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SRL Technical Services Limited

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C/30557/L01/JDH

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Dear Tom

163 Iverson Road – Review of Facade Specification

I have reviewed the noise survey data and proposed facade specification in the Sol Acoustic report ref P1498-REP01-SJF dated 27 June 2013. We have also analysed the spreadsheet of their raw survey results supplied in addition to the report.

1. Planning Condition

Planning Condition 18 sets limits for internal noise in habitable rooms:

"...externally generated noise... [shall] not cause internal noise levels to exceed an indoor ambient noise level in unoccupied rooms of 30dB L_{Aeq} (1 hour) and individual noise events shall not exceed 45 dB L_{AFmax}..."

"...(for the residential accommodation the design and construction criteria for development of building [sic] shall have regard to the good criteria set out in BS 8233:1999...)"

BS 8233 advises that *"for a reasonable standard in bedrooms at night, individual noise events should not normally exceed 45 dB L_{AFmax}"* and as the Sol report comments, the World Health Organisation (WHO) (in Chapter 3, *Adverse Health Effects of Noise*, 3.4) suggests that 45 dB L_{AFmax} should not be exceeded more than 10-15 times per night for good sleep.

I understand that the Environmental Health Officer at Camden Council, Mario Houska, has confirmed that the intention of the condition is not to achieve zero exceedances. We have therefore adopted the WHO guidance that 10-15 maximum noise events over 45 dB L_{AFmax} per night is acceptable.

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2. Comments on Noise Survey Report

We consider that the noise survey done by Sol is appropriate and the measurement positions and periods are suitable for determining external noise levels.

The predictions of road and rail traffic flows in 15 years are sensible and the increases in the average road and rail noise level (up to 1dB) are accurate enough for the assessment.

It is apparent that the facade specifications are driven by achieving the internal maximum noise level criteria.

Maximum noise levels are given as a range in the report and it is not clear which they have used in their noise break-in calculations. Also no account is given in the noise assessment of the screening offered by the building itself to the facades facing away from the primary noise sources. Therefore we have analysed the noise survey data and produced a facade specification that meets the requirements of the planning condition. Our approach is described in Section 3.

Particular points that Mario Houska has raised regarding the Sol report (notes dated 19/9/13, 17:38) are addressed below:

- **Railway station/platform activity noise:** The facade specifications given in this report (and those in the Sol report) are designed to protect against the highest average noise levels from train movements during the day and night and high maximum noise levels in bedrooms at night, including at upper floors of the building. The continuous noise measurements will have picked up any particular noise from the station and the platforms and therefore the facade specification is suitable to protect against this. In reality noise from the station and platforms (e.g. tannoys, shouting, etc) is likely to be significantly lower than the noise from trains and surrounding road traffic.

- **Measurement heights:** Measurements were made at a height of 5m at Positions 1 & 2. This is higher than the surrounding fences and structures and measurement positions were not obscured by the garden centre buildings currently on the site. I understand that the measurement positions had a clear line of site to the road/railway and therefore the noise levels measured at 5m are unlikely to vary significantly at higher floor levels (maximum noise levels may actually be lower). We are happy that the levels measured are representative of the facades on all floors.

- **Maximum noise levels recorded** by Sol in the key positions at night are tabulated in Appendix A of this report and are discussed in Section 3 below.

- **Traffic data** has been provided by Iceni Projects Ltd who are a planning and development consultancy whose specialisms include transport assessment and planning. Their predictions will have included all normal factors affecting the future traffic flows and will have incorporated any relevant information available from Mayor of London or Transport for London or other sources relating to future traffic flows. We have considered the information given in The Mayor's Ambient Noise Strategy (March 2004).

- **%HGVs:** The number of HGVs currently on Iverson road is relatively low and Iceni Projects Ltd have confirmed that the %HGVs for the 18 hour AAWT is between 3.2% and 3.5%. Note that because continuous noise monitoring was done, any maximum noise levels from HGVs have been recorded and therefore the facade specification protects against this.

- **Current railway stock:** The railway lines adjacent to the site currently carry a mixture of high speed InterCity services, lower speed commuter services and some freight (speeds are discussed in the Sol report). Because the Sol survey measured noise continuously for 24 hours, the number of trains, or specifically the number of significant maximum noise levels from trains, which drive the facade specification, is captured by the measured data. Maximum noise levels from each type of train will also have been captured by the noise survey.

- **Future rail traffic prediction:** Network rail have confirmed that rail freight is expected to grow by 30% in the next decade (currently there are 12 freight movements per 24 hour period, the majority during the day) but have not provided any data for passenger services. If we assume that passenger services increase by a similar percentage (it is unlikely to be as high as this, so this represents a worst case) the noise level at the facade of the proposed building would increase by 1.3dB. We have accounted for this increase in average noise levels in our facade specification.

  Note that an increase in the number of trains would not alter the absolute level of the maxima affecting the building, only the number of occurrences. The number of very high maximum noise levels (where levels greater than 45dB L_{AFmax} may be experienced in bedrooms) that may occur from fast trains or freight trains is very low at night (see Figure 1 of this report – 4 occurrences over 80dB L_{AFmax}). Even a 25% increase in the number of these maxima would only translate to 1 additional occurrence at night and is unlikely to lead to increased disturbance. For the vast majority of additional trains on the railway in the future, the maximum noise level in the bedroom would be lower than 45dB L_{AFmax} using our facade specification.

- **Reference to "stringent" criteria:** Where Sol refer in their report to the planning condition being "more stringent" than the WHO guidelines, they are referring to an interpretation of the condition where no exceedances of the 45dB L_{AFmax} criterion are allowed. As stated above, Mario Houska has confirmed that this is not the case.

