Proposed Recreational Facilities, Site Access Road and Energy Centre - Noise Assessment Report

J Pointon and Sons Ltd

28 August 2008

QM

Issue/revision	Issue 1	Revision 1	Revision 2	Revision 3
Remarks	Final	Final – Updated Logo		
Date	1st July 2008	28th August 2008		
Prepared by	Jim Powlson	Jim Powlson		
Signature				
Checked by	Nicola Bolton	Nicola Bolton		
Signature				
Authorised by	David Maundrill	David Maundrill		
Signature				
Project number	12102947/001	12102947/001		
File reference	12102947 – Final Report	12102947 – Final Report		

WSP Environmental UK
The Alexandra
200-220 The Quays
Salford
Manchester
M50 3SP

Tel: +44 (0)161 886 2400
Fax: +44 (0)16 1886 2402
http://www.wspgroup.com

Contents

1 Introduction

1.1 PURPOSE

1.1.1 WSP Acoustics have been appointed by John Pointon and Sons to undertake an environmental noise assessment for a proposed development comprising new local community recreational facilities, a new site access road, and a new energy centre.

1.1.2 These developments are proposed on, or in the vicinity of the current John Pointons animal by-product recycling centre ('the installation') near Cheddleton in Staffordshire. The recreational facilities are proposed on the Beresfords site and former agricultural land to the north of Felthouse Lane, a convenient location for the local community.

1.1.3 Felthouse Lane is the current main site access to the installation and as part of the proposal this would be stopped-up and a new access route provided to the north of the proposed recreational facilities. The energy centre is proposed to the north-east of the installation, well removed from local dwellings outside the ownership of John Pointon and Sons.

1.1.4 Following consultation with Environmental Health Department of Staffordshire Moorlands District Council, this assessment has been undertaken in accordance with Planning Policy Guidance Note (PPG) 24: *Planning and noise* and the guidance documents referenced therein including British Standard 4142: *Method for rating industrial noise affecting mixed residential and industrial areas,* and BS8233: *Sound insulation and noise reduction for buildings – Code of practice.*

1.1.5 The BS4142 assessment methodology is strictly only applicable to new industrial sources which are fixed in nature. Accordingly, the guidance contained within the draft *Guidelines for Environmental Noise Impact Assessment*, produced by the joint working party of the Institute of Acoustics and Institute of Environmental Management and Assessment has been drawn upon in the assessment of noise from the proposed recreational facilities, new access road and HGV manoeuvres. For the new site access road, a series of noise level predictions have been undertaken following the methodology presented in the Calculation of Road Traffic Noise Memorandum published in 1988 by the then department of Transport and the Welsh Office.

1.1.6 The completed assessments have drawn upon the results of detailed baseline environmental noise surveys undertaken on, and in the vicinity of the site. These surveys have included daytime, evening and night-time measurements undertaken over both weekday and weekend day periods. Further noise surveys have been undertaken to establish the typical source noise levels associated with the proposed recreational facilities, i.e. an 11-a-side grass football match, a 5-a-side Astroturf football match, and skate park use.

1.1.7 Where any significant noise impacts have been identified, consideration has been given to appropriate noise mitigation measures to ensure a commensurate level of protection is afforded to local residents.

1.1.8 This report is necessarily technical in nature so to assist the reader, a glossary of terminology related to acoustics is presented in Appendix A.

2 Site Description

2.1.1 The proposed development covers two distinct site regions which can be seen in Figure B1 of Appendix B.

2.1.2 The proposed recreational facilities and new site access road are proposed on the Beresfords site and former agricultural land to the north of Felthouse Lane. This site is bounded by Felthouse Lane to the south, open land to the north and east, and residential dwellings and Cheddleton Road to the west.

2.1.3 The proposed energy centre is located to the north-eastern side of the main John Pointon and Son installation, and is bounded by the installation water treatment works to the south-west, and open land to the north-west, north-east and south-east.

NOISE SENSITIVE RECEPTORS

Recreational Facilities

2.1.4 The closest residential receptors to the proposed recreational facilities are located between the site and Cheddleton Road to the west. These are No's 433, 435 and 439 Cheddleton Road. Number 439 Cheddleton Road is located on the corner of Cheddleton Road and Felthouse Lane. This property is owned by John Pointon and Sons and occupied by employees of the company. Accordingly, for the purpose of this assessment, numbers 433 and 435 are considered more critical.

Site Access Road

2.1.5 The closest dwellings to the proposed new site access road are numbers 411 and 433 Cheddleon Road, which are north and south of this route respectively. Both of these properties will be screened from the route by proposed earth bunding, with 411 being closer to the proposed facilities.

2.1.6 There are approximately 9 properties immediately adjacent to the existing site access road (Felthouse Lane), which would benefit from significant reductions in traffic noise following opening of the new site access road.

2.1.7 In addition, at the present time, a site on the west side of Cheddleton Road ("Staffordshire Farmers") is used by John Pointon and Sons for the storage of vehicles, including during the night-time period. Noisy activities commonly undertaken at this site include the arrival, starting up and departure of HGVs, HGV manoeuvres associated with the parking up of vehicles once on this site, and occasional loading and unloading operations. Such activities can occur over the course of 24 hours, and commonly occur during the night-time.

2.1.8 With the proposed new site development, and subject to a Section 106 Agreement, the Staffordshire Farmers site would be subject to a complete cessation of such noisy activities, with a proposed return to a green field. Two dwellings are located immediately adjacent to this site, which would immediately benefit from these proposals as would other nearby residential properties.

Energy Centre

2.1.9 The closest dwellings to the proposed Energy Centre are Felthouse Farm, Woodlands Hall and Woodland Cottage, which are located together and approximately 300m to north-east of the plant. However, these properties are within the ownership of John Pointon and Sons, and for this reason it is considered more appropriate to consider the next closest receptors in private ownership. These are Willow Cottage, approximately 750m to the north-east, properties on the east side of Folly Lane, approximately 700m to the south-west of the site, and properties at Ashcombe Park which is approximately 700m to the north-west.

2.1.10 Willow Cottage would be well screened from the energy plant by the local topography, it being located at the bottom of a circa 15 to 20m steep incline. Dwellings on Folly Lane are well screened from the energy plant by the lie of the local land, and the existing installation buildings.

3 Legislation And Guidance

3.1 PLANNING POLICY GUIDANCE NOTE 24: PLANNING AND NOISE

3.1.1 Planning Policy Guidance Note 24: *Planning and noise*, published in September 1994, sets out the governments policies on noise related planning issues. It gives guidance to Local Authorities in England on the use of their planning powers to minimise the adverse impact of noise. Specifically, it:

- outlines the considerations to be taken into account when determining planning applications for both noise-sensitive developments and for those activities which will generate noise;
- sets out Noise Exposure Categories for residential development, encourages their use and recommends appropriate levels for exposure to different sources of noise; and
- advises on the use of planning conditions to minimise the impact of noise.

