CHP Noise Assessment

Report No – **9384A-1**
Client – **Linden Homes**
Site – **63-75 Glenthorne Road,**
Hammersmith, London, W6 0LJ

noise.co.uk

1.0 Table of Contents

2.0 Object

The object of this report is to present the findings of a desktop study which has been commissioned by the Client to assess the acoustic impact of a CHP system which is housed in a purpose build boiler room on the ground floor of the development known as Gondor Gardens, West Hampstead, London NW6.

It is understood that there is a planning requirement set down by the Local Authority which requires and noise from mechanical and electrical services plant to be 10dB below the minimum prevailing background levels at the nearest residential receiver. In this case use is made of an earlier background noise report produced by noise.co.uk Ltd on 9th - 16th November 2010 which details the findings of a 24 hour background noise assessment on site. [Report No9587-1].

The report is designed to provide the objective evidence to prove compliance with the Local Authority planning requirement.

3.0 Scope

The scope of this report is as follows:

1) Presentation of sound pressure level prediction findings

2) Presentation of acoustic findings and comparison with current planning requirements of the Local Authority. See below (confirmed in client email see below)

It is understood the External Noise Level from the boiler would need to be 10dBA lower than the minimum prevailing background noise level.

It is understood that the boiler may be operational at anytime during the 24 hour period 7 days per week.

4.0 Sound Pressure Level Prediction

Boiler Room:

The boiler room flue location is detailed below:

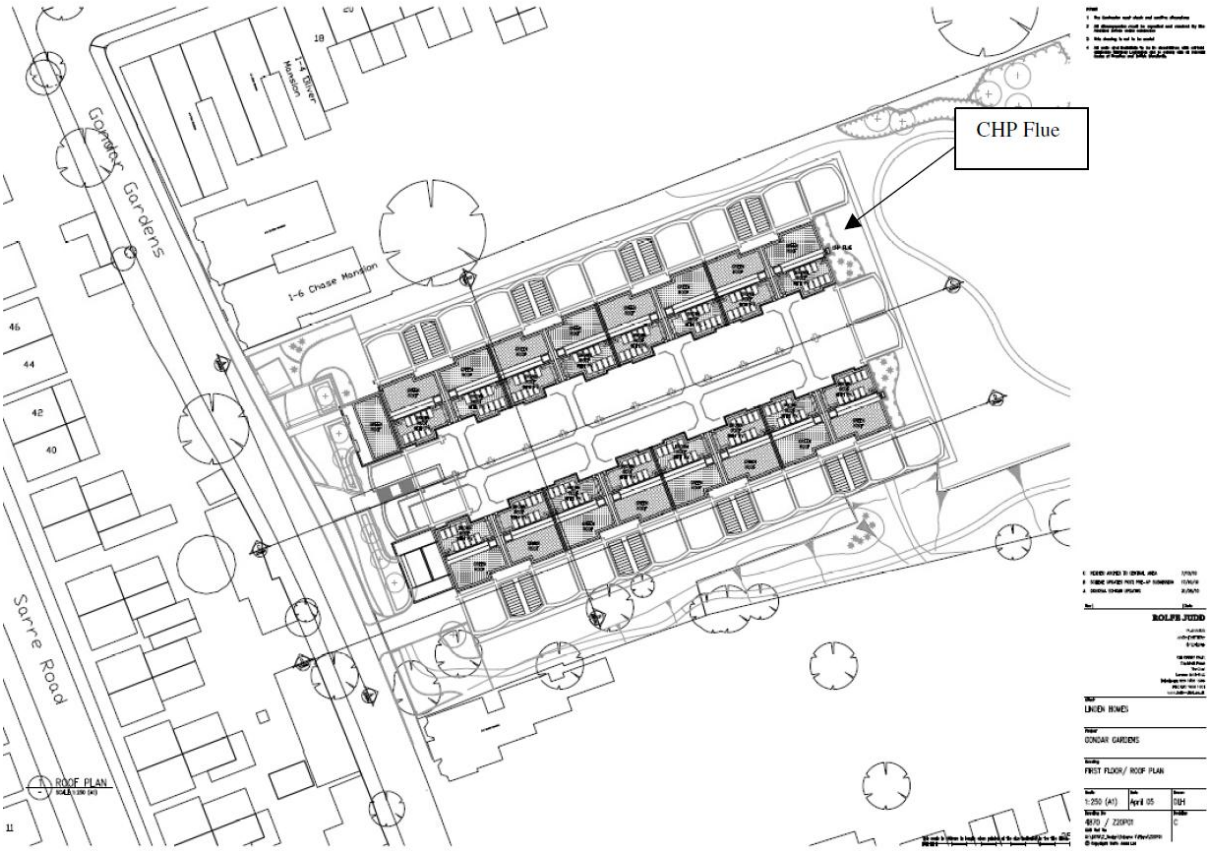

Figure 1: Boiler room approximate dimensions 6.5m x 6.5m x 2.4m high

Boiler CHP Room:

The external wall is a cavity wall construction assumed to be a min 380Kg/m2 mass with double hardwood reinforced door access to the space.

