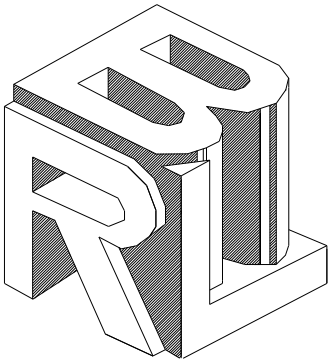

BELAIR RESEARCH LIMITED

Acoustic Assessment

IWMF Rivenhall Airfield,

Braintree, Essex

Broadway, Bourn, Cambridge CB23 2TA 01954 718344 www.acoustical.co.uk
Directors: R Collman S A Collman R A Collman Registered Office: Broadway, Bourn, Cambridge CB23 2TA
Incorporated in England: 01602951

Report Prepared by:

Lee Dursley BSc (Hons), MIOA, MInstP
Senior Acoustician

Report Reviewed by:

Richard A Collman BSc (Jt. Hons), CEng, MIOA, Tech IOSH
Director

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Contents

1.0 Introduction

1.1 Belair Research Limited is an independent acoustic consultancy company. All of our acoustic consultants are qualified and experienced practitioners and are either Associate or Corporate members of the Institute of Acoustics. Acoustical Control Engineers Limited is our associated company specialising in engineered solutions to acoustic problems.

1.2 Belair Research Limited (BRL) has been appointed by Gent Fairhead & Co Limited to undertake an acoustic assessment of the revised proposals at the Integrated Waste Management Facility (IWMF) on Rivenhall Airfield, Braintree, Essex.

1.3 The author also undertook and supported the 2008 assessment of the original scheme and has been involved with acoustic monitoring at the adjacent Bradwell Quarry since 2004 therefore has a good understanding of factors affecting the acoustic environment surrounding the site.

1.4 It is understood that Section 73 applications to vary elements of the development will be submitted to the Local Planning Authority and that this report will accompany the applications. BRL has reviewed the modified scheme. The aim of this report is to demonstrate that the proposals will not affect the ability of the proposed IWMF scheme to comply with the extant planning conditions.

1.5 The IWMF has evolved since 2008 and more detailed information has become available upon which this assessment is based.

2.0 Changes to the Regulatory Framework – Since 2008

2.1 The original assessment noted that BS4142:1997 may not be the most appropriate assessment methodology and that other guidance for example from the World Health Organisation (WHO) and BS8233:1999 Sound Insulation and Noise Reduction for Buildings offered more appropriate means of assessing internal sound levels as a result of external sound at night. The majority of the updates are associated with noise incidence during the night.

2.2 Both BS4142:1997 and BS8233:1999 were revised in 2014. One of the significant differences between BS4142:2014 and previous editions of the Standard is the explicit requirement to consider context as part of the assessment. It is no longer adequate to simply compare the Rating Level and the Background Sound Level without due regard to the context of the acoustic environment and the sound source. This is consistent with the original assessment's approach to also consider other more appropriate guidance.

2.3 BS8233:2014 offers updated guidance on suitable indoor sound levels as a result of external noise. For dwellings the main considerations are to protect sleep in bedrooms and to protect resting, listening and communicating in other rooms. For noise without a specific character it is desirable that the overall average levels during the 8 hour night or 16 hour day time periods do not exceed 30dBA or 35dBA respectively.

2.4 For amenity space, such as gardens and patios, it is desirable that the average level does not exceed 50dBA, with an upper guideline value of 55dBA which would be acceptable in noisier environments. For dwellings with conventional windows, an internal target of 35dBA during the day equates to around 50dBA (possibly slightly lower) outside noise sensitive rooms with openable windows.

2.5 The National Planning Policy Framework (NPPF), Noise Policy Statement for England (NPSE) and National Planning Practice Guidance (NPPG) were issued in 2012, 2010 and 2012 respectively.

2.6 These documents note that there is a presumption in favour of sustainable development, which should be seen as a golden thread running through both plan-making and decision-taking. Assessments should be proportionate to the proposed development. Local planning authorities should consider whether otherwise unacceptable development could be made acceptable through the use of conditions or planning obligations.

2.7 Below the No Observed Effect Level (NOEL) sound is unnoticeable and of no significance. Below the Lowest Observed Adverse Effect Level (LOAEL) sound can be heard but does not cause any changes in behaviour or attitude, although the acoustic character of the area may be slightly changed. Below the Significant Observed Adverse Effect Level (SOAEL) sound may cause slight changes in behaviour or attitude e.g. turning up volume of a television or closing windows. There is potential for some sleep disturbance and a perceived change in the acoustic character of the area and quality of life.

2.8 Areas of Tranquility should be protected, but in general cases it may be inappropriate to achieve a level below the LOAEL as this provides no benefit but may require additional resources such as energy, materials, space, time and money, adversely affecting the sustainability of doing so. Noise above the LOAEL should be mitigated and reduced to a minimum, although it may be appropriate to exceed the LOAEL and create an adverse acoustic impact, if this provides other sustainability benefits that are of greater significance. Noise above the SOAEL should be avoided.

2.9 The World Health Organisation: Night Noise Guidelines for Europe provides an update to the WHO - Guidelines for Community Noise document. These documents note that a steady level of 30dBA within bedrooms is suitable to protect vulnerable people from sleep disturbance and that occasional maximum levels of up to around 42dBA to 45dBA are also consistent with this. The difference between a sound level outdoors and the resultant level indoors with open windows varies through Europe due to differing building characteristics and particularly window type. An average difference of around 15dBA is often used, although this is also dependent upon other factors such as the frequency spectrum of the incident sound.

2.10 It is clear that the 2008 approach to the noise assessment for the IWMF was consistent with the revised/ updated informative guidance.