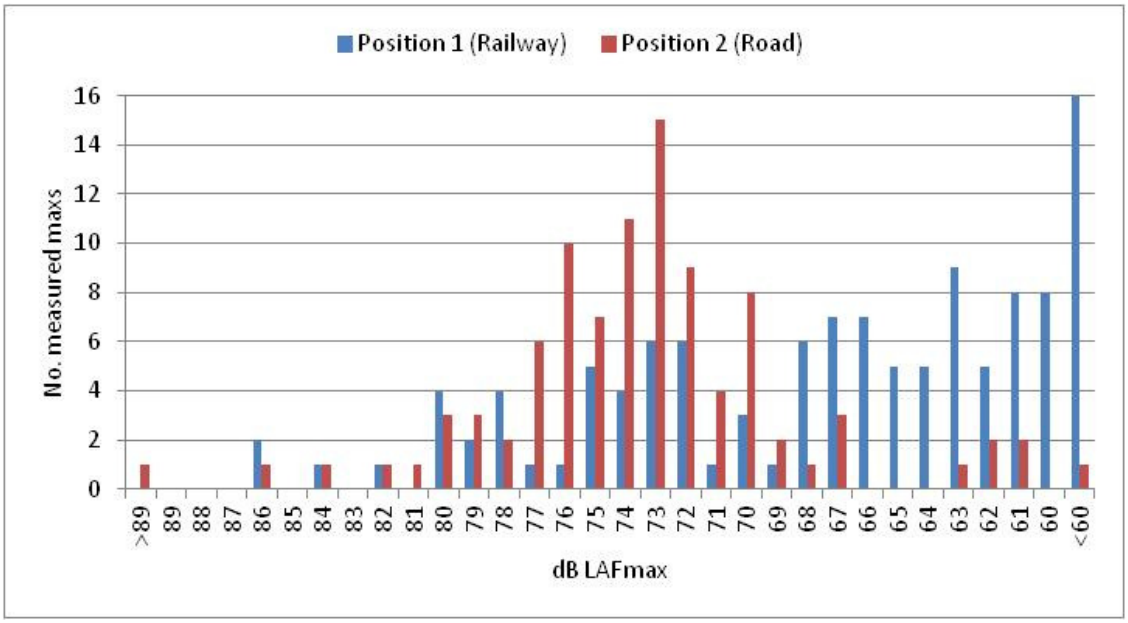
- **Noise from lifts:** We note the need for noise from lift motors and doors (and other mechanical services) to be controlled to acceptable levels in apartments. This will be considered in the detailed design stage of the project when internal elements will be designed.

3. Maximum Noise Levels

I have used the raw data from the noise survey done by Sol in May 2013 to determine a suitable *typical* maximum noise level at each facade of the building.

For Position 1 (facing the railway) and Position 2 (facing Iverson Road) I have counted the number of times that L_{AFmax} levels of different values were measured during the 8 hour period of the night survey. This is shown in the graph below.

Figure 1 – Maximum Levels from Sol Noise Survey (night time)



To determine the typical external maximum noise level I have disregarded the 10 highest maximum noise levels measured and taken the remaining highest level as typical. This is in line with the WHO guidance that 10-15 occurrences are acceptable. With reference to the graph above, the typical external maxima are taken as:

Table 1 – Typical Maximum Noise Levels

Position 1 (railway facade)	78 dB L_{AFmax}
Position 2 (Iverson Rd facade)	79 dB L_{AFmax}

I have applied the same process in each octave band to produce a spectrum for the typical maxima, given below. This has been used in our calculations:

Table 2 – Typical Maximum Noise Level Spectra

dB L_{max}	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**
Position 1	79	78	80	75	75	68	65
Position 2	87	80	74	73	74	73	71

I note that more than 1 maximum level will have occurred within the 1 minute or 5 minute period of measurement used by Sol. Therefore we have allowed for 10 of the highest measurements to be discarded rather than 15 (as is acceptable within WHO guidelines) to allow for potential additional maxima within a measurement period. Therefore our choice of typical maximum levels is robust. It is clear from Figure 1 that for both facades the vast majority of maximum noise events are lower than the levels in Table 1.

4. Alternative Facade Specification

We have used the data from the Sol noise survey to calculate the internal noise level in habitable rooms.

We have based our calculations on a typical bedroom and living room (approx $10m^2$ and $24m^2$ respectively – based on rooms shown on the GA drawings) with a ceiling height of 2.4m, a window area of $2m^2$ and a reverberation time of 0.5 seconds.

As mentioned above, the bedroom facade specifications are driven by the need to achieve 45 dB L_{AFmax} at night. Based on the typical maximum spectra given above, we have determined a facade specification which achieves both 45 dB L_{AFmax} and 30 dB $L_{Aeq,1\ hour}$ (based on the highest hourly L_{Aeq} measured) in bedrooms at night and 30 dB $L_{Aeq,1\ hour}$ in living rooms during the day.

The specifications we have given remain suitable once the corrections for the 15 year traffic increases are applied namely +1dB L_{Aeq} for road traffic and +1.3dB L_{Aeq} for rail traffic (see discussion in Section 2).

Increasing the amount of traffic is unlikely to alter the level of individual maximum noise events or to significantly increase the number of occurrences of the highest maximum noise levels (at levels greater than those given in our Table 1) as currently the majority are well below the level allowed for in our facade specification.

Screened Facades

There are a number of windows to bedrooms and living rooms that either face away from the railway and do not directly overlook Iverson Road (i.e. those on gridline D of the floor plans) and some that face away from the road and do not directly overlook the railway (those on gridline E). A lower facade specification is acceptable for these rooms.

As some of the rooms on these facades will still have a line of site to the road/railway, we have not applied a correction for screening from the intervening buildings, but only for the additional distance attenuation to the noise sources. The same corrections have been applied to the facades on both Gridline E and D. This is simplified but provides a robust assessment.

The rooms on gridline E are approximately 23m further from the nearest railway line than survey Position 1 and the rooms on gridline D approximately 17m further from the road than Position 2. Therefore a correction of -11dB has been applied to the maximum levels measured at Position 1 and 9dB to those at Position 2 to account for the additional distance.