The CHP system is understood to be housed entirely within the boiler room with the exhaust routed through a ducted system at roof level. The manufacturers data indicates that it will produce a worst case sound pressure level of 65dB(A) @ 1m maximum from each unit: see below:

Wessex ModuMax High Efficiency Boilers - Performance and General Data

Module Size		WM 110he			WM 160he			WM 220he		
Model No of modules		/110 1	/220 2	/330 3	/160 1	/320 2	/480 3	/220 1	/440 2	/660 3
Approx. shipping weight	kg	175	345	515	220	440	660	220	440	660
Noise emission @ 1m	Max dB (A) Min dB (A)	60 47			65 47					

Figure 2: CHP Boiler Manufacturers Technical Specification - Full Sheet Detailed in the Appendix.

NOTE: This sound pressure level is for 1 off boiler CHP system there are three programmed for installation on this site. If all operate at full duty the resulting sound pressure level would be:

3 x 65dB(A) = 69.8dB(A)

It is understood from the client that the nearest residential receiver is situated at 1st floor level approximately 8m from the boiler room facade.

In order to predict the sound pressure level at the nearest sensitive receiver the following assumptions are made.

1) Boiler noise (Octave bands) is taken from standard acoustic Text Engineering Noise Control 2nd Edition - Bies & Hansen.

2) Wall to door surface area is approximately 4:1 ratio.

3) the minimum prevailing background noise level can be taken from the survey carried out by noise.co.uk (and detailed in the Appendix to this document) the minimum recorded LA90 over the noise monitoring period was 33dB LA90,5min.

3) Cavity masonry wall performance is taken from Appendix 13B sound reduction index table[1]: see below:

[1] Noise Control in Building Services SRL Ltd - Pergamon Press

4) Door sound reduction index is also taken from Appendix 13B (worst case assumed wooden solid doors)see below

		63	125	250	500	1k	2k	4k
Assume min mass 380Kg/m2: Appendix 13B SRL NCinBS. P403		28	34	34	40	56	73	76
Solid Hardwood Door (worst case SRI): Appendix 13B SRL NCinBS. P403		13	17.0	21.0	26.0	29.0	31.0	34.0

Predicted sound pressure level:

The predicted sound pressure level is detailed in Table 1 in the Appendix and is summarised below:

			63	125	250	500	1k	2k	4k	dB(A)
Sound Pressure Level Outside Residential Property Boundary			36	33	27	18	14	0	-6	**23**
Minimum Night Time Background Sound Pressure Level (LA90,5min): noise.co.uk Ltd noise report No9587-1										**33**
Excess of Boiler Noise over background (Worst Case Condition) dB(A)										**-10**
Conclusion : Complies with Planning Requirement.	**Condition satisfied**									

Predicted Sound Pressure Level from Boiler Room Breakout at facade of nearest residential receiver = 23dB (A)

As the prevailing minimum background sound pressure level recorded over the period 9th - 16th November 2010 was 33dB LA90,5min the CHP Boiler noise is 10dB below the minimum background sound pressure level on site.

5.0 Conclusion

The CHP boiler noise has been assessed using manufacturer's data and standard prediction methods for calculating noise breakout from a plant room.

The plant room location is taken from the drawings. The nearest receiver is on the proposed development at approximately 8m distance. The plant room design is taken from standard construction and access to it from external areas is through standard double solid wooden doors.

The predictions indicate that the boiler noise will be 10dB below the minimum background sound pressure level at the nearest residential receiver (1st floor level) during the quietest period of the night (weekend period).

Based on this prediction the Local Authority planning requirement is met.