2.11 Planning conditions were set based on the report recommendations for operations being undertaken during the night. During the day the existing Bradwell Quarry noise conditions were adopted for the IWMF and an intermediate limit was applied during the evening.

3.0 Planning Conditions

3.1 The planning conditions relating to noise are numbered 38-42. Numbers 38 to 40 relate to the maximum permitted noise emissions from the IWMF and numbers 41 and 42 relate to the monitoring for compliance. Numbers 38 to 40 are duplicated below.

38. *Except for temporary operations, as defined in Condition 42, between the hours of 07:00 and 19:00 the free field Equivalent Continuous Noise Level (LAeq 1 hour) at noise sensitive properties adjoining the Site, due to operations in the Site, shall not exceed the LAeq 1 hour levels set out in the following table:*

Noise Sensitive Properties	***Location Criterion dBL$_{Aeq,1\ hour}$***
Herring's (Herons) Farm	*45*
Deeks Cottage	*45*
Haywards	*45*
Allshot's Farm	*47*
The Lodge	*49*
Sheepcotes Farm	*45*
Greenpastures Bungalow	*45*
Goslings Cottage	*47*
Goslings Farm	*47*
Goslings Barn	*47*
Bumby Hall	*45*
Parkgate Farm Cottages	*45*

Measurements shall be made no closer than 3.5m to the façade of properties or any other reflective surface facing the site and shall have regard to the effects of extraneous noise and shall be corrected for any such effects.

Reason: In the interests of residential and local amenity and to comply with MLP policy MLP13, WLP policy W10E and BDLPR policy RLP62.

39. *The free field Equivalent Continuous Noise Level (LAeq 1 hour) shall not exceed 42 dB(A) LAeq 1hour between the hours of 19:00 and 23:00, as measured or predicted at noise sensitive properties, listed in Condition 38, adjoining the site. Measurements shall be made no closer than 3.5m to the façade of properties or any other reflective surface facing the site and shall have regard to the effects of extraneous noise and shall be corrected for any such effects.*

Reason: In the interests of residential and local amenity and to comply with MLP policy MLP13, WLP policy W10E and BDLPR policy RLP62.

40. *The free field Equivalent Continuous Noise Level (LAeq 1 hour) shall not exceed 40 dB(A) LAeq 5min between the hours of 23:00 and 07:00, as measured and/or predicted at 1 metre from the façade facing the site at noise sensitive properties, listed in Condition 38, adjoining the site.*

Reason: In the interests of residential and local amenity and to comply with MLP policy MLP13, WLP policy W10E and BDLPR policy RLP62.

4.0 Potential Effects of the Modified Proposals

4.1 Full details of the modified IWMF proposals (and reasons for the revisions and modifications) are presented elsewhere in the submissions and should be read alongside this summary.

4.2 The two elements that have the potential to affect the way sound propagates from the IWMF are: the change to the building footprint; and, the modification to some of the retaining structures surrounding the site.

4.3 It is understood that the footprint of the building will be slightly reduced to accommodate the evolving scheme. This will lead to a slightly smaller building envelope and therefore radiating surface. In theory, if everything else remained unchanged, the sound level from the building may reduce slightly although this reduction would, in practice, be negligible.

4.4 The original scheme included steep, near vertical concrete retaining walls which would provide good screening attenuation between the IWMF operations and the sensitive receptors.

4.5 With the advance in waste treatment technologies and civil engineering construction techniques, the overall processing footprint has reduced which has allowed specialist ground engineering companies to consider a change in the proposed earth retention technique from vertical retaining walls to sloped soil nailed walls and natural side slopes.

4.6 The batter slopes might prove less acoustically effective than the steep concrete wall of the original scheme as sound tends to roll up and over the slope. Although this is not expected to lead to noise levels exceeding those in the planning conditions, a number of options could be employed in the event of a non-compliance, such as: additional attenuation of specific pieces of plant or equipment, or the provision of appropriately positioned acoustic barriers.

4.7 The IWMF involves several different operators, each specialising in a different technology. Considering the overall integration associated with the IWMF's waste recovery, recycling and treatment operations, the noise attenuation measures applied at the site will be implemented through a strategic review of the cumulative operations. This will optimise the various interfaces between each operator to ensure that the cumulative effect of their operations will comply with the planning condition limits. In practice this means that they will work together with a specialist acoustic advisor to devise the most efficient, sustainable and cost effective approach to controlling noise emissions from the site as a whole.

4.8 Plant and any other sources of noise will be selected, located, orientated and where necessary attenuated as appropriate to achieve suitable sound levels to protect residential amenity and to comply with the planning condition noise limits.

4.9 The various IWMF process areas require ventilation, which will be provided through a series of louvres and vents. The ventilation system is subject to detailed design which will ensure that the overall acoustic performance of the building is not compromised. Louvers and vents will be located, orientated and where necessary attenuated to ensure the amenity of nearby residents is protected and the planning condition noise limits are met.

4.10 Tables 1 and 2 in Appendix 1 show a summary of the anticipated sound levels based on the updated operational details and a comparison against the planning condition noise limits.

4.11 The output spreadsheets from the modelling exercise are shown in Appendix 2 at the end of this report.

5.0 Assessment

5.1 The sound levels set out in the Tables demonstrate that the proposed operations will comply with the planning condition noise limits.

5.2 In addition, the sound levels also comply with those levels of the other informative guidance discussed in section 2.

6.0 Conclusions

6.1 The changes proposed as part of this application will not affect the ability of the operations to comply with the noise limits set out in Conditions 38 to 40 of the planning consent.