5. Facade Specifications

Our proposed minimum facade specifications are given below:

External Walls

(All facades)

	Sound Reduction Index, R, dB							
	63Hz	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**Example**
External brick/cladding wall	33	40	40	47	52	59	54	Brick/block cavity wall

Windows – Main Facades

(Performance to be achieved by the combination of the glazing and frame)

	Sound Reduction Index, R, dB							
	63Hz	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**Example**
Bedrooms facing railway	23	28	30	39	44	49	54	10 / 12 / 8.4 laminated
Bedrooms facing Iverson Rd	23	27	29	36	41	42	44	10 / 12 / 6.4 laminated

	Sound Reduction Index, R, dB							
	63Hz	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**Example**
Living rooms facing railway	22	24	27	34	39	36	39	10 / 12 / 6
Living rooms facing Iverson Road	16	20	21	27	37	36	30	4 / 12 / 6

Trickle Ventilators – Main Facades

(Up to a maximum total effective open area per room of 4000mm^2)

	Element Normalised Level Difference, D_{ne}, dB							
	63Hz	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**Example**
All Bedrooms	36	34	37	44	49	51	51	Titon Silentbloc 5
All Living rooms	35	33	32	40	48	48	48	Titon Silentbloc 3

Windows – Screened Facades (on Gridline E & D)

(Performance to be achieved by the combination of the glazing and frame)

	Sound Reduction Index, R, dB							
	63Hz	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**Example**
Bedrooms	19	23	20	24	34	38	32	4 / 12 / 4

	Sound Reduction Index, R, dB							
	63Hz	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**Example**
Living rooms	19	24	23	29	40	34	36	10 / 12 / 6

Trickle Ventilators – Screened Facades (on Gridline E & D)

(Up to a maximum total effective open area per room of 4000mm^2)

	Element Normalised Level Difference, D_{ne}, dB							
	63Hz	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**Example**
Bedrooms	43	37	40	35	33	33	35	Standard vent
Living rooms	43	37	40	35	33	33	35	Standard vent

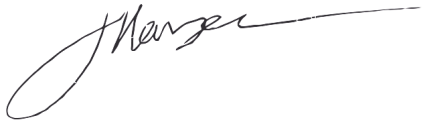
6. Conclusions

Our facade specification for bedrooms facing the railway is similar to that proposed by Sol and is driven by the need to protect against maximum noise levels with lots of energy at 250Hz, typical of noise from railways (see Table 2). Slightly lower specification glazing can be used in bedrooms facing Iverson Road but there are high levels of low frequency noise from the road which still demands a robust window specification.

On other facades, we have proposed lower specifications than that in the Sol report. Our specification is based on typical external maximum noise levels derived from the noise survey data and meets the internal noise level criteria of Condition 18 (for both average and maximum noise levels).

I trust the above is clear. Please contact me if you have any queries.

Yours sincerely



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Appendix A - Data from survey done by Sol Acoustics on 29-30 May 2013, Positions 1 and 2 (of Sol report P1498-REP01-SJF dated 27 June 2013)