W.A.Whitfield BA. MSc, MIOA

Noise & Vibration Consultant

Appendix

Technical Data

Wessex ModuMax High Efficiency Boilers - Performance and General Data

	Module Size		WM 110he			WM 160he			WM 220he		
	Model No of modules		/110 1	/220 2	/330 3	/160 1	/320 2	/480 3	/220 1	/440 2	/660 3
Energy	Building regulations seasonal efficiency	(%)gross	87.3			86.7			86.6		
	Boiler output 80/60°C	kW Btu/h x 1000	110 375	220 757	330 1126	160 546	320 1092	480 1638	220 750	440 1501	660 2252
	Boiler input (gross) Maximum	kW Btu/h x 1000	125 427	250 853	375 1280	190 648	380 1295	569 1943	262 894	524 1788	787 2685
	Boiler input (nett) Maximum	kW Btu/h x 1000	113 384	225 768	338 1152	171 583	342 1166	513 1749	236 805	472 1610	708 2416
	Boiler output Minimum 80/60°C	kW Btu/h x 1000	22 73			32 109			44 150		
Water	Water content (not including headers)	litres	14	28	42	17	34	51	17	34	51
	Minimum flow rate @ 20°C Δt rise	l/s	1.3	2.6	3.9	1.9	3.8	5.7	2.6	5.2	7.8
	Water side pressure loss @ 20°C Δt rise	mbar	25			144			190		
	System design flow rate @ 11°C Δt rise	l/s	2.3	4.6	6.9	3.4	6.8	10.2	4.8	9.6	14.4
	Water side pressure loss @ 11°C Δt rise	mbar	86			487			595		
	Maximum water pressure	barg	10								
Gas	Gas flow rate natural gas (G20) - Maximum	m^3/h	11.9	23.8	35.7	18.4	36.8	55.2	25	50	75
	Nominal gas inlet pressure natural gas (G20)	mbar	20								
	Maximum gas inlet pressure natural gas (G20)	mbar	25								
Flue	Approx. flue gas volume @ 15°C, 9.1% CO_2, N.T.P	m^3/h	161	322	483	239	478	717	321	642	963
	Maximum flue gas temperature	°C	129			118			129		
	NO_x Emission (DAF) European Class 5	mg/kWh	38			34			39		
	Pressure at flue outlet	Pa mbar	150 1.5			142 1.42			150 1.5		
Connection	Water flow/return connections		G1½"M			G2½"M					
	Gas inlet connection pipe thread size		R1"M			R1¼" M					
	Nominal flue diameter (I/D)	mm	100	180	180	150	250	250	150	250	250
	Condensate trap connection(s) (O/D)	mm	32								
Electrics	Power consumption - maximum	W	170	340	510	250	500	750	250	500	750
	Nominal supply voltage		230V 1PH 50Hz								
	Module start current	Start Amps Run Amps	1.2 0.8			1.3 0.9					
	Approx. shipping weight	kg	175	345	515	220	440	660	220	440	660
	Noise emission @ 1m	Max dB (A) Min dB (A)	60 47			65 47					

Sound Pressure Levels

noise.co.uk

Table 1 - Background Sound Pressure Level Survey
Gondor Gardens London NW6.

Max BG	Min BG	
65.5	33.0	LAF90.0% dB, (A)

