1MC04 Main Works - Contract Lot S2

Noise Impact Assessment - Ruislip Golf Course London S2

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	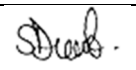					

SECURITY CLASSIFICATION: OFFICIAL

Handling instructions: None

Contents

1 Introduction

1.1 Background

1.1.1 This Noise Impact Assessment for the proposed relocation of Ruislip Rifle Range is prepared by Skanska Costain Strabag (SCS JV) on behalf of High Speed Two Ltd. (the applicant), to support the planning application for the reconfiguration of Ruislip Golf Course, which will include a new building constructed to accommodate Ruislip Rifle Club. The facility is a replacement for the previous Ruislip Rifle Range building which was recently closed and demolished to facilitate the construction of HS2. It was located just outside the planning application boundary for the reconfigured golf course works, whereas the proposed replacement building is located inside the application boundary.

1.1.2 Ruislip Golf Course is a municipal golf course, owned and operated by the London Borough of Hillingdon (LB Hillingdon). It falls partially within the alignment of the HS2 development. The High Speed Rail (London-West Midlands) Act 2017 (the HS2 Act), which gained Royal Assent in February 2017, conferred the necessary powers required to construct Phase One of the railway from London Euston to Birmingham Curzon Street. The southern part of Ruislip Golf Course falls within this boundary.

1.1.3 Construction of HS2 will result in land take from the Ruislip Golf Course, which was recently closed to facilitate the construction of HS2. The applicant has committed to designing and delivering a reconfigured golf course and replacement rifle club facility as part of a number of Undertakings and Assurances (U&A) that were agreed with LB Hillingdon (and which eventually formed part of the Hillingdon Agreement) during the passage of the Hybrid Bill through parliament.

1.1.4 The construction of the new rifle range will be undertaken by a contractor appointed by Ruislip Rifle Club. Controls on sound noise and vibration for the construction of the club will be identified by the contractor and are not considered within this document.

1.2 Scope and Purpose

1.2.1 This report presents a review of the rifle range proposals and an assessment of the likelihood of impact of sound from the activities at the club. Following the review, where assumptions about the acoustic performance of the building are considered to be material to the control of sound egress, these have been identified.

1.2.2 The assessment of vibration has been scoped out from this assessment as the firearms being used at the club are hand held and generate low levels of vibration. There are no in-ground or below ground activities which might generate groundborne sound or vibration and so assessment of these has also been scoped out.

2 Development

2.1.1 The proposed new rifle range will be located within the grounds of the existing golf course, to the immediate north west of the existing club house (containing the Fairway public house), on land which accommodated the now-closed outdoor driving range. The proposed rifle range is entirely contained within the building, with no external firing areas. The location is illustrated on Figure 1 below.

Figure 1: Location of proposed Ruislip Rifle Range (red)

2.1.2 The nearest existing buildings are:

- The club house (40m to outdoor seating area);
- Residences (Ickenham Road 115m, the Greenway, 95m);
- Blenheim Care Centre (Ickenham Road, 105m); and
- West Ruislip Station and associated commercial buildings (Ickenham Road, 105m).

2.1.3 The club house does not have windows overlooking the proposed rifle range, however there is an outdoor seating area, to which noise levels have been predicted.

2.1.4 The external walls of the building will be 300mm overall cavity wall construction. The outer layer will be minimum 100mm concrete blockwork, with a blockwork inner skin. In the range room itself, there will be two metal faced doors, which will act as an escape route.

2.1.5 These build-ups are not required for acoustic purposes, as the building fabric has to withstand bullet impact as a primary factor. However, the building fabric construction will have a high acoustic performance. For cavity blockwork walls of these dimensions, laboratory test information from similar constructions indicates that the approximate performance of this build up only is approximately Rw50.

2.1.6 The roof construction is substantially lighter, formed of a single ply roofing membrane 2mm thick, and insulation board mounted on 20mm external quality plywood deck. The performance of this based on the 20mm plywood and insulation board only has been conservatively calculated as Rw29.

2.1.7 There is a lay-in ceiling proposed in the areas where staff and public will regularly stand, but this is not proposed in the area containing the firing lanes of the range, and so has not been included in overall performance of the building structure.