3.1.2 PPG 24 advises that for industrial noise, "*where the standard is appropriate*", an assessment in accordance with BS 4142:1990: *Method for rating industrial noise affecting mixed residential and industrial areas* (updated in 1997) should be performed to identify the likelihood of complaints. It goes on to state that additional guidance can be found in BS 8233:1987:*Sound insulation and noise reduction for buildings - Code of practice* (updated in 1999).

3.1.3 BS4142 sets out a method to assess whether noise from factories, industrial premises or fixed installations and sources of an industrial nature in commercial premises are likely to give rise to complaints from noise-sensitive receptors in the vicinity. In the case of this development, it is appropriate therefore to use this standard in the assessment of noise breakout from the proposed energy plant.

3.1.4 For noise from other 'non-fixed and non industrial' sources such as recreational facilities and HGV manoeuvres, in strict accordance with PPG24, the default guidance is BS8233 which provides guidance on acceptable noise levels within and outside residential accommodation. In addition to BS8233, as the closest residential properties are existing, consideration has also been given to guidance contained within the draft *Guidelines for Environmental Noise Impact Assessment*, produced by the joint working party of the Institute of Acoustics and Institute of Environmental Management and Assessment. This guidance considers the significance of impacts as a result of changes in environmental noise conditions and can reasonably be considered to fall between BS4142 and BS8233 in the nature of it's approach.

3.1.5 The requirements of BS 4142: 1997 and BS 8233: 1999 are summarised below along with other relevant guidance and standards.

BRITISH STANDARD 4142:1997: METHOD FOR RATING INDUSTRIAL NOISE AFFECTING MIXED RESIDENTIAL AND INDUSTRIAL AREAS

3.1.6 This assessment method has been adopted for the assessment of noise break-out from the proposed energy plant.

3.1.7 The procedure contained in BS 4142 for assessing the likelihood of complaint is to compare the measured or predicted noise level from the source in question, known as the $L_{Aeq,T}$ specific noise level, immediately outside the dwelling, with the $L_{A90,T}$ background noise level that exists in the absence of the source in question.

3.1.8 Where the noise contains a "distinguishable discrete continuous note (whine, hiss, screech, hum etc.) or if there are distinct impulses in the noise (bangs, clicks,

clatters or thumps), or if the noise is “irregular enough to attract attention" then a correction of +5 dB is added to the specific noise level to obtain the $L_{Ar,T}$ rating level.

3.1.9 The likelihood of the noise giving rise to complaints is assessed by subtracting the background noise level from the rating noise level. BS 4142 states:

> "*A difference of around 10 dB or higher indicates that complaints are likely. A difference of around 5 dB is of marginal significance. A difference of –10 dB is a positive indication that complaints are unlikely.*"

BRITISH STANDARD BS8233: 1999: SOUND INSULATION AND NOISE REDUCTION FOR BUILDINGS - CODE OF PRACTICE

3.1.10 The scope of this standard is the provision of recommendations for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new buildings or refurbished buildings undergoing a change of use, rather than to assess the effect of changes in the external noise climate.

3.1.11 The standard suggests suitable internal noise levels within different types of buildings, including dwellings, and these are repeated in Table 1 below.

TABLE 1 RECOMMENDED INTERNAL NOISE LEVELS $L_{AEQ,T}$ dB

Criterion	Typical Situation	Design Range $L_{Aeq,T}$ dB	
		Good	Reasonable
Suitable resting/sleeping conditions	Living Rooms	30	40
	Bedroom	30	35
For a reasonable standard in bedrooms at night, individual noise events (measured with fast time weighting should not normally exceed 45 dB L_{Amax}).			

3.1.12 BS8233 goes on to recommend noise levels for gardens. According to BS8233, it is desirable that the steady noise level does not exceed $L_{Aeq,T}$ 50dB, and 55dB should be regarded as the upper limit.

3.2 INSTITUTE OF ACOUSTICS/INSTITUTE OF ENVIRONMENTAL ASSESSMENT WORKING PARTY

3.2.1 The draft *Guidelines for Noise Impact Assessment* produced by the Institute of Acoustics/Institute of Environmental Assessment Working Party have been referenced in relation to the change in ambient noise as a result of the proposed recreational facilities.

3.2.2 Whilst this document is currently draft, the guidance it contains is of assistance in establishing environmental noise impacts. The guidance provides an example of how changes in noise level can be categorised by significance, based on key benchmarks that relate to human perception of sound. For example, a change of 3dB is generally considered to be the smallest change in noise that is perceptible and a 10dB change in noise represents a doubling or halving of the noise level.

3.2.3 This guidance is contained in Table 2 below and has been split to provide greater definition to the rating of noise level changes.

TABLE 2 IMPACT SCALE FOR COMPARISON OF FUTURE NOISE AGAINST EXISTING NOISE

Change in Noise Level dB(A)	Subjective Response	Significance
0	No change	No Impact
0.1-2.9	Barely perceptible	Minor Impact
3.0-4.9	Noticeable	Moderate Impact
5.0-9.9	Up to a doubling or halving in loudness	Substantial Impact
10.0 or more	More than a doubling or halving in loudness	Major Impact

3.2.4 The draft guidelines present an example of how basic noise changes may be categorised, however, it suggests that in any assessment the noise level threshold and significance statement should be determined by the assessor, based upon the specific evidence and likely subjective response to the noise.

3.2.5 It is considered that the descriptions specified in the above table provide a good indication of the likely significance of changes in noise levels in this case. Therefore, these have been used to supplement the assessment of potential impacts of the Proposed Development.

CALCULATION OF ROAD TRAFFIC NOISE MEMORANDUM

3.2.6 CRTN, published in 1988 by the then Department of Transport and the Welsh Office, sets out standard procedures for calculating noise levels from road traffic. The calculation methods use a number of input variables, including traffic flow volume, average vehicle speed, percentage of heavy goods vehicles (HGVs), type of road, site geometry and the presence of noise barriers or acoustically absorbent ground. CRTN predicts the $L_{A10\ 18hour}$ or $L_{A10\ 1hour}$ noise level for any receptor point at a given distance from the road.

STAFFORDSHIRE MOORLANDS BOROUGH COUNCIL

3.2.7 At the outset of this project, the Staffordshire Moorlands Environmental Health Department was consulted in order to determine the scope and approach to this assessment. It was agreed that noise from the proposed recreational facilities, new site access road and HGV manoeuvres would be assessment in accordance with the draft guidelines for environmental noise impact assessment, with road traffic noise levels predicted in accordance with the methodology presented in CRTN.

3.2.8 It was also agreed that noise break-out from the proposed energy centre would be assessed based on the guidance contained within BS4142.

4 Environmental Noise Survey

4.1 BACKGROUND / AMBIENT NOISE SURVEYS.

4.1.1 To inform this assessment, a detailed baseline noise survey was undertaken to determine the prevailing noise environment at the closest noise-sensitive receptors to the proposed recreational facilities and new site access road, the energy centre, and the current site access road (Felthouse lane).