6.2 Therefore noise is not considered to be a material factor in determining said applications.

Appendix 1 Tables

Table 1 - night noise assessment			
Location	**2015 night Lp / dBL$_{Aeq,T}$**	**Planning condition limit / dBL$_{Aeq,5min}$**	**Difference / dBA**
Allshots Farm	39	40	-1
The Lodge	40		0
Bumby Hall	36		-4
Parkgate Farm	34		-6
Sheepcotes Farm	37		-3
Greenpastures Bungalow	33		-7
Goslings Barn	29		-11
Goslings Farm	29		-11
Goslings Cottage	29		-11
Herons Farm	31		-9
Deeks Cottage	31		-9
Haywards	34		-6

Table 2 - day noise assessment			
Location	**2015 day Lp / dBL$_{Aeq,T}$**	**Planning condition limit / dBL$_{Aeq,5min}$**	**Difference / dBA**
Allshots Farm	39	47	-8
The Lodge	41	49	-8
Bumby Hall	36	45	-9
Parkgate Farm	34	45	-11
Sheepcotes Farm	38	45	-7
Greenpastures Bungalow	35	45	-10
Goslings Barn	33	47	-14
Goslings Farm	35	47	-12
Goslings Cottage	33	47	-14
Herons Farm	35	45	-10
Deeks Cottage	33	45	-12
Haywards	34	45	-11

NB. Daytime vehicle movements are based on 2008 predicted sound levels

Appendix 2 Acoustic model output

Allshots Farm																		
50	**m (AOD)**																	
39 dBA																		
Operation	Equipment	Height (AOD)	Lw	LP @	dist/m		Distance S-R	Area correction	Dist correction	Scn correction	D'tivity correction	S.G. correction	Atten		Lp	Lp(HZI)		
HZI - CHP	Resultant sound level - From HZI assessment															35.9		3890.451
																	1	1
Paper Pulp Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*			620										1	1
																	1	1
																	1	1
Waste Water treatment	External Equipment																1	1
	Source 1 [assume 1m cube]	48	*105*	90	1		560		-63	-10					32		1598.173577	1
	Source 2 [assume 1m cube]	48	*105*	90	1		565		-63	-10					32		1570.012479	1
	Source 3 [assume 1m cube]	48	*105*	90	1		570		-63	-10					32		1542.589208	1
																	1	1
	Buffer area																1	1
	Source 1	36	*105*	90	1		690		-65	-10					30		1052.693202	1
	Source 2	36	*105*	90	1		700		-65	-10					30		1022.831089	1
	Source 3	36	*105*	90	1		705		-65	-10					30		1008.374294	1
	Process area																	
	Source 4	49	*0*	90	1												1	1
	Source 5	49	*0*	90	1												1	1
																	1	1
	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
AD Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
MRF	Indoor sound levels																1	1
	Reverberant sound level - estimate			*80*													1	1
																	1	1
MBT	Indoor sound levels																1	1
	Reverberant sound level - estimate			*80*													1	1
																	1	1
Roof - total	Effective incident Lp				80		680										1	1
	Area	44000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		97									-6			27		476.9082673	1
																	1	1
																	1	1
Walls - total	Effective incident Lp				80		680										1	1
	Area	19000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		94									-6			23		205.9376609	1
																	1	1
																	1	1
																	1	1
																	1	1
																	1	1
																	1	1
																	1	1
																	1	1
																	1	1
																	1	1
																	1	1
																	1	1
																Lp =	**39 dBA**	

The Lodge																		
49	**m (AOD)**																	
40 dBA																		
Operation	Equipment	Height (AOD)	Lw	LP @	dist/m		Distance S-R	Area correction	Dist correction	Scn correction	D'tivity correction	S.G. correction	Atten		Lp	Lp(HZI)		
HZI - CHP	Resultant sound level - From HZI assessment															37		5011.872
																	1	1
Paper Pulp Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*			565										1	1
																	1	1
																	1	1
Waste Water treatment	External Equipment																1	1
	Source 1 [assume 1m cube]	48	*105*	90	1		585		-63	-10					32		1464.496263	1
	Source 2 [assume 1m cube]	48	*105*	90	1		595		-63	-10					32		1415.683168	1
	Source 3 [assume 1m cube]	48	*105*	90	1		600		-64	-10					31		1392.18676	1
																	1	1
	Dutch Barn Equipment																1	1
	Source 1	36	*105*	90	1		610		-64	-10					31		1346.915436	1
	Source 2	36	*105*	90	1		610		-64	-10					31		1346.915436	1
	Source 3	36	*105*	90	1		620		-64	-10					31		1303.816945	1
	Internal sound sources																	
	Source 4	49		90	1												1	1
	Source 5	49		90	1												1	1
																	1	1
	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
AD Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
MRF	Indoor sound levels																1	1
	Reverberant sound level - estimate			*80*													1	1
																	1	1
MBT	Indoor sound levels																1	1
	Reverberant sound level - estimate			*80*													1	1
Roof - total	Effective incident Lp				80		620										1	1
	Area	44000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		97									-6			28		573.6794558	1
																	1	1
																	1	1
Walls - total	Effective incident Lp				80		620										1	1
	Area	19000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		94									-6			24		247.7252195	1
																	1	1
																	1	1
																	1	1
																	1	1
																Lp =	**40 dBA**	