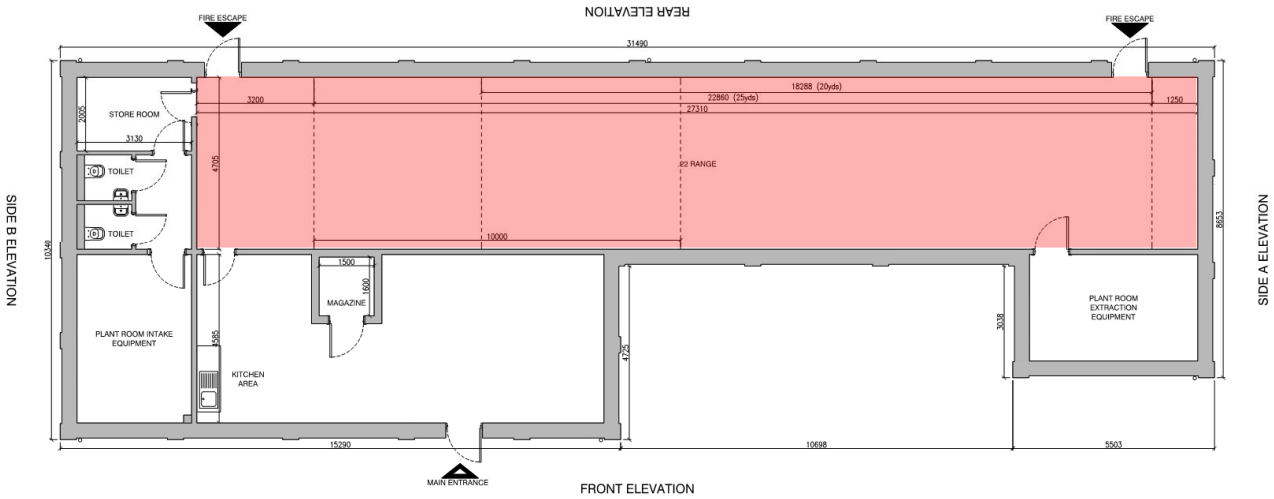

Figure 1: Plan of new rifle range (area in red indicated firing lanes)

2.1.8 As can be seen in Figure 1, the rear elevation (north) and side elevation (east) bound the firing lanes, however the front and west side elevation are largely to internal spaces.

2.1.9 The proposed opening hours of the club are similar to the opening hours of the existing facility, namely Monday to Friday 1900 to 2200 and Saturday 0930 to 1530. The facilities can accommodate a maximum of four people firing simultaneously. The club allows members to fire air rifles, air pistols, smallbore and sporting rifles of .22 calibre.

2.1.10 Additionally, there will be mechanical plant providing extract airflow to the building. This will take the form of small extract fans to the toilet areas, and a small extract unit which will be responsible for cleaning the air in the firing lanes. These will only be operational during the opening hours of the club.

3 Policy, Standards and Guidance

3.1 International policy

3.1.1 The Guideline Development Group (GDG) of the World Health Organisation recommend in the Noise Guidelines for the European Region 2018 that:

3.1.2 *For single-event and impulse noise exposures, the GDG conditionally recommends following existing guidelines and legal regulations to limit the risk of increases in hearing impairment from leisure noise in both children and adults.*

3.1.3 *Following a precautionary approach, to reduce possible health effects, the GDG strongly recommends that policy-makers take action to prevent exposure above the guideline values for average noise and single-event and impulse noise exposures.*

3.1.4 For single events, such as the noise source associated with the Rifle Range, there are no levels identified from the studies analysed by the GDG at which health effects may occur.

3.2 National Policy

3.2.1 The Government's noise policy is set out in the Noise Policy Statement for England (NPSE). In legislative and policy terms noise is taken to include vibration.

3.2.2 Government noise policy sets three aims, which are to be met within the context of the government policy on sustainable development:

- To avoid significant adverse impacts on health and quality of life;
- To mitigate and minimise adverse impacts on health and quality of life; and
- Where possible, contribute to the improvement of health and quality of life.

3.2.3 The same three aims are also reflected in:

- National Planning Policy Framework (NPPF); and
- Planning Practice Guidance – Noise (PPG-Noise);

3.2.4 PPG-Noise provides guidance on the application of Government noise policy. PPG-Noise notes that unacceptable adverse effects on health and quality of life due to noise exposure (set at a level higher than significant adverse impacts on health and quality of life) should be 'prevented'.