Datapoint	Date	Time	LAF90.0% dB, (A)
1	09/11/2010	11:49:00	51.5
2	09/11/2010	11:50:00	55.0
3	09/11/2010	11:51:00	54.0
4	09/11/2010	11:52:00	47.5
5	09/11/2010	11:53:00	49.0
6	09/11/2010	11:54:00	46.5
7	09/11/2010	11:55:00	47.5
8	09/11/2010	11:56:00	46.0
9	09/11/2010	11:57:00	47.0
10	09/11/2010	11:58:00	54.0
11	09/11/2010	11:59:00	48.0
12	09/11/2010	12:00:00	45.0
13	09/11/2010	12:01:00	45.0
14	09/11/2010	12:02:00	46.0
15	09/11/2010	12:03:00	45.5
16	09/11/2010	12:04:00	46.0
17	09/11/2010	12:05:00	47.0
18	09/11/2010	12:06:00	52.0
19	09/11/2010	12:07:00	49.0
20	09/11/2010	12:08:00	46.0
21	09/11/2010	12:09:00	48.5
22	09/11/2010	12:10:00	45.0
23	09/11/2010	12:11:00	44.5
24	09/11/2010	12:12:00	45.5
25	09/11/2010	12:13:00	49.5
26	09/11/2010	12:14:00	44.0
27	09/11/2010	12:15:00	44.5
28	09/11/2010	12:16:00	43.5
29	09/11/2010	12:17:00	45.0
30	09/11/2010	12:18:00	45.0
31	09/11/2010	12:19:00	46.0
32	09/11/2010	12:20:00	46.0
33	09/11/2010	12:21:00	44.5
34	09/11/2010	12:22:00	44.0
35	09/11/2010	12:23:00	47.0
36	09/11/2010	12:24:00	45.5
37	09/11/2010	12:25:00	47.0
38	09/11/2010	12:26:00	45.5
39	09/11/2010	12:27:00	44.5
40	09/11/2010	12:28:00	43.5
41	09/11/2010	12:29:00	44.5
42	09/11/2010	12:30:00	48.0
43	09/11/2010	12:31:00	44.5
44	09/11/2010	12:32:00	44.5
45	09/11/2010	12:33:00	46.0
46	09/11/2010	12:34:00	46.0
47	09/11/2010	12:35:00	46.0
48	09/11/2010	12:36:00	43.5
49	09/11/2010	12:37:00	44.5
50	09/11/2010	12:38:00	45.0
51	09/11/2010	12:39:00	44.5
52	09/11/2010	12:40:00	45.5
53	09/11/2010	12:41:00	45.0
54	09/11/2010	12:42:00	45.5
55	09/11/2010	12:43:00	46.5
56	09/11/2010	12:44:00	46.0
57	09/11/2010	12:45:00	45.0
58	09/11/2010	12:46:00	44.5
59	09/11/2010	12:47:00	44.5
60	09/11/2010	12:48:00	44.0
61	09/11/2010	12:49:00	46.5
62	09/11/2010	12:50:00	45.0
63	09/11/2010	12:51:00	46.0
64	09/11/2010	12:52:00	47.5
65	09/11/2010	12:53:00	49.5
66	09/11/2010	12:54:00	47.0
67	09/11/2010	12:55:00	46.5
68	09/11/2010	12:56:00	50.5
69	09/11/2010	12:57:00	47.5
70	09/11/2010	12:58:00	48.0
71	09/11/2010	12:59:00	47.5
72	09/11/2010	13:00:00	48.5
73	09/11/2010	13:01:00	47.5
74	09/11/2010	13:02:00	47.5
75	09/11/2010	13:03:00	47.0
76	09/11/2010	13:04:00	51.0
77	09/11/2010	13:05:00	45.5
78	09/11/2010	13:06:00	46.0
79	09/11/2010	13:07:00	45.5
80	09/11/2010	13:08:00	48.0
81	09/11/2010	13:09:00	47.0
82	09/11/2010	13:10:00	45.5
83	09/11/2010	13:11:00	45.5
84	09/11/2010	13:12:00	47.5
85	09/11/2010	13:13:00	45.5
86	09/11/2010	13:14:00	46.0
87	09/11/2010	13:15:00	46.5
88	09/11/2010	13:16:00	47.0
89	09/11/2010	13:17:00	44.0
90	09/11/2010	13:18:00	48.0
91	09/11/2010	13:19:00	47.5
92	09/11/2010	13:20:00	44.5
93	09/11/2010	13:21:00	46.0
94	09/11/2010	13:22:00	47.5
95	09/11/2010	13:23:00	49.0
96	09/11/2010	13:24:00	48.0
97	09/11/2010	13:25:00	46.5
98	09/11/2010	13:26:00	45.5
99	09/11/2010	13:27:00	45.0
100	09/11/2010	13:28:00	44.5
101	09/11/2010	13:29:00	48.5
102	09/11/2010	13:30:00	45.5
103	09/11/2010	13:31:00	44.0
104	09/11/2010	13:32:00	45.5