Bumby Hal																		
44	**m (AOD)**																	
36 dBA																		
Operation	Equipment	Height (AOD)	Lw	LP @	dist/m		Distance S-R	Area correction	Dist correction	Scn correction	D'tivity correction	S.G. correction	Atten		Lp	Lp(HZI)		
HZI - CHP	Resultant sound level - From HZI assessment															31.3		1348.963
																	1	1
Paper Pulp Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
																	1	1
Waste Water treatment	External Equipment																1	1
	Source 1 [assume 1m cube]	48	*105*	90	1		950		-68	-10					27		555.3321148	1
	Source 2 [assume 1m cube]	48	*105*	90	1		955		-68	-10					27		549.5323414	1
	Source 3 [assume 1m cube]	48	*105*	90	1		960		-68	-10					27		543.8229532	1
																	1	1
	Dutch Barn Equipment																1	1
	Source 1	36	*105*	90	1		980		-68	-10					27		521.8525964	1
	Source 2	36	*105*	90	1		980		-68	-10					27		521.8525964	1
	Source 3	36	*105*	90	1		980		-68	-10					27		521.8525964	1
	Internal sound sources																	
	Source 4	49		90	1													1
	Source 5	49		90	1													1
																		1
	Indoor sound levels																	1
	Reverberant sound level - estimate			*85*														1
																		1
AD Plant	Indoor sound levels																	1
	Reverberant sound level - estimate			*85*														1
																		1
MRF	Indoor sound levels																	1
	Reverberant sound level - estimate			*80*														1
																		1
MBT	Indoor sound levels																	1
	Reverberant sound level - estimate			*80*														1
Roof - total	Effective incident Lp				80		1030										1	1
	Area	44000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		97									-6			23		207.8634959	1
																	1	1
																	1	1
Walls - total	Effective incident Lp				80		1030										1	1
	Area	19000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		94									-6			20		89.75923686	1
																	1	1
																	1	1
																	1	1
																	1	1
																Lp =	**36 dBA**	

Parkgate Farm																		
45	**m (AOD)**																	
34 dBA																		
Operation	Equipment	Height (AOD)	Lw	LP @	dist/m		Distance S-R	Area correction	Dist correction	Scn correction	D'tivity correction	S.G. correction	Atten		Lp	Lp(HZI)		
HZI - CHP	Resultant sound level - From HZI assessment															29.1		812.8305
																	1	1
Paper Pulp Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
																	1	1
Waste Water treatment	External Equipment																1	1
	Source 1 [assume 1m cube]	48	*105*	90	1		1140		-69	-10					26		385.647302	1
	Source 2 [assume 1m cube]	48	*105*	90	1		1150		-69	-10					26		378.9695528	1
	Source 3 [assume 1m cube]	48	*105*	90	1		1160		-69	-10					26		372.4637586	1
																	1	1
	Dutch Barn Equipment																1	1
	Source 1	36	*105*	90	1		1150		-69	-10					26		378.9695528	1
	Source 2	36	*105*	90	1		1150		-69	-10					26		378.9695528	1
	Source 3	36	*105*	90	1		1150		-69	-10					26		378.9695528	1
	Internal sound sources																	
	Source 4	49		90	1													1
	Source 5	49		90	1													1
																		1
	Indoor sound levels																	1
	Reverberant sound level - estimate			*85*														1
																		1
AD Plant	Indoor sound levels																	1
	Reverberant sound level - estimate			*85*														1
																		1
MRF	Indoor sound levels																	1
	Reverberant sound level - estimate			*80*														1
																		1
MBT	Indoor sound levels																	1
	Reverberant sound level - estimate			*80*														1
Roof - total	Effective incident Lp				80		1300										1	1
	Area	44000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		97									-6			21		130.486617	1
																	1	1
																	1	1
Walls - total	Effective incident Lp				80		1300										1	1
	Area	19000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		94									-6			18		56.34649372	1
																	1	1
																	1	1
																	1	1
																	1	1
																Lp =	**34 dBA**	

Sheepcotes Farm																		
50 m (AOD)																		
37 dBA																		
Operation	Equipment	Height (AOD)	Lw	LP @	dist/m		Distance S-R	Area correction	Dist correction	Scn correction	D'tivity correction	S.G. correction	Atten		Lp	Lp(HZI)		
HZI - CHP	Resultant sound level - From HZI assessment															25.5		354.8134
																	1	1
Paper Pulp Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*			750										1	1
																	1	1
																	1	1
Waste Water treatment	External Equipment																1	1
	Source 1 [assume 1m cube]	48	*105*	90	1		890		-67	-10					28		632.7322732	1
	Source 2 [assume 1m cube]	48	*105*	90	1		880		-67	-10					28		647.1942583	1
	Source 3 [assume 1m cube]	48	*105*	90	1		875		-67	-10					28		654.611897	1
																	1	1
	Dutch Barn Equipment																1	1
	Source 1	36	*105*	90	1		840		-66	-10					29		710.2993674	1
	Source 2	36	*105*	90	1		845		-67	-10					28		701.9183273	1
	Source 3	36	*105*	90	1		860		-67	-10					28		677.6463408	1
	Internal sound sources																	
	Source 4	49		90	1												1	1
	Source 5	49		90	1												1	1
																	1	1
	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
AD Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
MRF	Indoor sound levels																1	1
	Reverberant sound level - estimate			*80*													1	1
																	1	1
MBT	Indoor sound levels																1	1
	Reverberant sound level - estimate			*80*													1	1
Roof - total	Effective incident Lp				80		860										1	1
	Area	44000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		97									-6			25		298.1643899	1
																	1	1
																	1	1
Walls - total	Effective incident Lp				80		860										1	1
	Area	19000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		94									-6			21		128.7528047	1
																	1	1
																	1	1
																	1	1
																	1	1
																Lp =	**37 dBA**	

