usually be met with a timber barrier constructed of at least 19 mm thickness with a dense mineral wool absorptive lining of not less than 50 mm thickness and a density of 100 kg/m3, or a proprietary cementitious woodwool or wood shaving panel.

Joints between panels should be well sealed to prevent leakage through the barrier. Timber panels and planks should incorporate due allowance for expansion and shrinkage of the timber by including a rebated overlap or tongue and groove joint between boards, or an external batten to cover movement gaps. The overlap should not be less than 25% of the board width to prevent significant leakage. Where materials are stable and significant movement between panels would not occur, the gaps between panels should be sealed with a resilient gasket.

Acoustic Absorption

Where a timber or other acoustically reflective material is to be used, the internal face can be lined with an acoustically absorptive material with a protective facing. The lining material, or barrier material, where inherently absorptive, shall be selected to meet a single figure sound absorption value DLα of not less than 7 dB when measured and rated in accordance with the requirements of BS EN 1793-1:1997, Road traffic noise reducing devices – Test method for determining the acoustic performance, Part 2 *Intrinsic characteristics of airborne sound absorption.*

Mechanical Performance and Stability

The barrier materials shall be selected to provide a service life of not less than 20 years, with no major maintenance required for 10 years.

The barrier shall be capable of resisting wind loadings and the self-weight of its component parts without reducing its effectiveness as an acoustic barrier. The mechanical performance shall be capable of meeting the requirements of BS EN 1794-1: 1998, *Road traffic noise reducing devices – Non-acoustic performance, Part 1. Mechanical performance and stability requirements relating to wind load and static load (Annex A) and self-weight (Annex B).*

Any absorptive material shall be chemically inert, rot-proof, resistant to the growth of fungi, moulds and bacteria and resistant to, or not offer sustenance to, vermin. The material shall retain its structural integrity over the specified life of the barrier.