105	09/11/2010	13:33:00	45.5
106	09/11/2010	13:34:00	48.0
107	09/11/2010	13:35:00	44.5
108	09/11/2010	13:36:00	45.0
109	09/11/2010	13:37:00	45.0
110	09/11/2010	13:38:00	44.5
111	09/11/2010	13:39:00	45.0
112	09/11/2010	13:40:00	46.5
113	09/11/2010	13:41:00	43.5
114	09/11/2010	13:42:00	44.5
115	09/11/2010	13:43:00	46.0
116	09/11/2010	13:44:00	47.0
117	09/11/2010	13:45:00	45.0
118	09/11/2010	13:46:00	45.5
119	09/11/2010	13:47:00	44.0
120	09/11/2010	13:48:00	45.5
121	09/11/2010	13:49:00	47.0
122	09/11/2010	13:50:00	44.5
123	09/11/2010	13:51:00	46.0
124	09/11/2010	13:52:00	45.5
125	09/11/2010	13:53:00	45.0
126	09/11/2010	13:54:00	45.5
127	09/11/2010	13:55:00	43.5
128	09/11/2010	13:56:00	43.5
129	09/11/2010	13:57:00	44.5
130	09/11/2010	13:58:00	44.0
131	09/11/2010	13:59:00	44.5
132	09/11/2010	14:00:00	48.0
133	09/11/2010	14:01:00	49.0
134	09/11/2010	14:02:00	47.5
135	09/11/2010	14:03:00	44.0
136	09/11/2010	14:04:00	44.5
137	09/11/2010	14:05:00	45.0
138	09/11/2010	14:06:00	44.5
139	09/11/2010	14:07:00	47.5
140	09/11/2010	14:08:00	46.0
141	09/11/2010	14:09:00	45.0
142	09/11/2010	14:10:00	45.0
143	09/11/2010	14:11:00	43.0
144	09/11/2010	14:12:00	43.0
145	09/11/2010	14:13:00	45.0
146	09/11/2010	14:14:00	48.0
147	09/11/2010	14:15:00	42.0
148	09/11/2010	14:16:00	43.0
149	09/11/2010	14:17:00	44.5
150	09/11/2010	14:18:00	44.0
151	09/11/2010	14:19:00	43.0
152	09/11/2010	14:20:00	44.5
153	09/11/2010	14:21:00	43.0
154	09/11/2010	14:22:00	42.5
155	09/11/2010	14:23:00	42.5
156	09/11/2010	14:24:00	45.5
157	09/11/2010	14:25:00	46.0
158	09/11/2010	14:26:00	43.5
159	09/11/2010	14:27:00	42.0
160	09/11/2010	14:28:00	42.5
161	09/11/2010	14:29:00	43.5
162	09/11/2010	14:30:00	45.0
163	09/11/2010	14:31:00	43.0
164	09/11/2010	14:32:00	42.5
165	09/11/2010	14:33:00	43.0
166	09/11/2010	14:34:00	43.0
167	09/11/2010	14:35:00	44.0
168	09/11/2010	14:36:00	42.0
169	09/11/2010	14:37:00	43.5
170	09/11/2010	14:38:00	45.5
171	09/11/2010	14:39:00	46.5
172	09/11/2010	14:40:00	44.0
173	09/11/2010	14:41:00	47.5
174	09/11/2010	14:42:00	46.5
175	09/11/2010	14:43:00	43.0
176	09/11/2010	14:44:00	45.5
177	09/11/2010	14:45:00	44.5
178	09/11/2010	14:46:00	44.0
179	09/11/2010	14:47:00	43.5
180	09/11/2010	14:48:00	45.0
181	09/11/2010	14:49:00	43.5
182	09/11/2010	14:50:00	44.0
183	09/11/2010	14:51:00	43.5
184	09/11/2010	14:52:00	43.5
185	09/11/2010	14:53:00	43.5
186	09/11/2010	14:54:00	45.5
187	09/11/2010	14:55:00	45.5
188	09/11/2010	14:56:00	45.0
189	09/11/2010	14:57:00	45.5
190	09/11/2010	14:58:00	44.5
191	09/11/2010	14:59:00	43.5
192	09/11/2010	15:00:00	44.0
193	09/11/2010	15:01:00	43.5
194	09/11/2010	15:02:00	46.5
195	09/11/2010	15:03:00	44.5
196	09/11/2010	15:04:00	44.0
197	09/11/2010	15:05:00	43.5
198	09/11/2010	15:06:00	43.0
199	09/11/2010	15:07:00	44.0
200	09/11/2010	15:08:00	45.0
201	09/11/2010	15:09:00	45.5
202	09/11/2010	15:10:00	44.0
203	09/11/2010	15:11:00	46.0
204	09/11/2010	15:12:00	46.5
205	09/11/2010	15:13:00	46.0
206	09/11/2010	15:14:00	46.0