Greenpastures																		
54	**m (AOD)**																	
33 dBA																		
Operation	Equipment	Height (AOD)	Lw	LP @	dist/m		Distance S-R	Area correction	Dist correction	Scn correction	D'tivity correction	S.G. correction	Atten		Lp	Lp(HZI)		
HZI - CHP	Resultant sound level - From HZI assessment															20.5		112.2018
																	1	1
Paper Pulp Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*			1200										1	1
																	1	1
																	1	1
Waste Water treatment	External Equipment																1	1
	Source 1 [assume 1m cube]	48	*105*	90	1		1340		-71	-15					19		88.26538163	1
	Source 2 [assume 1m cube]	48	*105*	90	1		1340		-71	-10					24		279.1196445	1
	Source 3 [assume 1m cube]	48	*105*	90	1		1340		-71	-10					24		279.1196445	1
																	1	1
	Dutch Barn Equipment																1	1
	Source 1	36	*105*	90	1		1300		-70	-10					25		296.5604933	1
	Source 2	36	*105*	90	1		1310		-70	-10					25		292.0501332	1
	Source 3	36	*105*	90	1		1330		-70	-10					25		283.3327116	1
	Internal sound sources																	
	Source 4	49		90	1												1	1
	Source 5	49		90	1												1	1
																	1	1
	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
AD Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
MRF	Indoor sound levels																1	1
	Reverberant sound level - estimate			*80*													1	1
																	1	1
MBT	Indoor sound levels																1	1
	Reverberant sound level - estimate			*80*													1	1
Roof - total	Effective incident Lp				80		1300										1	1
	Area	44000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		97									-6			21		130.486617	1
																	1	1
																	1	1
Walls - total	Effective incident Lp				80		1300										1	1
	Area	19000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		94									-6			18		56.34649372	1
																	1	1
																	1	1
																	1	1
																	1	1
																Lp =	**33 dBA**	

Goslings Barn																	
54	**m (AOD)**																
29 dBA																	
Operation	Equipment	Height (AOD)	Lw	LP @	dist/m		Distance S-R	Area correction	Dist correction	Scn correction	D'tivity correction	S.G. correction	Atten	Lp	Lp(HZI)		
HZI - CHP	Resultant sound level - From HZI assessment														20.8		120.2264
																1	1
Paper Pulp Plant	Indoor sound levels															1	1
	Reverberant sound level - estimate			*85*												1	1
																1	1
																1	1
Waste Water treatment	External Equipment															1	1
	Source 1 [assume 1m cube]	48	*105*	90	1		1370		-71	-15				19		84.44206897	1
	Source 2 [assume 1m cube]	48	*105*	90	1		1370		-71	-15				19		84.44206897	1
	Source 3 [assume 1m cube]	48	*105*	90	1		1370		-71	-15				19		84.44206897	1
																1	1
	Dutch Barn Equipment															1	1
	Source 1	36	*105*	90	1		1330		-70	-15				20		89.59767044	1
	Source 2	36	*105*	90	1		1340		-71	-15				19		88.26538163	1
	Source 3	36	*105*	90	1		1350		-71	-15				19		86.96258944	1
	Internal sound sources																
	Source 4	49		90	1											1	1
	Source 5	49		90	1											1	1
																1	1
	Indoor sound levels															1	1
	Reverberant sound level - estimate			*85*												1	1
																1	1
AD Plant	Indoor sound levels															1	1
	Reverberant sound level - estimate			*85*												1	1
																1	1
MRF	Indoor sound levels															1	1
	Reverberant sound level - estimate			*80*												1	1
																1	1
MBT	Indoor sound levels															1	1
	Reverberant sound level - estimate			*80*												1	1
Roof - total	Effective incident Lp				80		1300									1	1
	Area	44000														1	1
	Expected performance dBA				23											1	1
	Overall Lw		97									-6		21		130.486617	1
																1	1
																1	1
Walls - total	Effective incident Lp				80		1300									1	1
	Area	19000														1	1
	Expected performance dBA				23											1	1
	Overall Lw		94									-6		18		56.34649372	1
																1	1
																1	1
																1	1
																1	1
															Lp =	**29 dBA**	

Goslings Farm																		
54	**m (AOD)**																	
29 dBA																		
Operation	Equipment	Height (AOD)	Lw	LP @	dist/m		Distance S-R	Area correction	Dist correction	Scn correction	D'tivity correction	S.G. correction	Atten	Lp	Lp(HZI)			
HZI - CHP	Resultant sound level - From HZI assessment														20.9			123.0269
																	1	1
Paper Pulp Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
																	1	1
Waste Water treatment	External Equipment																1	1
	Source 1 [assume 1m cube]	48	*105*	90	1		1370		-71	-15				19			84.44206897	1
	Source 2 [assume 1m cube]	48	*105*	90	1		1370		-71	-15				19			84.44206897	1
	Source 3 [assume 1m cube]	48	*105*	90	1		1370		-71	-15				19			84.44206897	1
																	1	1
	Dutch Barn Equipment																1	1
	Source 1	36	*105*	90	1		1330		-70	-15				20			89.59767044	1
	Source 2	36	*105*	90	1		1340		-71	-15				19			88.26538163	1
	Source 3	36	*105*	90	1		1350		-71	-15				19			86.96258944	1
	Internal sound sources																	
	Source 4	49		90	1												1	1
	Source 5	49		90	1												1	1
																	1	1
	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
AD Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
MRF	Indoor sound levels																1	1
	Reverberant sound level - estimate			*80*													1	1
																	1	1
MBT	Indoor sound levels																1	1
	Reverberant sound level - estimate			*80*													1	1
Roof - total	Effective incident Lp				80		1300										1	1
	Area	44000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		97									-6		21			130.486617	1
																	1	1
																	1	1
Walls - total	Effective incident Lp				80		1300										1	1
	Area	19000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		94									-6		18			56.34649372	1
																	1	1
																	1	1
																	1	1
																	1	1
																Lp =	**29 dBA**	