4.1.2 The following measurement locations were adopted during the noise survey:

- Location 1, To the rear of 439 Cheddlton Road, between Cheddleton Road and the proposed Recreational Facilities;
- Location 2, To the rear of No. 54 Woodland Avenue, adjacent to Felthouse Lane; and
- Location 3, Adjacent to and on the east side of Willow Cottage.

4.1.3 Each of these measurement locations were subject to free-field conditions

4.1.4 Measurement Location 1 was subject to continuous measurement between 15:00 hours on Friday the 30 May 2008, and 10:00 hours on Monday the 2 June and was used to establish the weekday and weekend ambient and background noise levels at the rear of properties backing onto the proposed recreational facilities. This location was also considered representative of the closest receptors to the proposed new site access road.

4.1.5 Measurement Location 2 was subject to continuous measurement between 12:00 hours on 22 May 2008, and 10:00 hours the following day, and was used to establish the current road traffic noise levels impacting on dwellings adjacent to Felthouse Lane, the current site access road.

4.1.6 Measurement Location 3 was subject to continuous measurement between 11:00 hours on the 22 and 23 May 2008, to establish the typical daytime and night-time background noise levels at Willow Cottage.

4.1.7 To supplement the results of the above noise survey, the results of previous noise surveys undertaken by WSP Acoustics as part of the installation Integrated Pollution Prevention and Control application have also been used in this assessment. This survey included measurements at the following locations:

- Location 4, To the south of 95 Folly Lane; and
- Location 5 To the north of the installation, on the intervening land to Ashcmobe Park.

4.1.8 Each of these measurement locations were subject to free-field conditions

4.1.9 Measurement Location 4 was used to establish the daytime and night-time background and ambient noise levels representative of the rear of properties fronting Folly Lane, with measurements taken between 19:40 and 20:40 hours on the evening of the 26th April 2006, and 01:30 and 02:00 hours the following night-time.

4.1.10 Measurement Location 5 was used to establish the daytime and night-time background and ambient noise levels at a location considered representative of Ashcombe Park. Measurements were undertaken for 24 hours commencing at 11:00 hours on the 11 May 2006.

4.1.11 The surveys were carried out using the type 1noise measurement equipment detailed in Table 3 below.

TABLE 3 INVENTORY OF ACOUSTIC MEASUREMENT EQUIPMENT

Item	Make and Model	Serial Number
Sound level meter	01dB Solo Master	10330
Preamplifier	01dB PRE 21 S	10423
Microphone	Microtech Gefell MCE212	33494
Sound level meter	01dB Solo Master	10705
Preamplifier	01dB PRE 21 S	11464
Microphone	Microtech Gefell MCE212	59725
Sound level meter	01dB Solo Master	11750
Preamplifier	01dB PRE 21 S	12309
Microphone	Microtech Gefell MCE212	61802
Sound level meter	01dB Solo Master	11810
Preamplifier	01dB PRE 21 S	12495
Microphone	Microtech Gefell MCE212	67311
Acoustic Calibrator	01dB Cal 21	35242306
Acoustic Calibrator	01dB Cal 21	35072583
Acoustic Calibrator	01dB Cal 21	990743

4.1.12 All sound level meters had been calibrated to traceable standards within the preceding two years of the corresponding surveys, and the calibrators within the preceding 12 months. The weather during the surveys was conducive to the measurement of noise, it being dry with winds varying from still to occasionally light.

4.1.13 A summary of the measured noise levels is presented in Tables 4, 5, 6 and 7. Table 4 presents the ambient and maximum noise levels identified at the closest receptors to the proposed recreational facilities (Location 1), during periods when the facilities are anticipated to be commonly used (i.e. weekday evenings between 17:00 and 22:00 hours, and weekend day periods between 10:00 and 22:00 hours).

4.1.14 Table 5 presents the ambient and maximum noise levels at Location 1 during full 16 hour daytime periods, for use in the assessment of noise from the proposed new access road.

4.1.15 Table 6 presents the background noise levels measured at the closest noise sensitive receptors to the proposed Energy Centre (Locations 3, 4 and 5). Table 7 presents the road traffic noise levels measured at the closest receptors to the current site access road (Felthouse Lane).

4.1.16 Periods of significant bird song have been removed from the calculated noise levels.

TABLE 4 SUMMARY OF MEASURED WEEKDAY EVENING AND WEEKEND DAYTIME AMBIENT AND MAXIMUM NOISE LEVELS TO THE REAR OF PROPERTIES BETWEEN CHEDDLETON ROAD AND PROPOSED RECREATIONAL FACILITIES, FREE-FIELD, dBA

Measurement Position	Measurement Start	Period	Noise Levels, dB	
			$L_{Aeq,T}$	Typical L_{AFmax}[1]
1	Friday 17:00:00 30/05/08	Daytime 5 hours (until 22:00 hours)	55.7	70.2
	Saturday 10:00:00 31/05/08	Daytime 12 hours	54.2	74.4
	Sunday 10:00:00 01/06/08	Daytime 12 hours	55.5	73.4
Measurements have been corrected to eliminate the contribution of traffic on Felthouse Lane.				

TABLE 5 SUMMARY OF MEASURED WEEKDAY AND WEEKEND DAYTIME AND NIGHT-TIME AMBIENT AND MAXIMUM NOISE LEVELS TO THE REAR OF PROPERTIES BETWEEN CHEDDLETON ROAD AND PROPOSED NEW ACCESS ROAD, FREE-FIELD, dBA

Measurement Position	Measurement Start	Period	Noise Levels, dB	
			$L_{Aeq,T}$	Typical L_{AFmax}[1]
1	Friday 15:00:00 30/05/08	Daytime 16 hours[1]	55.7	70.7
	Saturday 07:00:00 31/05/08	Daytime 16 hours	54.2	74.4
	Sunday 07:00:00 01/06/08	Daytime 16 hours	54.9	73.4
	Friday 23:00:00 30/05/08	Night-time 8hours	50.5	71.1
	Saturday 23:00:00 31/05/08	Night-time 8hours	48.9	72.7
	Sunday 23:00:00 01/06/08	Night-time 8hours	51.5	70.4
Measurements have been corrected to eliminate the contribution of traffic on Felthouse Lane.				
[1] Considered representative of full 16 hour daytime period.				