Datapoint	Date	Time	LAF90.0% dB, (A)
207	09/11/2010	15:15:00	44.5
208	09/11/2010	15:16:00	45.0
209	09/11/2010	15:17:00	45.0
210	09/11/2010	15:18:00	46.0
211	09/11/2010	15:19:00	47.0
212	09/11/2010	15:20:00	48.0
213	09/11/2010	15:21:00	48.0
214	09/11/2010	15:22:00	47.0
215	09/11/2010	15:23:00	44.0
216	09/11/2010	15:24:00	44.5
217	09/11/2010	15:25:00	42.5
218	09/11/2010	15:26:00	45.5
219	09/11/2010	15:27:00	44.0
220	09/11/2010	15:28:00	48.0
221	09/11/2010	15:29:00	45.5
222	09/11/2010	15:30:00	46.5
223	09/11/2010	15:31:00	44.5
224	09/11/2010	15:32:00	43.0
225	09/11/2010	15:33:00	44.0
226	09/11/2010	15:34:00	46.5
227	09/11/2010	15:35:00	47.0
228	09/11/2010	15:36:00	46.5
229	09/11/2010	15:37:00	45.0
230	09/11/2010	15:38:00	47.5
231	09/11/2010	15:39:00	46.5
232	09/11/2010	15:40:00	48.0
233	09/11/2010	15:41:00	48.0
234	09/11/2010	15:42:00	47.0
235	09/11/2010	15:43:00	47.5
236	09/11/2010	15:44:00	47.0
237	09/11/2010	15:45:00	47.0
238	09/11/2010	15:46:00	46.0
239	09/11/2010	15:47:00	46.5
240	09/11/2010	15:48:00	47.0
241	09/11/2010	15:49:00	44.5
242	09/11/2010	15:50:00	45.5
243	09/11/2010	15:51:00	45.0
244	09/11/2010	15:52:00	49.0
245	09/11/2010	15:53:00	46.0
246	09/11/2010	15:54:00	47.0
247	09/11/2010	15:55:00	46.0
248	09/11/2010	15:56:00	46.5
249	09/11/2010	15:57:00	46.0
250	09/11/2010	15:58:00	45.5
251	09/11/2010	15:59:00	46.5
252	09/11/2010	16:00:00	45.5
253	09/11/2010	16:01:00	47.5
254	09/11/2010	16:02:00	45.0
255	09/11/2010	16:03:00	45.0
256	09/11/2010	16:04:00	45.0
257	09/11/2010	16:05:00	44.0
258	09/11/2010	16:06:00	47.0
259	09/11/2010	16:07:00	45.0
260	09/11/2010	16:08:00	44.0
261	09/11/2010	16:09:00	47.0
262	09/11/2010	16:10:00	47.0
263	09/11/2010	16:11:00	46.0
264	09/11/2010	16:12:00	45.0
265	09/11/2010	16:13:00	45.5
266	09/11/2010	16:14:00	46.0
267	09/11/2010	16:15:00	45.5
268	09/11/2010	16:16:00	45.5
269	09/11/2010	16:17:00	46.0
270	09/11/2010	16:18:00	44.5
271	09/11/2010	16:19:00	46.5
272	09/11/2010	16:20:00	44.5
273	09/11/2010	16:21:00	44.5
274	09/11/2010	16:22:00	45.5
275	09/11/2010	16:23:00	45.5
276	09/11/2010	16:24:00	50.5
277	09/11/2010	16:25:00	45.0
278	09/11/2010	16:26:00	47.0
279	09/11/2010	16:27:00	45.0
280	09/11/2010	16:28:00	45.0
281	09/11/2010	16:29:00	46.5
282	09/11/2010	16:30:00	46.0
283	09/11/2010	16:31:00	48.5
284	09/11/2010	16:32:00	46.0
285	09/11/2010	16:33:00	53.0
286	09/11/2010	16:34:00	46.0
287	09/11/2010	16:35:00	45.0
288	09/11/2010	16:36:00	44.0
289	09/11/2010	16:37:00	44.5
290	09/11/2010	16:38:00	45.0
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353	09/11/2010	17:41:00	43.5
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358	09/11/2010	17:46:00	43.5
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715	09/11/2010	23:43:00	42.5
716	09/11/2010	23:44:00	41.5
717	09/11/2010	23:45:00	41.0
718	09/11/2010	23:46:00	40.5
719	09/11/2010	23:47:00	40.5
720	09/11/2010	23:48:00	40.5
721	09/11/2010	23:49:00	41.0
722	09/11/2010	23:50:00	41.0
723	09/11/2010	23:51:00	40.0
724	09/11/2010	23:52:00	41.0
725	09/11/2010	23:53:00	41.0
726	09/11/2010	23:54:00	40.5
727	09/11/2010	23:55:00	41.0
728	09/11/2010	23:56:00	40.5
729	09/11/2010	23:57:00	41.0
730	09/11/2010	23:58:00	41.0
731	09/11/2010	23:59:00	40.0
732	10/11/2010	00:00:00	40.0
733	10/11/2010	00:01:00	40.0
734	10/11/2010	00:02:00	40.5
735	10/11/2010	00:03:00	40.0
736	10/11/2010	00:04:00	41.0
737	10/11/2010	00:05:00	41.0
738	10/11/2010	00:06:00	41.0
739	10/11/2010	00:07:00	41.0