Goslings Cottage																		
53	**m (AOD)**																	
29 dBA																		
Operation	Equipment	Height (AOD)	Lw	LP @	dist/m		Distance S-R	Area correction	Dist correction	Scn correction	D'tivity correction	S.G. correction	Atten		Lp	Lp(HZI)		
HZI - CHP	Resultant sound level - From HZI assessment															21.2		131.8257
																	1	1
Paper Pulp Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*			1060										1	1
																	1	1
																	1	1
Waste Water treatment	External Equipment																1	1
	Source 1 [assume 1m cube]	48	*105*	90	1		1330		-70	-15					20		89.59767044	1
	Source 2 [assume 1m cube]	48	*105*	90	1		1330		-70	-15					20		89.59767044	1
	Source 3 [assume 1m cube]	48	*105*	90	1		1330		-70	-15					20		89.59767044	1
																	1	1
	Dutch Barn Equipment																1	1
	Source 1	36	*105*	90	1		1300		-70	-15					20		93.78066228	1
	Source 2	36	*105*	90	1		1310		-70	-15					20		92.35436119	1
	Source 3	36	*105*	90	1		1320		-70	-15					20		90.9603531	1
	Internal sound sources																	
	Source 4	49		90	1												1	1
	Source 5	49		90	1												1	1
																	1	1
	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
AD Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
MRF	Indoor sound levels																1	1
	Reverberant sound level - estimate			*80*													1	1
																	1	1
MBT	Indoor sound levels																1	1
	Reverberant sound level - estimate			*80*													1	1
Roof - total	Effective incident Lp				80		1300										1	1
	Area	44000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		97									-6			21		130.486617	1
																	1	1
																	1	1
Walls - total	Effective incident Lp				80		1300										1	1
	Area	19000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		94									-6			18		56.34649372	1
																	1	1
																	1	1
																	1	1
																	1	1
																Lp =	**29 dBA**	

Herons Farm																		
50 m (AOD)																		
31 dBA																		
Operation	Equipment	Height (AOD)	Lw	LP @	dist/m		Distance S-R	Area correction	Dist correction	Scn correction	D'tivity correction	S.G. correction	Atten		Lp	Lp(HZI)		
HZI - CHP	Resultant sound level - From HZI assessment															26.9		489.7788
																	1	1
Paper Pulp Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*			750										1	1
																	1	1
																	1	1
Waste Water treatment	External Equipment																1	1
	Source 1 [assume 1m cube]	48	*105*	90	1		1020		-68	-15					22		152.3349858	1
	Source 2 [assume 1m cube]	48	*105*	90	1		1030		-68	-15					22		149.391384	1
	Source 3 [assume 1m cube]	48	*105*	90	1		1040		-68	-15					22		146.5322848	1
																	1	1
	Dutch Barn Equipment																1	1
	Source 1	36	*105*	90	1		1020		-68	-15					22		152.3349858	1
	Source 2	36	*105*	90	1		1020		-68	-15					22		152.3349858	1
	Source 3	36	*105*	90	1		1020		-68	-15					22		152.3349858	1
	Internal sound sources																	
	Source 4	49		90	1												1	1
	Source 5	49		90	1												1	1
																	1	1
	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
AD Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
MRF	Indoor sound levels																1	1
	Reverberant sound level - estimate			*80*													1	1
																	1	1
MBT	Indoor sound levels																1	1
	Reverberant sound level - estimate			*80*													1	1
Roof - total	Effective incident Lp				80		920										1	1
	Area	44000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		97									-6			24		260.5415676	1
																	1	1
																	1	1
Walls - total	Effective incident Lp				80		920										1	1
	Area	19000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		94									-6			21		112.506586	1
																	1	1
																	1	1
																	1	1
																	1	1
																Lp = 31 dBA		

Deeks Cottage																		
51	**m (AOD)**																	
31 dBA																		
Operation	Equipment	Height (AOD)	Lw	LP @	dist/m		Distance S-R	Area correction	Dist correction	Scn correction	D'tivity correction	S.G. correction	Atten		Lp	Lp(HZI)		
HZI - CHP	Resultant sound level - From HZI assessment															27.9		616.595
																	1	1
Paper Pulp Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*			880										1	1
																	1	1
																	1	1
Waste Water treatment	External Equipment																1	1
	Source 1 [assume 1m cube]	48	*105*	90	1		1060		-69	-15					21		141.0549299	1
	Source 2 [assume 1m cube]	48	*105*	90	1		1070		-69	-15					21		138.4307094	1
	Source 3 [assume 1m cube]	48	*105*	90	1		1075		-69	-15					21		137.1459766	1
																	1	1
	Dutch Barn Equipment																1	1
	Source 1	36	*105*	90	1		1080		-69	-15					21		135.879046	1
	Source 2	36	*105*	90	1		1080		-69	-15					21		135.879046	1
	Source 3	36	*105*	90	1		1080		-69	-15					21		135.879046	1
	Internal sound sources																	
	Source 4	49		90	1												1	1
	Source 5	49		90	1												1	1
																	1	1
	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
AD Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
MRF	Indoor sound levels																1	1
	Reverberant sound level - estimate			*80*													1	1
																	1	1
MBT	Indoor sound levels																1	1
	Reverberant sound level - estimate			*80*													1	1
Roof - total	Effective incident Lp				80		1000										1	1
	Area	44000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		97									-6			23		220.5223828	1
																	1	1
																	1	1
Walls - total	Effective incident Lp				80		1000										1	1
	Area	19000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		94									-6			20		95.22557439	1
																	1	1
																	1	1
																	1	1
																	1	1
																Lp =	**31 dBA**	