TABLE 6 SUMMARY OF MEASURED WEEKDAY DAYTIME AND NIGHT-TIME BACKGROUND AND AMBIENT NOISE LEVELS AT CLOSEST PROPERTIES TO PROPOSED ENERGY CENTRE

Measurement Position	Measurement Start	Period	Duration	Noise Levels, dB	
				$L_{A90, T}$	$L_{Aeq,T}$
3	Thursday 11:00:00 22/05/08	Daytime	16 hours	33.1	45.6
	Thursday 11:00:00 22/05/08	Night-time	8 hours	25.6	46.7
4	Wednesday 19:40:00 26/04/06	Daytime	1 hour	41.6	53.2
	Thursday 01:30:00 27/04/06	Night-time	30 Minutes	33.6	36.8
5	Thursday 12:00:00 11/05/06	Daytime	16 hours	38.8	46.9
	Thursday 23:00:00 11/05/06	Night-time	8 hours	33.0	44.6

TABLE 7 SUMMARY OF MEASURED ROAD TRAFFIC NOISE LEVELS FROM FELTHOUSE LANE

Measurement Position	Measurement Start	Period	Duration	Noise Levels, dB
				$L_{Aeq,T}$
2	Thursday 12:00:00 22/05/08	Daytime	16 hours	60.4

SOURCE LEVEL NOISE SURVEYS

4.1.17 A series of additional noise surveys have been undertaken to determine typical levels associated with the use of the different proposed recreational facilities. These surveys are summarised below.

Skate Park Activities

4.1.18 On the Saturday afternoon, the 31 May 2008, between 12:15 and 14:15 hours, an environmental noise measurement was undertaken at the Platt Fields Park Skate Park facility in Manchester. This measurement was undertaken at a distance of approximately 7m from the closest skate ramp, and was used to establish noise levels associated with the use of a facility similar to that proposed.

4.1.19 Measurements were undertaken using a 01dB SIP type 1 sound level meter (serial number 10565) fitted with a 01dB PRE21S pre amplifier (serial Number 002557) and ½ inch Microtech Gefell GmbH MCE212 condenser microphone (serial number 42589) which was fitted with a windshield. The meter was calibrated prior to and upon

completion of the surveys with an Aclan CAL 01 acoustic calibrator (serial number 35242306). No calibration drifts were found to have occurred.

4.1.20 The facility was subject to intensive use over the 2nd half of the measurement, and accordingly, the measured results for this period have been used in this assessment. A summary of the measurement results are present in Table 8 below.

TABLE 8 SUMMARY OF MEASURED SKATE PARK NOISE LEVELS – INTENSIVE USE, FREE-FIELD, dB

Measurement Position	Measurement Start	Duration	Noise Levels, dB	
			$L_{Aeq,T}$	L_{AFmax}
7m from closest skate ramp	Saturday 12:13:00 31/05/08	1 hour	54.6	80.6

5-a-Side Astroturf Football Match

4.1.21 On Saturday morning, the 25 May 2008, between 10:25 and 11:30 hours, an environmental noise measurement was undertaken adjacent to the Anthony Gell School Leisure Centre 5-a-sie Astroturf football pitch, in Wirksworth Derbyshire. This measurement was undertaken at a distance of approximately 2m from the back of the goal. The edge of the pitch is bounded by an open boarded timber fence, such that the ball rebounds back into play rather that having a throw-on. The measurement was undertaken during a typical 5-a-side football match.

4.1.22 Measurements were undertaken using a 01dB SIP type 1 sound level meter (serial number 10566) fitted with a 01dB PRE21S pre amplifier (serial Number 991313) and ½ inch Microtech Gefell GmbH MCE212 condenser microphone (serial number 3738) which was fitted with a windshield. The meter was calibrated prior to and upon completion of the surveys with an Aclan CAL 01 acoustic calibrator (serial number 35242306). No calibration drifts were found to have occurred.

4.1.23 Over the course of the measurement, wind speeds were observed to be moderate, gusting to high. Accordingly, the measurement result was analysed to establish the 'residual' underlying level from natural sources, and the ambient level from all sources'. These results are presented in Table 9 below as well as the derived 'specific' noise level associated with the pitch alone. The L_{AFmax} noise levels are also presented which correspond to the ball hitting the edge boarding.

TABLE 9 SUMMARY OF MEASURED 5-A-SIDE ASTROTURF FOOTBALL MATCH NOISE LEVELS, FREE-FIELD, dB

Measurement Position	Meas. Start	Duration	$L_{Aeq,T}$ Meas. Type	Noise Levels, dB	
				$L_{Aeq,T}$	L_{AFmax}
2m from rear of goal	Saturday 10:25:00 25/05/08	1 hour and 5 minutes	Ambient [A]	61.1	95.3
			Residual [B]	55.2	-
			Specific [A-B]	59.8	95.3

11-a-side Full Size Grass Football Match

4.1.24 On Saturday afternoon, the 13 January 2007, between 12:15 and 14:15 hours, an environmental noise measurement was undertaken adjacent to the full size Barnton Football Club grass pitch, during a competitive 11-a-side match in Division 1 of the Mid-Cheshire football league. This measurement was undertaken at a distance of approximately 11m from the pitch edge and 31m from the pitch centre.

4.1.25 Measurements were undertaken using a 01dB SIP type 1 sound level meter (serial number 10566) fitted with a 01dB PRE21S pre amplifier (serial Number 991313) and ½ inch Microtech Gefell GmbH MCE212 condenser microphone (serial number 3738) which was fitted with a windshield. The meter was calibrated prior to and upon completion of the surveys with an Aclan CAL 01 acoustic calibrator (serial number 35242306). No calibration drifts were found to have occurred.

4.1.26 A summary of the measurement results are present in Table 10 below.

TABLE 10 SUMMARY OF MEASURED 11-A-SIDE 'GRASS' FOOTBALL MATCH NOISE LEVELS, FREE-FIELD, dB

Measurement Position	Measurement Start	Duration	Noise Levels, dB	
			$L_{Aeq,T}$	L_{AFmax}
11m from pitch edge	Saturday 12:14:00 13/01/07	Full Match	60.4	80.2

5 Assessment

5.1 IDENTIFICATION OF POTENTIAL SOURCES

5.1.1 The following have been identified as potentially significant noise sources associated with each of the main development areas:

Recreational Facilities

Use of the following:

- The proposed Skate Park;
- The proposed under 9s Astroturf football pitch;
- The proposed 5-a-side / multipurpose court; and
- The proposed grass football pitch.

Energy Centre

- Noise break-out from the Bio Diesel Production building;
- Noise break-out from the Bio Diesel Material Pre Treatment building;
- Noise break-out from the Renewable Energy Power generation building; and
- HGV manoeuvres in each of the turning / parking areas.

New Access Road

- Road traffic movements on the proposed new route.

5.1.2 Noise from each of the three main development areas presented above has been assessed in turn below

5.2 PROPOSED RECREATIONAL FACILITIES

5.2.1 The assessment of noise from the recreational facilities has been assessed by determining the predicted noise level changes that would arise at the rear of adjacent dwellings during use of the facilities.