3.2.5 Thresholds for identifying policy adverse effect levels are not clearly defined numerically in any Government document; rather they are to be established specifically for each scheme and context.

3.3 Local Policy

London Environment Strategy

3.3.1 The London Environment Strategy (Published 31 May 2018) gives a high-level indication of the strategic aims of the Mayor of London for a number of environmental factors including noise.

3.3.2 Policy 9.3.3 of the Environment Strategy places the burden of responsibility of reducing noise impacts from future developments such as the proposed rifle range on the developer of new schemes by introducing the concept of good acoustic design and the agent of change principle. This indicates that it is incumbent on the developer of the rifle range to adequately design the building to ensure that sound emanating from the activities within does not disturb local residences.

Hillingdon Local Plan, Parts 1 and 2

3.3.3 The Hillingdon Local Plan does not identify specific requirements for noise related to recreational activities such as the rifle range however a number of the policies refer to the development generating "No adverse impact on nearby land uses or proposed occupants by virtue of noise…", and so this requirement has been taken into account in the design and assessment of this scheme.

4 Methodology and Baseline

4.1 Methodology

4.1.1 National policy places the burden on controlling sound from new developments on the identification of potential new health impacts from noise. Where these are identified there is requirement for new developments to reduce health impacts and where possible improve the existing health and quality of life.

4.1.2 There are no currently identified limits or recommendations on the impulsive or maximum sound levels identified in national or local guidance, however it is noted that the HS2 assessment of sound from operational rail refers to maximum sound levels (L_{pAFmax}) as likely to result in long term direct sound impacts. This refers to impacts during night-time, where maximum sound levels may result in sleep disturbance. As the rifle range will not be open after 2200, sleep disturbance is not considered directly relevant to this assessment.

4.1.3 As a screening criteria for this project, it is therefore proposed to compare the sound of the operation of the proposed rifle range (as a maximum noise level) to the existing measured ambient sound levels, to establish whether there is a likelihood of impact to the nearest residences.

4.1.4 The sound of weaponry being fired is likely to be the main source of disturbance for nearby premises. This report evaluates the noise from weaponry fired (as a maximum noise level), and then considers the noise breakout from the firing lane area itself.

4.1.5 As measurement information is only available for the ambient sound levels during the daytime and night-time period, comparison has been made to both periods as the existing early evening sound climate may be better represented by the night-time. Where sound levels are within 10dB of either the existing daytime or the night-time sound levels, additional consideration has been given to evaluating the potential for impact from this source.

4.1.6 The location of mechanical plant associated with the development is such that any intake or exhaust from the equipment is screened by intervening buildings. Additionally, the nearest receptors are at least 100m from the plant item. As such, a limit on plant sound power of 75dBA from any individual plant item will ensure that the specific noise level[1] at the façade of the nearest residential receptor will not exceed 35dBL_{Aeq}.

[1] As defined in BS4142:

4.2 Measured Baseline

4.2.1 As part of the HS2 Environmental Statement that supported the Hybrid Bill application, a number of measurements of the sound climate in the vicinity of the proposed rifle range were made, the locations of these are illustrated on Figure 2.

Figure 2: Measurement locations from HS2

4.2.2 Details of the measured sound levels are contained in Table 1.

Location		Measured sound level	
		Ambient sound level $L_{pAeq,07:00-23:00}$	Ambient sound level $L_{pAeq,23:00-07:00}$
LM077	The Greenway	59	53
LM5005	The Greenway	58	50
LM5104	Ickenham Road	73	67
LM0048	Clacks Lane	53	50

Table 1: Sound levels measured during the production of the Environmental Statement to support the Hybrid Bill

5 Assessment

5.1.1 Calculation of the sound from the sound of rifle fire at 1m from the outside of the nearest properties has been made (Please refer to Appendix B for details of calculations). Measurements of the sound from air pistols and rifles were not available, however the source sound levels are based on measurements made at an MOD rifle range of the Cadet GP rifle (L98A2). This is subjectively much louder than the air pistols or .22 calibre sporting rifles used at the current facility, however this allows for a reasonable worst-case assessment to be carried out to inform the design. The predictions assume a reasonable worst case of four people firing simultaneously.