Haywards																		
51	**m (AOD)**																	
34 dBA																		
Operation	Equipment	Height (AOD)	Lw	LP @	dist/m		Distance S-R	Area correction	Dist correction	Scn correction	D'tivity correction	S.G. correction	Atten	Lp	Lp(HZI)			
HZI - CHP	Resultant sound level - From HZI assessment														28.6			724.436
																	1	1
Paper Pulp Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
																	1	1
Waste Water treatment	External Equipment																1	1
	Source 1 [assume 1m cube]	48	*105*	90	1		1130		-69	-10				26			392.5031198	1
	Source 2 [assume 1m cube]	48	*105*	90	1		1140		-69	-10				26			385.647302	1
	Source 3 [assume 1m cube]	48	*105*	90	1		1150		-69	-10				26			378.9695528	1
																	1	1
	Dutch Barn Equipment																1	1
	Source 1	36	*105*	90	1		1160		-69	-10				26			372.4637586	1
	Source 2	36	*105*	90	1		1160		-69	-10				26			372.4637586	1
	Source 3	36	*105*	90	1		1160		-69	-10				26			372.4637586	1
	Internal sound sources																	
	Source 4	49		90	1												1	1
	Source 5	49		90	1												1	1
																	1	1
	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
AD Plant	Indoor sound levels																1	1
	Reverberant sound level - estimate			*85*													1	1
																	1	1
MRF	Indoor sound levels																1	1
	Reverberant sound level - estimate			*80*													1	1
																	1	1
MBT	Indoor sound levels																1	1
	Reverberant sound level - estimate			*80*													1	1
Roof - total	Effective incident Lp				80		1100										1	1
	Area	44000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		97									-6		23			182.2499031	1
																	1	1
																	1	1
Walls - total	Effective incident Lp				80		1100										1	1
	Area	19000															1	1
	Expected performance dBA				23												1	1
	Overall Lw		94									-6		19			78.69882181	1
																	1	1
																	1	1
																	1	1
																	1	1
																Lp =	**34 dBA**	

Annex A Guidance

Synopsis

A.1 BS4142:2014 uses a comparison between the Rating and Background Sound Levels to establish an Initial Estimate of the Likely Significance of Impact. The context of the assessment must then be considered, which can significantly alter the outcome of the assessment.

A.2 Where the aim is to ensure that people are not disturbed by plant during the night it is the absolute level of sound within the dwelling that will be of most significance. What constitute a suitable level of sound from plant will depend upon the character of the acoustic environment. This means that identification of a suitable criterion to properly protect residents must be informed by the existing residual sound level, of which the Background Sound Level is one partial indicator, with others such as the average or maximum providing further information.

A.3 For gardens and other outdoor amenity areas, BS8233 indicates that an average level of 50dBA may be desirable, but this is based on considering residential development in what may be relatively noisy areas. For quieter locations NPPF and NPSE provide further assistance. When establishing what may be a suitable level in gardens etc. for sound from plant, it is important to consider the existing acoustic environment including the residual levels (background, average, etc.) and the character of the area e.g. quiet rural, busy urban, adjacent to a car park or service yard.

BS4142:2014 Methods of rating industrial and commercial sound

A.4 BS4142:2014 differs from previous editions of this Standard in many ways, including that:

- The aim is to assess the likely significance of impact not the likelihood of complaint. This is consistent with current Government planning policy but is not aligned to it because this is a British standard, whereas planning policy does not apply to all of Britain.
- The context of the situation must be considered as part of and can significantly affect the outcome of the assessment.
- The outcome of the numerical assessment will not be a single number but a range, together with uncertainty, the significance of which must be considered as part of the assessment process.
- The absolute sound levels may be more significant than the difference between the rating and background sound levels.
- It may also be appropriate to consider other guidance such as BS8233:2014 as part of the assessment.

- Sound having significant characteristics that attract a listener's attention may be significantly more intrusive than featureless sound of a somewhat higher level, as a result of which the rating penalty may now be significantly greater than before.
- The reference to a rating level 10 dB below the background sound level has been removed because this was mis-applied in many cases to impose unreasonably low criteria.
- The many factors that affect the uncertainty of an assessment must be taken into account.

A.5 Clause 11 states: '*The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context*'.

A.6 BS4142 requires that the Rating Level be compared to the Background Sound Level to provide an Initial Estimate of the Likely Significance of Impact. This is then amended to take account of the context of the assessment, and the effects of the uncertainty in the entire process on the outcome of the assessment must also be considered.

A.7 The Background Sound Level ($L_{A90,T}$) is defined as the level exceeded for 90% of the time i.e. the quietest 10% level. This specifically excludes consideration of the sound level prevailing for 90% of the time and is intended to provide an indication of the sound level during 'lulls' in activity. This means that the same Background Sound Level can be measured outside a dwelling in a continuously quiet location with little activity or sources of residual sound, and outside a dwelling beside a road with vehicles passing at high speed every few minutes. Clearly these two locations have very different acoustic characteristics and sensitivity to sound, despite having the same L_{A90} level. In this situation the average ($L_{Aeq,T}$) levels may differ by around 20dBA to 30dBA and the maximum ($L_{AMax,T}$) levels may differ by 40dBA or more.

BS8233:2014 Guidance on sound insulation and noise reduction for buildings

A.8 This Standard draws on authoritative guidance such as that issued by the World Health Organisation to identify suitable noise levels for a wide range of different environments. For dwellings these include bedrooms, where the aim is to protect people from sleep disturbance; other habitable rooms that are in use during the day, where the aim is to provide good listening/ communication/ recreational conditions; and outdoor amenity space including gardens.

A.9 This confirms that a steady average level of 30dBA within a bedroom, due to external sound sources, is desirable and that this should not have significant acoustically distinguishing characteristics. For habitable rooms during the day a desirable level is 35dBA.