5.2.2 The predictions have been undertaken based on the measured noise level data presented in Tables 8, 9 and 10, and based on the proposed scheme layout. These predictions assume that the average noise levels (the $L_{Aeq,T}$ index) will be generated from the centre of the each facility (e.g. court, pitch or skate park), with the expectation of the grass football pitch where the centre of the closest pitch half has been adopted due to the overall pitch size. It is assumed that the maximum noise levels will be generated at the closest edge of the proposed facility to the receptor (either 433, 435 or 439 Cheddleton Road).

5.2.3 As the proposed changing rooms would in part screen the skate park, a 3dB reduction has been applied to this source.

TABLE 11 PREDICTED OPERATIONAL RECREATIONAL FACILITIES NOISE LEVELS AT REAR OF CLOSEST RECEPTORS, FREE-FIELD, dBA

Operational Facility	Source Data	Predicted Receptor Noise Levels, dB	
		$L_{Aeq,T}$	Typical L_{AFmax} [1]
Skate park	Table 8 (Skate park use)	37.6	63.9
Under 9's astroturf football pitch	Table 9 (5-a-side astroturf pitch use)	50.0	64.8
5-a-side / multi-use astroturf court	Table 9 (5-a-side atroturf pitch use)	48.0	61.6
11-a-side grass football pitch	Table 10 (11-a-side grass football match)	54.2	69.6
All	**-**	**56.4**	**69.6**

5.2.4 Table 12 below compares the predicted total operational noise level with the measured prevailing ambient noise levels for weekday evenings and Saturdays and Sunday daytimes. The associated $L_{Aeq,T}$ noise level changes are also calculated and assessed in accordance with the IoA/IEMA guidance as summarised in Section 3.

TABLE 12 PREDICTED UNMITIGATED RECEPTOR NOISE LEVEL CHANGES ASSOCIATED WITH RECREATIONAL FACILITIES USE, FREE-FIELD, dB

Period	$L_{Aeq,T}$ Noise Levels, dB				L_{AFmax} Noise Levels, dB	
	Predicted Source Operational Noise Level [A]	Measured Ambient Noise Level [B]	Future Noise Level [A+B] = [C]	Predicted Change [C-B]	Predicted Operational Source Noise Level	Measured Noise Level
Weekday Evening	56.4	55.7	59.1	**+3.4 Moderate Adverse**	69.6	70.2
Saturday	56.4	54.2	58.4	**+4.2 Moderate Adverse**	69.6	74.4
Sunday	56.4	55.5	59.0	**+3.5 Moderate Adverse**	69.6	73.4

5.2.5 It can be seen from Table 12 above that the predicted unmitigated $L_{Aeq,T}$ operational source levels are just above the measured ambient noise levels, giving rise to noise level increases of between +3.4 and +4.2 dB when all of the proposed facilities are in use. However, it is considered that all of these facilities would only rarely be used simultaneously and the levels presented in Table 12 represent very much a worst case. Notwithstanding this, consideration has been given to appropriate noise mitigation measures in the corresponding mitigation section below.

5.2.6 Considering the L_{AFmax} noise levels, it can be seen that those predicted to arise from the use of the proposed facilities are lower than those that already arise, and as such, no impact is predicted to arise in this respect.

5.3 PROPOSED ENERGY CENTRE

Installation building noise break-out

5.3.1 The Noise at Work Regulations 2005, presents two 'Exposure Action Values', of 80 and 85dBA. Above the lower action value, the employer must make hearing protection available to the work force for their use, and above the upper value, the employer must enforce use of this hearing protection.

5.3.2 It is proposed by the developer to ensure that noise levels within the installation buildings remain below the upper action value, at worst.

5.3.3 Accordingly, a series of noise breakout calculations have been undertaken for the proposed Bio Diesel Production, Bio Diesel material Pre-Treatment, and Renewable Energy Power Generation Plant buildings, assuming a worst case internal reverberant noise level of 85dBA.

5.3.4 The proposed building fabrication is understood to be profiled 0.5 gauge plastisol coated metal sheets. Based on published acoustic data for sample products, and including for workmanship factors (-6dB), a sound reduction index of R_w 19 has been assumed for this fabrication.

5.3.5 Table 13 below presents the noise levels that are predicted to arise at sample noise sensitive receptors as a result of noise breakout from the installation buildings. A 15dB noise reduction has been assumed for Willow Cottage to account for proposed interim installation buildings and screening due to local topography, with a 10dB reduction assumed for dwellings on Folly Lane due to existing installation buildings.

5.3.6 The predicted noise levels are compared with the measured prevailing background noise levels (taken from Table 6) in accordance with BS4142.

TABLE 13 PREDICTED OPERATIONAL ENERGY CENTRE NOISE BREAK-OUT LEVELS AT SAMPLE RECEPTORS, FREE-FIELD, dBA

Receptor	Period	Predicted Specific Noise Levels, dB [A] $L_{Aeq,T}$	Rating Noise Level [A]+5 =[B]	Measured Background Noise Level [C]	Difference [B-C]
Willow Cottage	Daytime	8	13	33	**-20**
	Night-time	8	13	26	**-13**
Dwellings on Folly Lane	Daytime	15	20	42	**-22**
	Night-time	15	20	34	**-14**
Ashcombe Park	Daytime	24	29	39	**-10**
	Night-time	24	29	33	**-4**

5.3.7 Comparing the difference values presented in Table 13 above with the guidance contained within BS4142 it can be seen that in all cases, the rating noise levels approach or meet the situation described as 'a positive indication that complaints are unlikely'.

Operational HGV Noise

5.3.8 Table 14 below details typical source noise levels associated with vehicular manoeuvres, likely to take place at the proposed Energy Centre. These figures are based on historical field measurements undertaken by WSP Acoustics. The source noise levels are presented as single event noise exposure levels, SELs. The distance between the measurement position and the activity has been corrected to 10 metres in each case.

TABLE 14 TYPICAL SOURCE SINGLE EVENT LEVELS ASSOCIATED WITH HGV MANOEUVRES, FREE-FIELD, dB

Operation	SEL at 10 m
HGV Forward Pass-by	77
HGV Reversing Pass-by	85
Driver Door Close	59
HGV Pulling Away	84

5.3.9 The likely changes in the ambient noise levels as a result of the operations within the HGV turning areas have been predicted for a sample of noise-sensitive receptors. It is assumed that over the course of any 5 minute period, of the daytime or night-time, each turning area will be subject to one of each of the above events.

5.3.10 Table 15 below presents the existing, ambient noise levels for each receptor location, the predicted total HGV noise level, and the corresponding noise level change and significance. The significance has been determined based on the guidance contained within the IOA/IEMA guidelines as presented earlier in Section 3.