740	10/11/2010	00:08:00	40.5
741	10/11/2010	00:09:00	40.5
742	10/11/2010	00:10:00	40.0
743	10/11/2010	00:11:00	40.5
744	10/11/2010	00:12:00	41.0
745	10/11/2010	00:13:00	39.5
746	10/11/2010	00:14:00	40.0
747	10/11/2010	00:15:00	40.5
748	10/11/2010	00:16:00	41.0
749	10/11/2010	00:17:00	41.0
750	10/11/2010	00:18:00	39.5
751	10/11/2010	00:19:00	40.0
752	10/11/2010	00:20:00	40.5
753	10/11/2010	00:21:00	40.5
754	10/11/2010	00:22:00	40.5
755	10/11/2010	00:23:00	41.0
756	10/11/2010	00:24:00	41.5
757	10/11/2010	00:25:00	41.0
758	10/11/2010	00:26:00	40.5
759	10/11/2010	00:27:00	41.5
760	10/11/2010	00:28:00	40.5
761	10/11/2010	00:29:00	40.0
762	10/11/2010	00:30:00	40.0
763	10/11/2010	00:31:00	40.5
764	10/11/2010	00:32:00	40.0
765	10/11/2010	00:33:00	39.5
766	10/11/2010	00:34:00	39.5
767	10/11/2010	00:35:00	40.0
768	10/11/2010	00:36:00	39.0
769	10/11/2010	00:37:00	40.0
770	10/11/2010	00:38:00	40.0
771	10/11/2010	00:39:00	39.5
772	10/11/2010	00:40:00	39.5
773	10/11/2010	00:41:00	40.5
774	10/11/2010	00:42:00	41.0
775	10/11/2010	00:43:00	40.5
776	10/11/2010	00:44:00	41.0
777	10/11/2010	00:45:00	40.0
778	10/11/2010	00:46:00	39.5
779	10/11/2010	00:47:00	39.5
780	10/11/2010	00:48:00	38.5
781	10/11/2010	00:49:00	39.5
782	10/11/2010	00:50:00	39.0
783	10/11/2010	00:51:00	38.5
784	10/11/2010	00:52:00	39.0
785	10/11/2010	00:53:00	38.5
786	10/11/2010	00:54:00	39.0
787	10/11/2010	00:55:00	39.5
788	10/11/2010	00:56:00	39.5
789	10/11/2010	00:57:00	39.5
790	10/11/2010	00:58:00	39.5
791	10/11/2010	00:59:00	39.5
792	10/11/2010	01:00:00	39.0
793	10/11/2010	01:01:00	39.0
794	10/11/2010	01:02:00	39.5
795	10/11/2010	01:03:00	39.0
796	10/11/2010	01:04:00	39.5
797	10/11/2010	01:05:00	39.5
798	10/11/2010	01:06:00	39.0
799	10/11/2010	01:07:00	39.0
800	10/11/2010	01:08:00	40.0
801	10/11/2010	01:09:00	40.0
802	10/11/2010	01:10:00	40.5
803	10/11/2010	01:11:00	39.0
804	10/11/2010	01:12:00	39.0
805	10/11/2010	01:13:00	40.5
806	10/11/2010	01:14:00	40.0
807	10/11/2010	01:15:00	38.5
808	10/11/2010	01:16:00	39.0
809	10/11/2010	01:17:00	38.0
810	10/11/2010	01:18:00	39.0
811	10/11/2010	01:19:00	38.5
812	10/11/2010	01:20:00	38.5
813	10/11/2010	01:21:00	38.5
814	10/11/2010	01:22:00	39.0
815	10/11/2010	01:23:00	39.5
816	10/11/2010	01:24:00	39.0
817	10/11/2010	01:25:00	38.5
818	10/11/2010	01:26:00	38.5
819	10/11/2010	01:27:00	38.5
820	10/11/2010	01:28:00	38.5
821	10/11/2010	01:29:00	39.0
822	10/11/2010	01:30:00	39.0
823	10/11/2010	01:31:00	39.0
824	10/11/2010	01:32:00	38.5
825	10/11/2010	01:33:00	39.0
826	10/11/2010	01:34:00	39.5
827	10/11/2010	01:35:00	40.0
828	10/11/2010	01:36:00	39.0
829	10/11/2010	01:37:00	39.0
830	10/11/2010	01:38:00	38.5
831	10/11/2010	01:39:00	39.0
832	10/11/2010	01:40:00	39.0
833	10/11/2010	01:41:00	39.5
834	10/11/2010	01:42:00	39.0
835	10/11/2010	01:43:00	39.0
836	10/11/2010	01:44:00	39.0
837	10/11/2010	01:45:00	41.0
838	10/11/2010	01:46:00	40.0
839	10/11/2010	01:47:00	40.5
840	10/11/2010	01:48:00	38.5
841	10/11/2010	01:49:00	39.5
842	10/11/2010	01:50:00	38.5
843	10/11/2010	01:51:00	38.0
844	10/11/2010	01:52:00	38.5
845	10/11/2010	01:53:00	40.0
846	10/11/2010	01:54:00	40.0
847	10/11/2010	01:55:00	39.5
848	10/11/2010	01:56:00	40.0
849	10/11/2010	01:57:00	42.5
850	10/11/2010	01:58:00	40.0
851	10/11/2010	01:59:00	39.0
852	10/11/2010	02:00:00	39.5
853	10/11/2010	02:01:00	39.5
854	10/11/2010	02:02:00	39.5
855	10/11/2010	02:03:00	39.0
856	10/11/2010	02:04:00	38.5
857	10/11/2010	02:05:00	38.5