Receptor	Location	Predicted sound level from weapon fire L_{pAFmax}	Measured ambient sound level		Smallest difference
			$L_{pAeq,07:00-23:00}$	$L_{pAeq,23:00-07:00}$	
Residences	Ickenham Road	38	53	50	-12
Residences	The Greenway	40	58	50	-10
Restaurant	Fairway Pub (external seating)	37[2]	53	50	-13
Blenheim Care Centre	Ickenham Road	<20	73	67	-47
Station/commercial	Ickenham Road	<20	73	67	-47

Table 2: Predicted L_{pAFmax} level at nearest receptors from the operation of the Rifle Club

5.1.2 The predicted levels of sound from the operation of the club is well below the measured ambient sound level at all receptors, and on or below the screening criteria of 10dB below the measured ambient sound level during either the daytime or night-time period.

5.1.3 Further analysis of the sound levels or consideration of changes to the design of the building are not considered necessary.

5.1.4 For ventilation plant, a limiting sound power at the extract or intake opening of 75dB(A) is proposed. This is considered achievable based on the relatively small requirements for ventilation and will limit the level of noise to residences to 35dB at 1m from the façade of the residence.

[2] Free field level reported

6 Summary and Conclusions

6.1.1 The design and use of the proposed rifle range has been reviewed, and the potential for disturbance from the development has been assessed. Comparison of the sound from the firing of weapons within the facility and the existing measured ambient sound level at properties has been made.

6.1.2 The results of the comparison indicate that the maximum predicted sound levels are well below the existing ambient sound levels, by 10dB or greater, based on the current building fabric and layout. As a result, no design changes have been considered to mitigate this sound level further. Limits have been derived for the mechanical plant from the scheme

7 References

Title	Reference
Noise Guidelines for the European Region 2018	ISBN 978 92 890 5356 3 (online publication only)
Noise Policy Statement for England	DEFRA March 2010
London Environment Strategy	Greater London Authority May 2018
Hillingdon Local Plan Parts 1 and 2	HIllingdon.gov.uk, October 2015
London Borough of Hillingdon Noise Supplementary Planning Document	Hillingdon Local Development Framework Planning and Transportation Group, April 2006

8 Appendices

Appendix A – Acoustic terminology

Appendix B – Calculations

Appendix A: Acoustic terminology

8.1 L_{pAeq} - Equivalent continuous sound level

8.1.1 An index for assessment for overall sound exposure is the equivalent continuous sound level, Leq. This is a notional steady level which would, over a given period of time, deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating levels can be described in terms of a single figure level.

8.2 L_{pAFmax} - Maximum sound level

8.2.1 The maximum sound level identified during a measurement period. Experimental data has shown that the human ear does not generally register the full loudness of transient sound events of less than 125ms duration and fast time weighting (F) has an exponential time constant of 125ms which reflects the ear's response.

Appendix B: Noise predictions

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Job No.	Job Title			
	Ruislip Rifle Range			
Date Created	By	Date Revised	Rev	Sheet
13 Dec 2018	SD	22 Feb 2019	23	2
Date Reviewed	By	Review Type	Review Status	
22 Feb 2019	SD	Self Check	No Comments	