TABLE 15 ASSESSMENT OF AMBIENT NOISE LEVEL CHANGES DURING HGV MANOUVRES, FREE-FIELD, dBA

Receptor	Period	Existing Ambient Noise Levels ($L_{Aeq,T}$) [A]	Predicted Operational Level ($L_{Aeq,1hour}$) [B]	Future Ambient Level [C = A+B]	Change [A-C] / Significance
Willow Cottage	Daytime	45.6	10	45.6	**0dB - No Impact**
	Night-time	46.7	10	46.7	**0dB - No Impact**
Folly Lane	Daytime	53.2	16	53.2	**0dB - No Impact**
	Night-time	36.8	16	36.8	**0dB - No Impact**
Ashcombe Park	Daytime	46.9	16	46.9	**0dB - No Impact**
	Night-time	44.6	16	44.6	**0dB - No Impact**

5.3.11 It can be seen from Table 15 above that noise from the anticipated HGV movements at the Energy Park is predicted to fall below the prevailing noise levels at local receptors, and that no change in these ambient noise levels is predicted to arise.

5.4 PROPOSED NEW ACCESS ROAD

5.4.1 To assess the potential noise impact arising from the proposed new site access road, a series of road traffic noise level predictions have been undertaken in accordance with the procedure present in the Calculation of Road Traffic Noise (CRTN) document. These calculations have been based on the existing road traffic noise level measured immediately adjacent to the current site access road (see Table 7), and the scheme road

traffic flow data provided by Single Clamp Partners, the project transportation consultants.

5.4.2 The calculations were undertaken assuming a net increase in noise level (based on the scheme traffic data) over and above that measured (Table 7). To represent a worst case, it was assumed that the percentage of HGVs on the new access road would be the same as that on the current road. However, it should be noted that in practice, this percentage will be subject to a significant decrease.

5.4.3 Daytime road traffic noise levels resulting from the new access road where calculated at the rear of both 411 and 433 Cheddleton Road. These calculations included the affect of the proposed route edge earth bunding which will provide significant acoustic screening to these properties.

5.4.4 The final predicted noise levels are presented in Tables 16 and 17 which correspond to daytime and night-time periods respectively. These tables include the existing noise levels, future 'with new access road' noise levels, and the resulting noise level change and significance. To represent a worst case, the existing noise levels have been taken as the lowest measured values from Friday, Saturday and Sunday of the baseline survey. It is assumed that regularity of vehicle pass-bys will be similar during both daytime and night-time periods.

TABLE 16 PREDICTED RECEPTOR NOISE LEVEL CHANGES ASSOCIATED WITH NEW ACCESS ROAD, DAYTIME, FREE-FIELD, dB

Receptor	$L_{Aeq,T}$ Noise Levels, dB				L_{AFmax} Noise Levels, dB	
	Predicted Access Road Noise Level [A]	Measured Ambient Noise Level [B]	Future Noise Level [A +B] = [C]	Predicted Change [C-B]	Predicted Access Road Noise Level	Measured Noise Level
Rear of 411 Cheddleton Road	44.4	54.2	54.6	**0.4dB No Impact**	67.4	80.0
Rear of 433 Cheddleton Road	43.7	54.2	54.6	**0.4dB No Impact**	67.3	80.0

TABLE 17 PREDICTED RECEPTOR NOISE LEVEL CHANGES ASSOCIATED WITH NEW ACCESS ROAD, NIGHT-TIME, FREE-FIELD, DB

Receptor	$L_{Aeq,T}$ Noise Levels, dB				L_{AFmax} Noise Levels, dB	
	Predicted Access Road Noise Level [A]	Measured Ambient Noise Level [B]	Future Noise Level [A +B] = [C]	Predicted Change [C-B]	Predicted Access Road Noise Level	Measured Noise Level
Rear of 411 Cheddleton Road	44.4	48.9	50.2	**1.3dB Minor Adverse**	67.4	76.4
Rear of 433 Cheddleton Road	43.7	48.9	50.0	**1.1dB Minor Adverse**	67.3	76.4

5.4.5 It can be seen from Tables 16 and 17 above that during both daytime and night-time periods, the noise levels predicted to be generated by the new access road fall well below the current measured ambient noise levels. During the daytime, the predicted noise level changes at the closest residential dwellings give rise to 'No Impact'. Impacts of only minor adverse significance are predicted during the night-time despite the worst case assumptions made. In reality, it is anticipated that no significant impact will arise from the new access road.

5.4.6 Considering L_{AFmax} noise levels, it can be seen that during both daytime and night-time periods, the levels predicted to arise from the new access road fall below those which currently exist.

5.4.7 The Predicted access road noise levels also fall within the 55dBA criterion specified in BS8233 as appropriate for external living spaces.

5.4.8 Overall, it is considered that the proposed new access road will have no significant affect on the existing noise environment at the closest existing noise sensitive receptors.

5.4.9 The opening of the proposed new access road will result in significant decreases of road traffic on Felthouse Lane. Based on the traffic flow figures, it is anticipated that the noise levels arising from Felthouse Lane would reduce by between 3 and 5dB, corresponding to a substantial beneficial impact at adjacent dwellings.

5.4.10 In addition, at the present time, a site on the west side of Cheddleton Road ("Staffordshire Farmers") is used by John Pointon and Sons for the storage of vehicles, including during the night-time. Noisy activities commonly undertaken at this site include the arrival. Starting up and departure of HGVs, HGV manoeuvres associated with the parking up of vehicles once on this site, and occasional loading and unloading operations. Such activities can occur over the course of 24 hours, and commonly occur during the night-time.

5.4.11 With the proposed new energy resource centre development, and subject to a Section 106 Agreement, the Staffordshire Farmers site would be subject to a complete cessation of such noisy activities, with a proposed return to a green field. Two dwellings are located immediately adjacent to this site, which would immediately benefit from these proposals as would other nearby residential properties.

6 Mitigation

6.1 PROPOSED RECREATIONAL FACILITIES

6.1.1 As noise level changes ranging from +3.4 to +4.2 dB have been predicted to arise, consideration has been given to appropriate noise mitigation measures, namely installation of an acoustic barrier between the existing properties and the recreational facilities.

6.1.2 It is propose to install a 2m high security fence around the facilities. Based on the acoustic barrier performance calculation methodologies presented in both the CRTN document, and BS5228: *Noise and vibration control on construction and open sites*, ensuring that this fence is acoustically rated for noise reduction purposes would provide in a noise reduction of between 5 and 10dB in adjacent property gardens.

6.1.3 The section of fence that would need to be acoustically rated is shown in Figure B2 of Appendix B. This section of fence should have a superficial density of at least 15 kg/m^2, be continuous, imperforate and sealed at the base.

6.1.4 Table 18 below presents the noise level changes that would arise at adjacent properties assuming a 5dB noise reduction due to installation of this acoustic barrier.