Table 2: Calculation of Composite Sound Reduction Index - Common Room Façade

Includes Wall and Double Access Doors

			63	125	250	500	1k	2k	4k	79
Internal Sound Pressure in Common Room Using Typical burner Noise Spectrum Table 11.15 Bies & Hansen p460			6	7	9	12	15	18	21	**dB(A)**
Lp =			73	72	70	67	64	61	58	**70**

Nearest Residential Property 8m away (1st Floor)
Approx Surface Area of Wall (m)6.9m x 2.4m 16.56
Approx Surface Area of Door (m) 2m x 2.1m 4.2
Approx Wall to Door Ratio = 4:1

Compute the Contribution from Boiler Room

			63	125	250	500	1k	2k	4k
Wall Construction - Double Skin masonry Wall	Assume min mass 380Kg/m2: Appendix 13B SRL NCinBS. P403		28	34	34	40	56	73	76
Door Construction - Steel double door set.	Solid Hardwood Door (worst case SRI): Appendix 13B SRL NCinBS. P403		13	17.0	21.0	26.0	29.0	31.0	34.0
Difference in building elements			-15	-17	-13	-14	-27	-42	-42
			7	11.0	7.0	7.0	22.0	28.0	28.0

Composite Sound Reduction Index Fig 5.9 SRL "Noise Control in Building Services"assumed ratio 1:3

Compositie Wall & Roof SRI Non -uniform partitions

	63	125	250	500	1k	2k	4k
Final Composite SRI Pump Room	**21**	**23**	**27**	**33**	**34**	**45**	**48**

Noise Breakout to Residential Property Calculated Using L2 = L1 - R + 10Log S - 20 Log r - 14 (Where S = Area of Common Room Wall & r is distance to Residential Property 17m)

			63	125	250	500	1k	2k	4k	
Sound Pressure Level in Pump Room			73	72	70	67	64	61	58	
Composite Sound Reduction of Common Room Façade			21	23	27	33	34	45	48	
10Log S	s = roof & front façade	20.76	13	13	13	13	13	13	13	
20 Log r	r = 8m	8	18	18	18	18	18	18	18	
Façade Correction	3dB	3	3	3	3	3	3	3	3	
			63	125	250	500	1k	2k	4k	dB(A)
Sound Pressure Level Outside Residential Property Boundary			36	33	27	18	14	0	-6	**23**

Minimum Night Time Background Sound Pressure Level (LA90,5min): noise.co.uk Ltd noise report No9587-1 **33**

Excess of Boiler Noise over background (Worst Case Condition) dB(A) **-10**

Conclusion : Complies with Planning Requirement. **Condition satisfied**

Table 11.15 Values to be subtracted from overall power levels L_w to obtain band levels for boiler noise

Octave band center frequency (Hz)	*Octave band corrections* (dB) *General-purpose boilders*	*Large power plant boilers*
31.5	6	4
63	6	5
125	7	10
250	9	16
500	12	17
1000	15	19
2000	18	21
4000	21	21
8000	24	21

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11.11 TURBINE NOISE

The principal noise sources of gas turbines are the casing, inlet and exhaust. The overall sound power levels contributed by these components of gas turbine noise (with no noise control) may be calculated using the following equations (Army, Air Force and Navy, USA 1983a):

Casing:

$$L_w = 120 + 5\log_{10} MW \quad (\text{dB re } 10^{-12}\,\text{W}) \tag{11.64}$$

Inlet:

$$L_w = 127 + 15\log_{10} MW \quad (\text{dB re } 10^{-12}\,\text{W}) \tag{11.65}$$

Exhaust:

$$L_w = 133 + 10\log_{10} MW \quad (\text{dB re } 10^{-12}\,\text{W}) \tag{11.66}$$

The octave band levels may be calculated by subtracting the corrections listed in Table 11.16. The approximate casing noise reduction due to various types of cover are listed in Table 11.17. Noise reductions due to inlet and exhaust mufflers can be calculated using the methods of Chapter 9, or preferably using manufacturer's data. Normally, the inlet and discharge cross-sectional areas of the muffler stacks are very large; thus additional noise reductions will occur due to the directivity of the stacks. This effect can be calculated using Figure 9.25.