Position 1 – facing railway

Time	LAeq	LAFmax	Time	LAeq	LAFmax	Time	LAeq	LAFmax	Time	LAeq	LAFmax
23:00	54.1	66.9	01:00	43.7	52.4	03:00	44.3	52	04:59	48.4	55.9
23:01	51.3	63.2	01:01	50.1	59.5	03:01	62.2	73.1	05:00	49.1	56.3
23:02	71.7	85.6	01:02	46.1	57.4	03:02	43.8	48.1	05:02	50	57.3
23:03	47.9	54.4	01:03	44.5	54.5	03:03	44.4	53.3	05:03	49.1	54.8
23:04	47.7	51.6	01:04	43.3	49.4	03:04	45.1	49.8	05:04	48.5	55
23:05	48.2	54.8	01:05	45.8	53.2	03:05	58.9	66.7	05:05	47.4	54.5
23:06	46.4	53.1	01:06	41.8	49.5	03:06	45.2	48.1	05:06	48	56
23:07	48.5	54.8	01:07	40.5	43.4	03:07	45.7	52.2	05:07	57.7	66
23:08	47.8	53.8	01:08	39.6	41.8	03:08	49.5	56.9	05:08	49.6	56
23:09	54.5	64.6	01:09	39.7	44.7	03:09	43.2	46.3	05:09	49.5	55.3
23:10	52.3	62.8	01:10	43	46.9	03:10	42.2	47.4	05:10	50.2	56
23:11	62.3	72.4	01:11	44.1	51.7	03:11	44	48.6	05:11	49.1	55.6
23:12	52.4	61.3	01:12	48	55.4	03:12	42.3	45.5	05:12	49.2	56.6
23:13	57.9	72.2	01:13	40.9	48.7	03:13	42.5	49.6	05:13	48.4	57.3
23:14	66.2	75.4	01:14	48.4	63.4	03:14	43.2	46.6	05:14	48.7	57.5
23:15	50.6	60.7	01:15	39.8	44.2	03:15	45	49.1	05:15	54.6	60.3
23:16	43.8	47.6	01:16	48.1	56.5	03:16	49.1	53.5	05:16	48.6	55.5
23:17	65.2	72.1	01:17	43.2	49.9	03:17	46.8	53.9	05:17	49.9	56
23:18	57.9	66.3	01:18	45.2	54	03:18	47	53.5	05:18	47.1	54.6
23:19	46.3	52.5	01:19	62.4	78.1	03:19	47.7	52.9	05:19	48	56
23:20	68.1	82.2	01:20	43.2	54.3	03:20	49.9	55	05:20	47.8	55.2
23:21	48.5	61.2	01:21	39.2	45.2	03:21	47.5	53.6	05:21	48.4	56.5
23:22	48.1	57	01:22	42.3	48.6	03:22	48.3	52.3	05:22	49.1	56
23:23	49.2	64.4	01:23	41.9	49	03:23	47.2	50.8	05:23	50.3	58
23:24	48.5	56.1	01:24	38.7	44	03:24	48.4	56.8	05:24	60.3	68
23:25	57.5	67.3	01:25	44.2	51.2	03:25	49.6	57.8	05:25	48.4	59.1
23:26	55.1	66	01:26	38	44	03:26	46.7	49.7	05:26	45.7	53.1
23:27	64.2	79.1	01:27	48.2	56.8	03:27	46.6	50.8	05:27	47.1	54.5
23:28	47.2	52.5	01:28	44.5	53.5	03:28	47.5	51.3	05:28	53.5	58.3
23:29	45.1	53.7	01:29	43.5	50.7	03:29	46.7	52	05:29	73.6	79.1
23:30	46.1	51.8	01:30	38.9	42.3	03:30	46.2	51.7	05:30	64.2	75.3
23:31	42.3	47.1	01:31	40.4	45.5	03:31	46.8	51.1	05:31	48.2	54
23:32	62.6	72.2	01:32	39.6	44.9	03:32	48.1	54.6	05:32	65.4	72.7
23:33	44.9	50.4	01:33	39.3	42.9	03:33	61.1	70.3	05:33	53.2	61.8
23:34	46.6	52.5	01:34	41	45.6	03:34	46.7	51.7	05:34	59.6	71.1
23:36	44.9	49.2	01:35	44.9	52.9	03:35	46.6	51	05:35	47	55.3
23:37	46.2	51.3	01:36	45.5	52.7	03:36	48.7	55.9	05:36	46.6	56.3
23:38	46.6	51.6	01:37	42.3	50.2	03:37	50	55.2	05:37	54.3	60.6
23:39	46.3	52.5	01:39	42.5	49.8	03:38	48.5	54.9	05:38	44.4	48.4
23:40	51.1	59.2	01:40	38.7	44.2	03:40	50.1	54.6	05:39	42.9	48.5
23:41	61.5	74.5	01:41	54.5	63.4	03:41	48.7	55.8	05:40	44.9	55.4
23:42	62.5	73	01:42	44.7	51.8	03:42	49.6	59.3	05:41	43.2	49.8
23:43	49.4	60.7	01:43	44.4	51.5	03:43	48.7	52.5	05:43	46.8	53.4
23:44	47.4	53.4	01:44	41.8	48.3	03:44	48.2	52.1	05:44	46.5	53.9
23:45	56.1	63.9	01:45	56.2	62.6	03:45	48.1	53.1	05:45	46.1	48.8
23:46	44.9	48.5	01:46	51.3	58.8	03:46	56.6	66	05:46	47.1	54.6
23:47	47.2	51.6	01:47	43.6	50.5	03:47	57.9	65	05:47	56.8	64.4
23:48	67.9	80.3	01:48	46	52.9	03:48	48.6	53	05:48	49.5	61.6
23:49	43.7	47.6	01:49	42.5	49.4	03:49	46.7	51.6	05:49	46.6	54.1
23:50	43.9	51.4	01:50	45.2	51.7	03:50	46	50.8	05:50	65.6	77.6
23:51	44	49.7	01:51	40.6	43.4	03:51	46.2	56.1	05:51	48.5	56.8
23:52	42.4	46.1	01:52	39.6	43.9	03:52	47.1	51	05:52	48	54.6