Ruislip Rifle Range - Noise within the range

Item / Description	Rating/Broadband/Input Rating	dB	dB(A)	31.5	63	Octave Band Centre Frequency, Hz 125	250	500	1k	2k	4k	8k
Noise within rifle range												
one shot - LW (Based on measurements of L98 rifle)			106.0 (A)		99.0	99.0	99.0	99.0	99.0	99.0	99.0	99.0
Assume 4 people firing simultaneously	4.0				6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
total max internal Lw					105.0	105.0	105.0	105.0	105.0	105.0	105.0	105.0
Quick RT (from RT Library) - Room Type: Plantrooms, Finish Type: Hard	1.00 s				1.3	1.2	1.1	1.0	1.0	0.9	0.7	0.5
Reverberant Sound Level (from RT) - RT: Row 18, Lw : Row 16	346 m³	1 x	99.8 (A)		94.8	94.4	94.0	93.6	93.6	93.2	92.1	90.6
	L	W	H									
Rifle Range firing lane area dimensions	27.3 m	4.7 m	2.7 m									
North wall construction (rear elevation)												
Cavity blockwork 100mm block/100mm cavity/100mm block	Rw 50	71.7 m²				-37.9	-39.7	-45.7	-51.4	-55.9	-59.5	
Metal faced door (based on data for 3/4" Hollow metal door)	Rw 28	2.0 m²				-21.9	-25.6	-27.9	-31.3	-26.6	-37.2	
Composite Transmission Loss	Rw 44	73.7 m²				-34.8	-37.5	-41.5	-45.7	-42.1	-52.0	
East wall construction (side elevation)												
Cavity blockwork 100mm block/100mm cavity/100mm block (based on 100mm	Rw 50					-37.9	-39.7	-45.7	-51.4	-55.9	-59.5	
Roof construction												
20mm plywood, insulation, 2mm roofing membrane (based on 19mm ply plus	Rw 29					-17.2	-24.5	-28.2	-30.6	-27.9	-32.0	

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Job No.	Job Title			
	Ruislip Rifle Range			
Date Created	By	Date Revised	Rev	Sheet
13 Dec 2018	SD	22 Feb 2019	23	3
Date Reviewed	By	Review Type	Review Status	
22 Feb 2019	SD	Self Check	No Comments	

Ruislip Rifle Range - Noise level at receptors

Item / Description		Rating/Broadband/Input Rating	dB	dB(A)	31.5	Octave Band Centre Frequency, Hz 63	125	250	500	1k	2k	4k	8k
Reverberant level in firing range (assuming 4 people firing simultaneously)						94.8	94.4	94.0	93.6	93.6	93.2	92.1	90.6
		L	W	H									
Areas		27.3	4.7	2.7									
Transmission losses													
North wall construction (rear elevation)		Rw 44	73.7 m²				-34.8	-37.5	-41.5	-45.7	-42.1	-52.0	
East wall construction (side elevation)		Rw 50	12.7 m²				-37.9	-39.7	-45.7	-51.4	-55.9	-59.5	
Roof construction		Rw 29	128.3 m²				-17.2	-24.5	-28.2	-30.6	-27.9	-32.0	
	Relevant facades												
Fairway Pub external seating area	east, south, roof												
Reverberant Room to Environment	east	35 m	13 m²	16.3 (A)			22.7	20.5	14.1	8.4	3.4	-1.3	
Reverberant Room to Environment	roof	40 m	128 m²	45.8 (A)			52.3	44.6	40.5	38.1	40.3	35.1	
Directivity (Laymon Miller)		90°					-4.0	-6.0	-8.0	-10.0	-12.0	-14.0	
Total contribution at Fairway pub				**37.2 (A)**			48.3	38.6	32.5	28.1	28.3	21.1	
Blenheim Care Centre	east, south, roof												
Reverberant Room to Environment	east	105 m	13 m²	6.8 (A)			13.1	10.9	4.5	-1.2	-6.1	-10.8	
Barrier Attenuation - Theory: Maekawa, Source Height: 0 m, Receiver Height		9.0 m	10.0 m	90.0 m			-16.9	-19.9	-22.9	-25.0	-25.0	-25.0	
Contribution from eastern façade							-3.8	-9.0	-18.4	-26.2	-31.1	-35.8	
Reverberant Room to Environment	roof	110 m	128 m²	37.0 (A)			43.5	35.8	31.7	29.3	31.5	26.3	
Barrier Attenuation - Theory: Maekawa, Source Height: 0 m, Receiver Height		9.0 m	10.0 m	90.0 m			-16.9	-19.9	-22.9	-25.0	-25.0	-25.0	
Contribution from roof							26.6	15.9	8.8	4.3	6.5	1.3	
Total contribution at Blenheim Care Centre (including 3dB façade correction)				**17.8 (A)**			29.6	18.9	11.8	7.3	9.5	4.3	
West Ruislip Station	east, south, roof												
Reverberant Room to Environment	east	100 m	13 m²	7.2 (A)			13.6	11.4	5.0	-0.7	-5.7	-10.4	
Barrier Attenuation - Theory: Maekawa, Source Height: 0 m, Receiver Height		9.0 m	10.0 m	90.0 m			-17.3	-20.3	-23.3	-25.0	-25.0	-25.0	
Contribution from eastern façade				-14.1 (A)			-3.7	-8.9	-18.3	-25.7	-30.7	-35.4	
Reverberant Room to Environment	roof	105 m	128 m²	37.4 (A)			43.9	36.2	32.1	29.7	31.9	26.7	
Barrier Attenuation - Theory: Maekawa, Source Height: 0 m, Receiver Height		9.0 m	10.0 m	90.0 m			-17.3	-20.3	-23.3	-25.0	-25.0	-25.0	
Contribution from roof				15.0 (A)			26.6	15.9	8.8	4.7	6.9	1.7	
Total contribution at West Ruislip Station (including 3dB façade correction)				**18.0 (A)**			29.6	18.9	11.8	7.7	9.9	4.7	