A.10 For outdoor areas such as gardens and patios a desirable upper average level of 50dBA is stated, with an upper guideline average limit of 55dBA, which would be acceptable in noisier environments. However it is also recognised that for strategic reasons it may be appropriate to permit higher levels, such as for new dwellings in busy urban areas.

National Planning Policy Framework (NPPF), Noise Policy Statement for England (NPSE) and National Planning Practice Guidance (NPPG)

A.11 These documents clarify Government policy regarding development and noise. There is a presumption in favour of sustainable development and a recognition that when considering sustainability, the various factors that affect the sustainability of a proposed development must be considered collectively.

A.12 The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied. It sets out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so. It provides a framework within which local people and their accountable councils can produce their own distinctive local and neighbourhood plans, which reflect the needs and priorities of their communities.

A.13 Paragraph 123 of NPPF states that:

> Planning policies and decisions should aim to:
>
> a. avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
>
> b. mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
>
> c. recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
>
> d. identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

A.14 The Noise Policy Statement for England (NPSE) sets out the long term vision of Government noise policy by promoting good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

A.15 Paragraph 2.23 of NPSE clarifies the first part of the above excerpt:

a. The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development.

A.16 Similarly paragraph 2.24 of NPSE clarifies the second part:

a. The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL (Lowest Observed Adverse Effect Level) and SOAEL (Significant Observed Adverse Effect Level). It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur.

A.17 These make it clear that noise must not be considered in isolation but as part of the overall sustainability and associated impacts of the proposed development. There is no benefit in reducing noise to an excessively low level, particularly if this creates or increases some other adverse impact. Similarly, it may be appropriate for noise to have an adverse impact if this is outweighed by the reduction or removal of some other adverse impact that is of greater significance when considering the overall sustainability of the proposed development.

A.18 NPSE clarifies the difference between NOEL (No Observed Effect Level) and LOAEL as used in Night Noise Guidelines for Europe, which gives values of 30dB(A) and 40dB(A) for the night time average level measured outside dwellings respectively. This indicates that there may be no significant overall benefit in achieving an average level of less than around 40dB(A) outside dwellings during the night.

A.19 It should also be considered that in order to make equipment quieter it is often necessary to use larger equipment that operates more slowly and for longer periods of time. This may increase energy consumption and hence the carbon footprint of the equipment. The overall impact of this may outweigh any acoustic benefit of the equipment being slightly quieter.

World Health Organisation: Guidelines for Community Noise; Night Noise Guidelines for Europe

A.20 The WHO publication 'Guidelines for Community Noise – 1999' provides guidance regarding suitable levels of noise that will protect vulnerable groups against sleep disturbance. A steady level of 30dB(A) in bedrooms, with occasional maximum levels of 45dB(A) are identified as being suitable to achieve this, with an assumed difference of approximately 15dB(A) between the noise level outdoors and that resulting in the bedroom, assuming that the bedroom windows are partly open for ventilation. This means that the corresponding targets for the noise level outdoors are steady levels of up to about 45dB(A) and occasional maxima of up to around 60dB(A).

A.21 The more recent WHO guidance 'Night Noise Guidelines for Europe – 2009' is more concerned with the longer term average noise levels that are covered by the EU Directive on Environmental Noise, although this does appear to suggest slightly lower external maximum noise levels of around 57dB(A) outside bedrooms during the night.

A.22 Furthermore the 1999 guidance states that: '*To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dBLAeq on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50dBLAeq. Where it is practicable and feasible, the lower outdoor level should be considered the maximum desirable sound level for new development.'*

Annex B Competence & Experience

B.1 Belair Research Limited has the advantage of personnel that were directly involved in the drafting of the original 1967 edition of BS4142 and the most recent 2014 edition, who have specialised in the measurement, assessment and control of noise from industrial and commercial sources throughout their careers. This type of work forms a major part of our activity and has done so for several decades. Our culture, systems and working practices are geared towards ensuring that this type of work is consistently undertaken to the high and robust level of quality for which we are known.

B.2 **Richard Collman** has specialised in acoustic engineering for half a century and was the founding director of Belair Research Limited (BRL) in 1981. He was seconded onto the BSI committee that drafted the original 1967 version of BS4142 and has been involved in the assessment of sound from industrial and commercial plant since then. He pioneered the consideration of sustainability as part of acoustic assessments rather than simply assessing the level and character of noise in isolation.

B.3 **Richard A Collman** now has overall responsibility for BRL's activities including BS4142 assessments. He graduated with a BSc (Class I) in Acoustics and Computer Science from Salford University in 1984, being awarded the course prize in both the second and final years. He is a Chartered Engineer and has specialised in the measurement and assessment of sound from industrial and commercial plant for over 30 years, writing articles and papers on this subject for Acoustics Bulletin and IOA conferences. He pioneered the use of digital instrumentation for short duration consecutive logging rather than longer term statistical averaging measurement techniques. As an expert on sound from refrigeration and air conditioning plant he represented the Institute of Refrigeration on the BSI committee and the Drafting Panel responsible for the 2014 edition of BS4142, presented the section on Uncertainty at the BS4142 Launch Meeting in November 2014, and authored an associated Technical Article in Acoustics Bulletin. He has been closely involved in the development of BRL's BS4142 measurement, assessment and reporting system to ensure that it is fully compliant with all aspects of BS4142.

B.4 **Lee Dursley,** Senior Acoustician has specialised in the measurement and assessment of sound from commercial and industrial sites for over 10 years. He has a BSc (Hons) in Engineering Physics, a Post Graduate Diploma in Acoustics and Noise Control and is a corporate member of both the Institute of Physics and the Institute of Acoustics. With day to day responsibility for BRL's consultancy activities he has been significantly involved in the development of the measurement, assessment and reporting systems to ensure that they are compliant with the requirements of the latest version of BS4142.