Time	LAeq	LAFmax	Time	LAeq	LAFmax	Time	LAeq	LAFmax	Time	LAeq	LAFmax
23:53	46	52	01:53	43.9	52.4	03:53	48.2	55.4	05:53	48.6	55.5
23:54	47.4	58	01:54	43.4	51.4	03:54	48.1	53.9	05:54	51.7	59.2
23:55	43	46.2	01:55	44.9	50.6	03:55	47	51.8	05:55	48.9	55.5
23:56	46.6	50.1	01:56	48.6	56.6	03:56	46.2	51.9	05:56	54.1	63.4
23:57	62.5	72.3	01:57	43.4	50.2	03:57	46	52.8	05:57	56.3	73.1
23:58	45.5	53.9	01:58	43.1	49.7	03:58	45.5	52.3	05:58	54.5	60.4
23:59	42.1	44.4	01:59	44.6	50.9	03:59	45.9	52.4	05:59	49.1	56.7
00:00	45.2	52	02:00	46.2	54.7	04:00	46.2	53.1	06:00	48.5	56.6
00:01	48.5	56.2	02:01	45	58.9	04:01	48.5	58.3	06:01	58.3	65
00:02	44.2	54.5	02:02	38.8	43.8	04:02	46.8	53.9	06:02	52.3	59.5
00:03	45.5	51.6	02:03	40.5	44.3	04:03	46.9	51.8	06:03	51.3	59.1
00:04	44.7	51.6	02:04	43.4	50	04:04	47.3	52.3	06:04	46.3	52.2
00:05	46.8	52.7	02:05	41	45	04:05	63	73.2	06:05	50	62.4
00:06	47.9	60.1	02:06	45.3	52.5	04:06	48.5	54.1	06:06	47.4	54.5
00:07	48.3	57.5	02:07	40.4	49.6	04:07	47.2	51.7	06:07	49.8	56.6
00:08	46.7	54.7	02:08	43.2	52.3	04:08	47.4	52.3	06:08	53	67.6
00:09	48.7	56.9	02:09	46.8	52.8	04:09	48	53.1	06:09	46.8	51.6
00:10	48.5	57.1	02:10	39.3	44.3	04:10	48.9	54.7	06:10	47.5	55.3
00:11	48.6	58.2	02:11	42	49.7	04:11	47.4	53.5	06:11	55.7	68
00:12	66.1	74.7	02:12	41.1	47.6	04:12	49.1	55	06:12	54.8	69.5
00:13	50.5	57.8	02:13	41.9	49.8	04:13	47.6	51.3	06:13	73.5	85.6
00:14	45.1	51.9	02:14	39.6	45.3	04:14	48.6	52.7	06:14	50.6	57.7
00:15	54.4	62	02:15	40.6	46.4	04:15	49.9	57	06:15	50.6	58.6
00:17	49	61.2	02:16	49.2	56.8	04:16	49.4	54.3	06:16	57.5	67.3
00:18	44.2	48.2	02:17	38.1	43.2	04:17	51.1	58.2	06:17	49.1	54
00:19	46.2	54.8	02:18	37.1	40	04:18	48.3	53.4	06:18	47.7	54.2
00:20	45.2	53.8	02:20	44.1	49.7	04:19	48.3	53.3	06:19	49.7	55.1
00:21	65.5	77.8	02:21	39.2	44.3	04:21	48.6	54.5	06:20	50.1	55.9
00:22	45.1	50.9	02:22	41.3	48.1	04:22	47.7	51.2	06:21	53.6	74
00:23	41	43.5	02:23	39.8	46.8	04:23	47.9	54.2	06:22	70.2	83.5
00:24	41.3	48.5	02:24	38.9	44	04:24	47.8	51.6	06:24	51.3	56.2
00:25	46.7	51.9	02:25	44	53	04:25	48.5	56.7	06:25	58.3	66.4
00:26	45.1	54.8	02:26	38.3	41.9	04:26	53.2	64.1	06:26	48.7	53.1
00:27	49.7	59	02:27	43.8	51.8	04:27	63.3	74.4	06:27	49.4	56.2
00:28	61.1	75.7	02:28	39.3	43.5	04:28	50.9	55.8	06:28	48	53
00:29	45.5	55	02:29	39.1	41.8	04:29	49.5	55.3	06:29	58.4	73.7
00:30	47.5	54.4	02:30	40.5	47.5	04:30	51.1	57	06:30	66.8	80
00:31	45.7	52.6	02:31	40.5	49.3	04:31	52	56.7	06:31	49.3	58.5
00:32	43.7	49.1	02:32	39.6	45.5	04:32	51.5	57	06:32	50.4	60.3
00:33	43.5	48.3	02:33	50.9	62.9	04:33	52.8	59.3	06:33	49.5	58.2
00:34	45.5	55	02:34	62.1	77	04:34	64.8	74.6	06:34	51.4	63
00:35	48.9	57.2	02:35	38.8	44.6	04:35	50.9	56.8	06:35	57.2	67.3
00:36	43.9	50.3	02:36	40.8	49.1	04:36	52	61.8	06:36	50.5	54.5
00:37	42.1	49.3	02:37	38.6	42.7	04:37	51.6	58.2	06:37	47.9	54.7
00:38	44.9	50.2	02:38	43.9	49.1	04:38	51.8	58.8	06:38	47.1	52.9
00:39	43.6	50.1	02:39	39.2	44.7	04:39	50.9	58.7	06:39	47.2	54.6
00:40	44.4	52	02:40	38.4	44.1	04:40	48.7	56.5	06:40	58.5	68.3
00:41	42.8	48.6	02:41	38.9	43	04:41	51.9	56.9	06:41	51.4	60.8
00:42	44.8	57.8	02:42	39.6	46.4	04:42	54.9	60.9	06:42	47.8	54.1
00:43	45.6	53.8	02:43	39.7	46.7	04:43	50.4	56.6	06:43	70.1	80
00:44	47.2	57.8	02:44	38.5	43.9	04:44	49.3	57.7	06:44	59.5	68.8
00:45	56.1	65.9	02:45	53.8	65.7	04:45	48.7	55.1	06:45	51.1	56.5
00:46	47.5	53.5	02:46	58.3	67.1	04:46	48.3	56.4	06:46	47.6	54
00:47	60.9	73.7	02:47	47.2	57.3	04:47	48.2	56.7	06:47	49.7	56.6
00:48	56.8	67.8	02:48	40.7	43.4	04:48	57	65.4	06:48	57.1	65.3
00:49	66.2	80.2	02:49	66.4	78.2	04:49	50	55.5	06:49	59.8	69.7
00:50	40.9	44.7	02:50	55.2	71.8	04:50	47.8	55.8	06:50	54.9	63.6

Time	LAeq	LAFmax	Time	LAeq	LAFmax	Time	LAeq	LAFmax	Time	LAeq	LAFmax
00:51	41.9	45.5	02:51	42.1	51.3	04:51	54	72.5	06:51	50.4	59.5
00:52	40.3	47.4	02:52	43.4	51.1	04:52	47.8	66.9	06:52	50.7	57.2
00:53	40.3	48.8	02:53	43.8	52.7	04:53	47.1	56.2	06:53	52.3	58.1
00:54	43.3	51.1	02:54	40.3	43.2	04:54	47.3	55.9	06:54	49.6	56.7
00:55	46.7	57.3	02:55	46.1	53.5	04:55	45.3	52.8	06:55	50.6	59.7
00:56	59	68.1	02:56	40	45.1	04:56	46.8	56	06:56	47.3	53.1
00:58	44.5	56.9	02:57	42.9	50.2	04:57	48.8	56.3	06:57	54.6	62.8
00:59	46.6	52.9	02:58	41.4	45.2	04:58	48.7	55.9	06:58	47.7	54.1
									06:59	48	58.7