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Job No.	Job Title			
	Ruislip Rifle Range			
Date Created	By	Date Revised	Rev	Sheet
13 Dec 2018	SD	22 Feb 2019	11	4
Date Reviewed	By	Review Type	Review Status	
22 Feb 2019	SD	Self Check	No Comments	

Ruislip Rifle Range - Noise level at Fairway Pub

Item / Description		Rating/Broadband/Input Rating	dB	dB(A)	31.5	Octave Band Centre Frequency, Hz 63	125	250	500	1k	2k	4k	8k
Reverberant level in firing range (assuming 4 people firing simultaneously)						94.8	94.4	94.0	93.6	93.6	93.2	92.1	90.6
		L	W	H									
Areas		27.3	4.7	2.7									
Transmission losses													
North wall construction (rear elevation)		Rw 44	73.7 m²				-34.8	-37.5	-41.5	-45.7	-42.1	-52.0	
East wall construction (side elevation)		Rw 50	0.0 m²				-37.9	-39.7	-45.7	-51.4	-55.9	-59.5	
Roof construction		Rw 29	128.3 m²				-17.2	-24.5	-28.2	-30.6	-27.9	-32.0	
	Relevant facades												
The Greenway	south, west, roof												
Reverberant Room to Environment	roof	110 m	128 m²	37.0 (A)	-33.7		43.5	35.8	31.7	29.3	31.5	26.3	
Total contribution at the Greenway (including 3dB façade correction)				**40.0 (A)**			46.5	38.8	34.7	32.3	34.5	29.3	

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Job No.	Job Title			
	Ruislip Rifle Range			
Date Created	By	Date Revised	Rev	Sheet
13 Dec 2018	SD	22 Feb 2019	6	5
Date Reviewed	By	Review Type	Review Status	
22 Feb 2019	SD	Self Check	No Comments	

Ruislip Rifle Range - Noise level at Ickenham Road

Item / Description		Rating/Broadband/Input Rating	dB	dB(A)	31.5	63	Octave Band Centre Frequency, Hz 125	250	500	1k	2k	4k	8k
Reverberant level in firing range (assuming 4 people firing simultaneously)						94.8	94.4	94.0	93.6	93.6	93.2	92.1	90.6
Areas		L	W	H									
		27.3	4.7	2.7									
transmission losses													
North wall construction (rear elevation)		Rw 44	73.7 m²				-34.8	-37.5	-41.5	-45.7	-42.1	-52.0	
East wall construction (side elevation)		Rw 50	12.7 m²				-37.9	-39.7	-45.7	-51.4	-55.9	-59.5	
Roof construction		Rw 29	128.3 m²				-17.2	-24.5	-28.2	-30.6	-27.9	-32.0	
Ickenham Road	east, north, roof												
Reverberant Room to Environment	east	120 m	13 m²	5.6 (A)			12.0	9.8	3.4	-2.3	-7.3	-12.0	
Reverberant Room to Environment	north	135 m	74 m²	18.2 (A)			21.7	18.6	14.2	10.0	13.1	2.1	
Reverberant Room to Environment	roof	135 m	128 m²	35.2 (A)			41.7	34.0	29.9	27.5	29.7	24.6	
Total contribution at Ickenham Road (including 3dB façade correction)				**38.3 (A)**			44.7	37.2	33.0	30.6	32.8	27.6	

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