TABLE 18 PREDICTED MITIGATED RECEPTOR NOISE LEVEL CHANGES ASSOCIATED WITH RECREATIONAL FACILITIES USE, FREE-FIELD, dB

Period	$L_{Aeq,T}$ Noise Levels, dB				L_{AFmax} Noise Levels, dB	
	Predicted Source Operational Noise Level [A]	Measured Ambient Noise Level [B]	Future Noise Level [A +B] = [C]	Predicted Change [C-B]	Predicted Operational Source Noise Level	Measured Noise Level
Weekday Evening	51.4	55.7	57.1	**+1.4dB Minor Adverse**	64.6	70.2
Saturday	51.4	54.2	56.0	**+1.8dB Minor Adverse**	64.6	74.4
Sunday	51.4	55.5	56.9	**+1.4dB Minor Adverse**	64.6	73.4

6.1.5 It can be seen from Table 18 above that with the installation of the proposed acoustic barrier, the $L_{Aeq,T}$ noise level changes associated with simultaneous use of all of the facilities would give rise to only minor noise level increases. This barrier would also reduce the operational L_{AFmax} noise levels to even further below those which already prevail.

6.1.6 The Predicted operational noise levels also fall well within the 55dBA criterion specified in BS8233 as appropriate for external living spaces.

6.2 PROPOSED ENERGY CENTRE

Installation building noise break-out

6.2.1 Noise break-out from the installation buildings is predicted to approach or meet the situation described as ‘a positive indication that complaints are unlikely’. Accordingly consideration to mitigation measures for this source is unwarranted.

Operational HGV Noise

6.2.2 Noise from this source is predicted to fall well below the prevailing ambient noise levels at local receptors with no change predicted to arise. Accordingly consideration to mitigation measures for this source is unwarranted.

6.3 PROPOSED NEW ACCESS ROAD

6.3.1 Noise from this source is predicted to fall well below the prevailing ambient noise levels at local receptors with no significant impacts predicted to arise. Accordingly consideration to mitigation measures for this source is unwarranted.

7 Conclusion

7.1.1 WSP Acoustics have been appointed by John Pointon and Sons to undertake an environmental noise assessment for a proposed development comprising new local community recreational facilities, a new sit5-e access road, and a new energy centre.

7.1.2 These developments are proposed on, or in the vicinity of the current John Pointons animal by-product recycling centre ('the installation') near Cheddleton in Staffordshire. The recreational facilities and new access road are proposed on the Beresfords site and former agricultural land to the north of Felthouse Lane, a convenient location for the local community. The energy centre is proposed to the north-east of the installation, well removed from local dwellings outside the ownership of John Pointon and Sons.

7.1.3 Following consultation with Environmental Health Department of Staffordshire Moorlands District Council, this assessment has been undertaken in accordance with Planning Policy Guidance Note (PPG) 24: *Planning and noise* and the guidance documents referenced therein, including British Standard 4142: *Method for rating industrial noise affecting mixed residential and industrial areas,* and BS8233:*Sound insulation and noise reduction for buildings – Code of practice.*

7.1.4 To inform the assessment, detailed baseline noise surveys have been undertaken in the vicinity of the site, at locations considered representative of the closest receptors to the various development aspects. Measurements have also been undertaken of various operational sports/social facilities that are likely to be replicated as part of the recreational proposals. The assessment has determined the significance of the future noise levels and associated noise level changes that would arise once the development is operational, drawing on the guidance contained within the draft *Guidelines for Environmental Noise Impact Assessment*, produced by the joint working party of the Institute of Acoustics and Institute of Environmental Management and Assessment.

7.1.5 It has been identified that with an appropriate acoustic boundary fence in place (specification provided), noise levels from the proposed recreational facilities will fall below those which currently exist at local dwellings, and that the significance of noise level changes would be 'minor adverse' at worst. In addition, noise levels would fall below applicable absolute criteria taken from BS8233.

7.1.6 Noise break-out from the energy centre installation buildings is predicted to approach or meet the situation described as 'a positive indication that complaints are unlikely' at local dwellings. Accordingly no significant impacts are predicted to arise.

7.1.7 Noise from HGV manoeuvres at the energy centre is predicted to fall well below the prevailing ambient noise levels at local receptors with no change predicted to arise.

7.1.8 Noise from use of the proposed new access road is predicted to fall well below the prevailing ambient noise levels at local receptors with no significant impacts predicted to arise.

7.1.9 Following the opening of the proposed new access road, substantial, beneficial impacts are predicted to arise at dwellings adjacent to Felthouse Lane, due to decreases in site related traffic, including HGVs on this route. With the cessation of the use of the Staffordshire Farmers site, all noise from the vehicles manoeuvring, starting up (often at unsociably early hours) and the sometimes loading/unloading activities will also cease to the considerable benefit of adjoining and nearby neighbours,

7.1.10 Following completion of this assessment, it is considered that noise need not be considered a determining factor in granting planning permission for this application.

Appendix A Glossary Of Acoustic Terminology

NOISE

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq}, L_{A90} etc, according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

An indication of the range of sound levels commonly found in the environment is given in the following table.

TYPICAL SOUND LEVELS FOUND IN THE ENVIRONMENT

Sound Level	Location
0 dB(A)	Threshold of hearing
20 to 30 dB(A)	Quiet bedroom at night
30 to 4 0dB(A)	Living room during the day
40 to 50 dB(A)	Typical office
50 to 60 dB(A)	Inside a car
60 to 70 dB(A)	Typical high street
70 to 90 dB(A)	Inside factory
100 to 110 dB(A)	Burglar alarm at 1m away
110 to 130 dB(A)	Jet aircraft on take off
140 dB(A)	Threshold of pain

ACOUSTIC TERMINOLOGY

dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2x10^{-5}$Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{10} & L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Fast	A time weighting used in the root mean square section of a sound level meter with a 125millisecond time constant.
Slow	A time weighting used in the root mean square section of a sound level meter with a 1000millisecond time constant.
Façade Level	A sound field determined at a distance of 1m in front of a large sound reflecting object such as a building façade.
Ambient Noise Level	The all encompassing noise level measured in $L_{Aeq,T}$. The Ambient Noise Level incorporates background sounds as well as the industrial source noise under consideration.
Residual Noise Level	The Ambient Noise Level in the absence of the industrial source noise under consideration, measured in $L_{Aeq,T}$.
Specific Noise Level	The noise level measured in $L_{Aeq,T}$ attributed to the industrial noise source under consideration alone.
Background Noise Level	The noise level in the absence of the industrial source noise under consideration, measured in L_{A90}.