Position 2 – facing Iverson Road

Time	LAeq	LAFmax	Time	LAeq	LAFmax	Time	LAeq	LAFmax
23:03	58.7	72.9	02:03	54.3	74.1	05:04	48.2	60.6
23:08	61.3	72.7	02:08	56	71.5	05:09	53.6	73.4
23:13	60.1	75.1	02:13	58	80.4	05:14	54	74
23:18	58.4	74	02:18	50.1	67.8	05:19	54.3	73.9
23:23	57.5	74	02:23	52.8	71	05:24	49.4	62.1
23:28	57.7	73.3	02:28	48.9	68.8	05:29	64.9	83.5
23:33	57.8	72.6	02:33	49.9	67	05:34	60.7	77
23:38	61.2	76.3	02:38	38.6	46.1	05:39	51.6	70.4
23:43	59.1	77.7	02:43	50.6	69	05:44	58.1	74.2
23:48	53.3	72.4	02:48	55	69.5	05:49	56.6	72.4
23:53	56.9	79.9	02:53	53.6	73	05:54	60.1	73.6
23:58	57	75.4	02:58	53.3	70.5	05:59	60.6	75.2
00:03	58.4	72.8	03:03	55.1	74.8	06:04	62.8	79.7
00:08	57.7	72.6	03:08	47.9	66.7	06:09	63.4	77.4
00:13	57.8	76.5	03:13	52.9	72.7	06:14	62.8	82.3
00:18	58.5	71.7	03:18	54	71.5	06:19	63.7	78.6
00:23	58.5	75.9	03:23	58.1	78.6	06:24	55.4	73.8
00:28	56.1	70.1	03:28	47.6	62.3	06:29	57.8	72.5
00:33	53.4	70.2	03:33	57.4	76	06:34	58.5	74
00:38	54.1	72.9	03:38	50.9	67	06:39	62.1	75.8
00:43	55.7	70.1	03:43	57.1	75.5	06:44	66.4	86.2
00:48	53.5	69.9	03:48	54.1	74.6	06:49	62.7	76.8
00:53	68.3	92.5	03:53	47	60.5	06:54	64.4	80.7
00:58	54.5	71.9	03:58	54.5	75.5			
01:03	54.8	72.9	04:03	54.1	69.9			
01:08	54.9	69.6	04:09	57.3	74.5			
01:13	57.9	76.7	04:14	58.8	75.6			
01:18	51.6	71.1	04:19	54	73.6			
01:23	57.1	76.1	04:24	60	77.5			
01:28	52.9	72.5	04:29	58.5	75.8			
01:33	56.7	75.3	04:34	61.1	79.3			
01:38	54.3	71.9	04:39	57.9	77.4			
01:43	55.5	73.6	04:44	47.1	63.1			
01:48	50.6	71.8	04:49	53.4	72.8			
01:53	56.7	75.5	04:54	52.1	70.5			
01:58	54.9	73.1	04:59	55.9	72.1			

Email: tom@waughthistleton.com

SRL Technical Services Limited

3 December 2013

C/30557/L02/JDH

Tom Westwood
Waugh Thistleton
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London
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Dear Tom

163 Iverson Road – Review of Facade Specification

Further to our review of the Sol acoustic report done for the Iverson Road project (our report C/30557/L01/JDH dated 25 November 2013) and our subsequent meeting with Environmental Health at Camden Council, I have addressed below the items raised in our meeting and I hope that the information is to the satisfaction of the Environmental Health department.

1. Glazing Specifications to Control External Noise Break-in

The EHO requested that we present the highest performing glazing that is practicable for use on the Iverson Road building. Five glazing types have been proposed and these represent the highest sound insulation performances that the manufactures are able to offer for this project:

- Idealcombi Futura+ [8.4mm laminated glass / 20mm cavity / 10mm glass]
- Idealcombi Futura+ [8.4 lam glass / 16mm cavity / 4mm glass + 10mm glass]
- Reynaers CS 68 ac_3813 Gasket [12.8 lam glass / 20mm cavity / 8.8mm lam glass]
- Olsen IV 92 ALU 2+1 SOiD [build-up unknown]
- Rationel Aldus [6mm glass / 18mm cavity / 8.4mm lam glass]

The table below shows the internal maximum noise level (L_{AFmax}) that would be achieved in a typical bedroom using each type of window for each of the maximum noise levels measured during the 8 hour night time surveys done by Sol (details in their report ref P1498-REP01-SJF dated 27 June 2013).

Note that some internal levels in the table below may in some cases be higher for a corresponding lower external level. This is due to the frequency content of the particular maximum noise level recorded.

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Registered Name and Address:
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Registered Number: 907694 England

Table 1 – Internal Maximum noise Levels on Railway Facade

Position 1 (Railway)		Internal L_{AFmax} with Glazing Unit, dB				
External L_{AFmax}, dB	No. Maxs recorded over 8 hour night‡	idealcombi futura+ 8.4-20-10	idealcombi futura+ 8.4-16-4+10	Reynaers CS 68 ac_3813 12.8-20-8.8	Olsen IV 92 ALU 2+1 SOiD	Rationel Aldus 6-18-8.4
86	2	48	43	45	49	50
84	1	44	41	43	44	47
82	1	47	43	45	48	49
80	4	46	41	43	49	49
79	2	45	40	42	47	47
78*	4	43	40	41	44	45

Table 2 - Internal Maximum noise Levels on Iverson Road Facade

Position 2 (Road)		Internal L_{AFmax} with Glazing Unit, dB				
External L_{AFmax}, dB	No. Maxs recorded over 8 hour night‡	idealcombi futura+ 8.4-20-10	idealcombi futura+ 8.4-16-4+10	Reynaers CS 68 ac_3813 12.8-20-8.8	Olsen IV 92 ALU 2+1 SOiD	Rationel Aldus 6-18-8.4
93†	1	50	47	49	50	55
86	1	48	45	46	49	51
84	1	48	45	46	51	50
82	1	50	48	48	51	52
81	1	43	40	41	46	46
80	3	43	41	42	46	46
79*	3	42	40	40	44	45

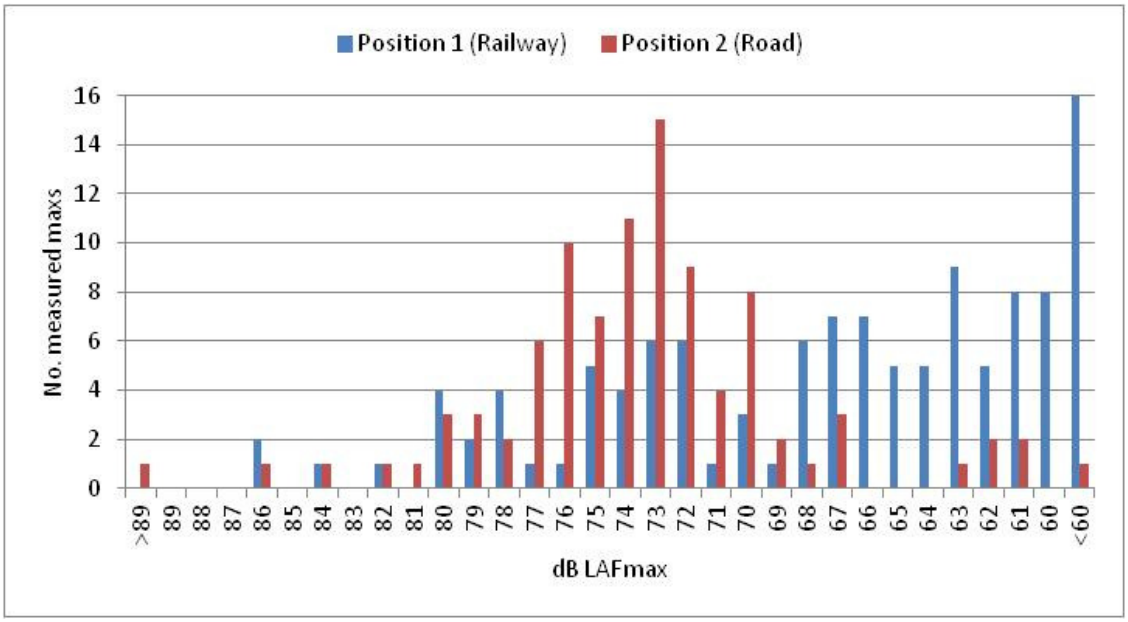
†The spectrum of this maximum shows more energy at higher frequencies and it is likely to be due to a siren on an emergency vehicle and as such is not considered typical.

*This is the level SRL have proposed to use as the typical maximum level, based on the WHO guidance that 10-15 occurrences of 45dB L_{AFmax} in bedrooms is acceptable.

‡Total number of L_{AFmax} levels recorded over 8 hour night: Position 1 – 469, Position 2 – 95.

The distribution of the maximum noise levels recorded is shown in the graph below for information.

Figure 1 – Maximum Levels from Sol Noise Survey (night time)



2. Railway-side Acoustic Fence

The Sol report specifies a “close-boarded, gap-free, 2.4m height... perimeter fence along the entire northern boundary and garden boundary...”

A concern was raised by the EHO that while the barrier would reduce railway noise levels in the garden areas, the barrier may increase the noise level at the facade of the building above the level of the top of the barrier.

This is not the case. A barrier will offer a reduction in noise level within its “Shadow Zone” and can also provide some reduction in level within its “Illuminated Zone” (see diagram in Appendix A). Outside of these zones, the barrier will have no effect on the sound propagating from the source.

Note that Chart 6(a)(ii) of Calculation of Railway Noise (HMSO) shows that for the illuminated zone, where the path difference is greater than 0.4m, the correction is zero. This is the case for the facade areas of the first floor and above of the Iverson Road building which the barrier will have no effect upon.

We have calculated the approximate reduction in railway noise that would be experienced in the gardens based on the barrier proposed by Sol, assuming the following:

- Source height: approx 3m
- Barrier height: 2.4m
- Receiver height: 1.5m
- Source-to-barrier distance: 24m (mid way between the 4 railway lines)
- Barrier-to-receiver distance: approx 5m

The gardens would be in the “shadow zone” and the barrier correction would be approximately 8dB. Based on a daytime noise level of 65.9dB $L_{Aeq,16hour}$, at Position 1 of the Sol report, the level in the gardens would be approximately 58dB $L_{Aeq,16hour}$.

3. Maximum Noise Level Measurement Periods

Details of the noise survey can be found in the Sol report and the maximum noise levels measured are also presented in our previous letter.

Sol measured in 1 minute periods at Position 1, overlooking the railway and in 5 minute periods at Position 2 overlooking Iverson Road. The data therefore presents the single highest noise level (L_{AFmax}) measured during the 1 or 5 minute period. It is noted that a better representation of the noise would have been a full time trace which would allow every occurrence over a given level to be seen in any time period.

However because a whole 8 hour night time period has been measured, we consider that there is a sufficient number of L_{AFmax} levels recorded to represent the type of events and the noise levels that typically occur.

It is clear that the highest maximum levels recorded, shown in Tables 1 and 2 above, are a small percentage of the total number of maximum levels and the distribution of maxima in Figure 1 shows that the vast majority are significantly lower.

The total number of *maxima* throughout the night may in reality be slightly higher than the data presents but the number of *events* that cause the maxima is likely to be well represented by the data and is therefore a reasonable indicator of the number of times that sleep disturbance may occur in an 8 hour period.

For example a train passing which produces a maximum level of 86dB L_{AFmax} may also produce slightly lower maxima during the duration of its passing by, but it is the *event* of the train passing and producing a high maximum that may cause sleep disturbance, not necessarily the number of maxima that occurred within the period of that event.

Of course, two or more distinct events may occur within the 1 minute or 5 minute measurement period and only the single highest level is recorded, but at night it is unlikely that multiple “events” would occur in the same measurement period regularly and therefore the data from the Sol report is considered a good representation of the number of potential sleep disturbance events over the night.

I trust the above is clear. Please contact me if you have any queries.

Yours sincerely

Jonathan Howson
For and on behalf of
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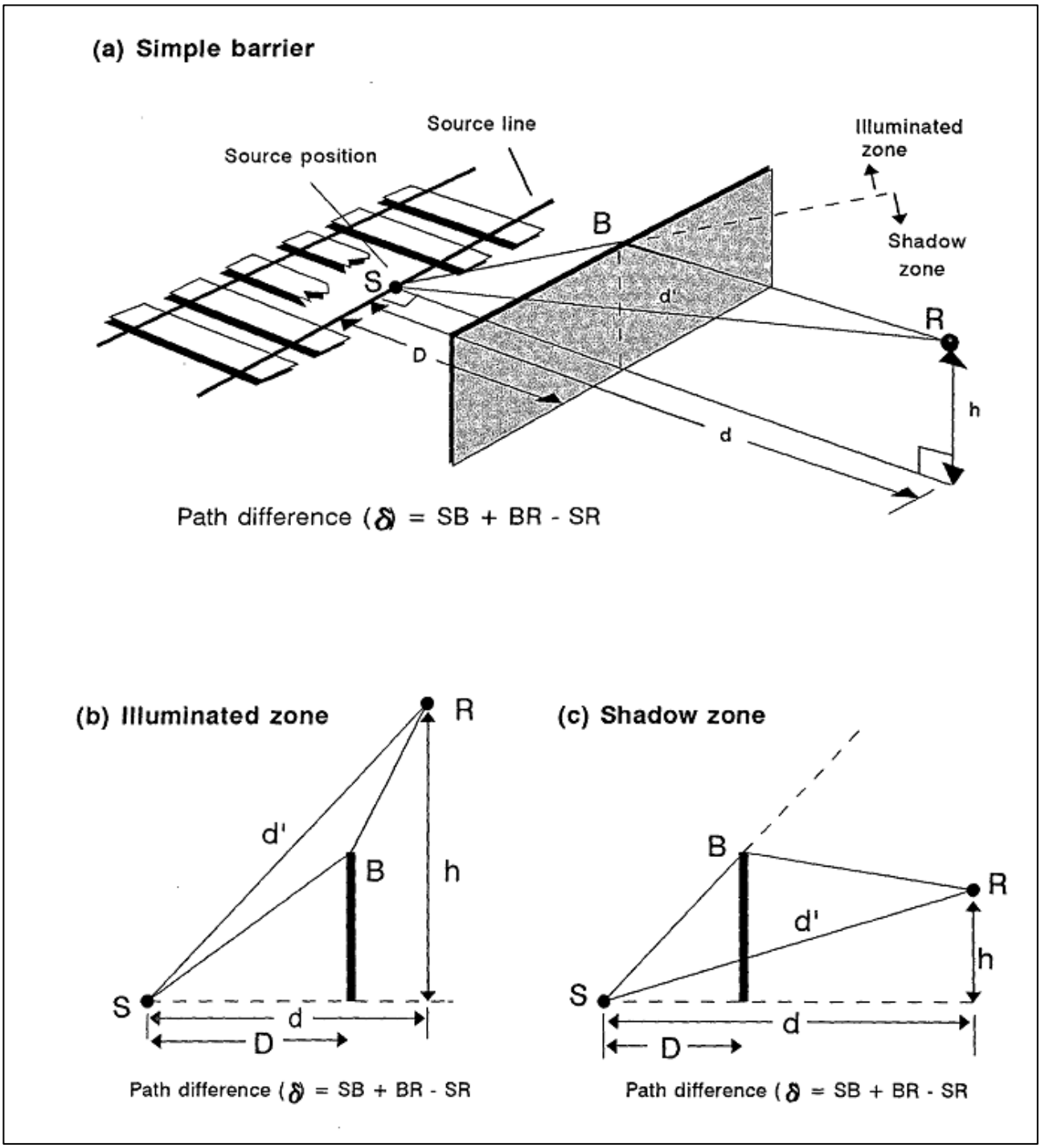
Appendix A – Diagram showing barrier corrections taken from Calculation of Rail Noise 1995



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Planning Report

Project 163 Iverson Road

No 1-475

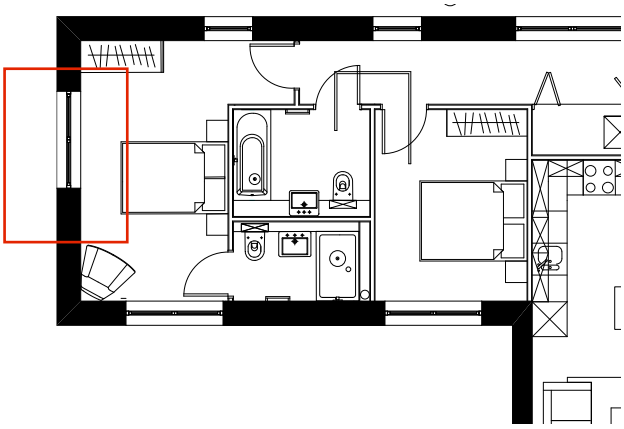
Date 17/12/2013

LPA Ref: 2013/6014/PRE & 2013/4129/P

Re. Tree house windows - to be read in conjunction with acoustic update C/30557/L02/JDH

The windows at the far end of the treehouse element of the scheme were originally designed as large openings however, as has been previously discussed with Camden officers, it is not possible to meet acoustic criteria with windows of this size. It is therefore proposed to reduce the maximum possible size that still meets the acoustic requirements

Previously submitted view of windows



Plan showing location of windows.

The windows, opening onto bedrooms, have been designed to follow the guidance in the latest Acoustic report from SRL C/30557/L02/JDH - 163 Iverson Road - Review of Facade Specification, which is issued with this report.

SRL have confirmed that the currently proposed sizes of these windows cannot be increased. This is conformed in an email which is attached to this report and quoted below:

> *" in order to achieve the internal LAFmax levels which have been presented to the EHO at Camden (namely those in Table 1 of our letter C/30557/L02/JDH), in bedrooms of the Treehouse apartments, the glazing areas cannot be increased over the currently proposed areas (3.75m^2 and 0.86m^2 overlooking the railway)"*

N.B. the windows indicated are the end window (at 3.75m^2) and the side window (at 0.86m^2)

Thus we can amend the shape and arrangement of the windows but not increase the overall open area.

Working within these constraints we have developed three options in addition to that earlier proposed, which redistribute the area of glazing to this façade. These can be found on the following pages.

Option 1

Windows separated into four portrait windows.

Option 2

Four portrait windows evenly spaced.

Option 3

Stretched longer windows.

Originally submitted

Single opening