Appendix B Site Layout, Measurement Locations and Acoustic Fence Alignment

FIGURE B1 PROPOSED SITE LAYOUT AND MEASUREMENT LOCATIONS

FIGURE B2 PROPOSED ACOUSTIC FENCE ALLIGNEMNT

Appendix C Full Tabulated Noise Survey Results

TABLE C1 SUMMARY OF MEASURED NOISE LEVEL DATA FOR MEASUREMENT LOCATION 1 – FREE-FIELD, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{ASmax}	L_{AFmax}
30/05/2008 15:00	01:00:00	59.3	48.8	61.7	77.7	79.6
30/05/2008 16:00	01:00:00	59.9	50.2	61.4	78.8	82.4
30/05/2008 17:00	01:00:00	58.2	50.6	60.2	73.7	74.7
30/05/2008 18:00	01:00:00	58.3	48.9	60.0	75.9	77.5
30/05/2008 19:00	01:00:00	58.2	48.2	59.8	80.1	85.3
30/05/2008 20:00	01:00:00	57.4	43.4	59.4	77.5	79.0
30/05/2008 21:00	01:00:00	57.8	41.0	58.1	85.4	89.3
30/05/2008 22:00	01:00:00	55.3	31.3	56.4	78.4	80.3
30/05/2008 23:00	01:00:00	54.5	30.4	55.5	78.2	80.0
31/05/2008 00:00	01:00:00	49.5	24.0	53.4	75.4	78.1
31/05/2008 01:00	01:00:00	46.3	24.0	50.7	65.1	67.1
31/05/2008 02:00	01:00:00	45.3	22.3	49.3	62.6	64.8
31/05/2008 03:00	01:00:00	46.8	21.2	48.0	71.1	73.6
31/05/2008 04:00	01:00:00	54.4	44.7	58.5	73.5	78.3
31/05/2008 05:00	01:00:00	54.5	42.0	56.0	72.7	74.1
31/05/2008 06:00	01:00:00	56.8	42.6	58.9	76.0	78.9
31/05/2008 07:00	01:00:00	56.2	43.1	59.0	72.9	75.1
31/05/2008 08:00	01:00:00	57.4	45.5	59.3	74.6	76.6
31/05/2008 09:00	01:00:00	57.4	46.5	59.3	77.6	79.0
31/05/2008 10:00	01:00:00	56.3	48.0	58.2	73.5	75.4
31/05/2008 11:00	01:00:00	56.4	46.8	58.1	73.5	74.5
31/05/2008 12:00	01:00:00	56.9	47.9	58.5	74.9	76.5
31/05/2008 13:00	01:00:00	56.5	45.8	58.0	75.8	78.1
31/05/2008 14:00	01:00:00	55.8	46.1	57.4	74.3	76.2
31/05/2008 15:00	01:00:00	56.1	46.2	57.8	76.8	84.2
31/05/2008 16:00	01:00:00	55.2	45.7	57.6	72.8	74.8
31/05/2008 17:00	01:00:00	56.4	46.4	58.0	77.0	78.3
31/05/2008 18:00	01:00:00	56.4	47.1	58.4	76.4	82.2
31/05/2008 19:00	01:00:00	55.5	45.3	57.1	81.2	84.7
31/05/2008 20:00	01:00:00	53.6	41.0	56.6	68.6	72.4
31/05/2008 21:00	01:00:00	51.2	36.1	55.1	68.8	73.5
31/05/2008 22:00	01:00:00	51.9	33.3	55.1	71.5	74.1
31/05/2008 23:00	01:00:00	49.9	33.2	54.4	64.8	67.0
01/06/2008 00:00	01:00:00	48.3	31.5	53.4	65.1	68.2
01/06/2008 01:00	01:00:00	46.7	26.8	51.2	64.4	66.1
01/06/2008 02:00	01:00:00	42.6	24.2	42.5	62.3	65.3
01/06/2008 03:00	01:00:00	48.8	23.3	48.5	77.1	82.4
01/06/2008 04:00	01:00:00	51.3	44.5	53.5	67.4	69.5
01/06/2008 05:00	01:00:00	50.1	39.1	53.7	64.1	68.8
01/06/2008 06:00	01:00:00	53.0	41.5	56.0	74.7	76.1
01/06/2008 07:00	01:00:00	52.2	41.4	56.3	63.3	68.7
01/06/2008 08:00	01:00:00	54.0	42.1	56.9	73.9	77.0
01/06/2008 09:00	01:00:00	54.5	43.4	57.5	75.4	78.7
01/06/2008 10:00	01:00:00	57.2	48.9	60.2	74.0	80.6
01/06/2008 11:00	01:00:00	59.4	52.4	61.0	80.8	84.1
01/06/2008 12:00	01:00:00	56.9	48.5	59.6	74.4	75.8
01/06/2008 13:00	01:00:00	55.5	46.6	58.5	70.5	71.8
01/06/2008 14:00	01:00:00	56.5	45.7	58.1	78.2	79.5
01/06/2008 15:00	01:00:00	55.3	46.5	58.1	69.2	72.0
01/06/2008 16:00	01:00:00	55.8	47.2	58.7	70.3	75.7

01/06/2008 17:00	01:00:00	55.8	46.0	58.5	77.7	80.2
01/06/2008 18:00	01:00:00	56.7	46.2	59.5	74.6	76.1
01/06/2008 19:00	01:00:00	55.4	43.5	58.3	72.3	73.5
01/06/2008 20:00	01:00:00	54.8	40.4	58.4	70.6	75.5
01/06/2008 21:00	01:00:00	53.1	37.2	57.0	65.9	69.8
01/06/2008 22:00	01:00:00	50.0	28.9	54.4	70.5	71.7
01/06/2008 23:00	01:00:00	47.6	26.8	51.4	69.9	76.4
02/06/2008 00:00	01:00:00	47.7	27.9	49.5	75.2	77.1
02/06/2008 01:00	01:00:00	42.9	25.3	39.1	65.4	67.7
02/06/2008 02:00	01:00:00	41.7	25.3	37.4	64.1	67.3
02/06/2008 03:00	01:00:00	45.6	27.3	49.7	63.3	65.1
02/06/2008 04:00	01:00:00	55.0	48.2	58.5	66.4	70.4
02/06/2008 05:00	01:00:00	55.7	43.1	58.4	75.6	77.8
02/06/2008 06:00	01:00:00	58.7	45.2	60.1	87.0	91.5
02/06/2008 07:00	01:00:00	58.4	51.5	60.9	73.6	75.5
02/06/2008 08:00	01:00:00	58.3	50.6	60.4	76.9	78.7
02/06/2008 09:00	01:00:00	57.4	47.5	59.9	74.7	75.4
02/06/2008 10:00	01:00:00	57.5	47.9	60.2	72.1	75.1

TABLE C2 SUMMARY OF MEASURED NOISE LEVEL DATA FOR MEASUREMENT LOCATION 2 – FREE-FIELD, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{ASmax}	L_{AFmax}
22/05/2008 12:00	01:00:00	58.3	44.2	56.3	81.1	83.4
22/05/2008 13:00	01:00:00	58.8	42.8	57.7	80.8	86.4
22/05/2008 14:00	01:00:00	58.7	44.1	57.7	82.6	86.0
22/05/2008 15:00	01:00:00	61.5	43.0	58.7	82.6	89.6
22/05/2008 16:00	01:00:00	58.9	42.7	58.9	82.1	86.9
22/05/2008 17:00	01:00:00	59.5	43.4	58.3	81.4	85.9
22/05/2008 18:00	01:00:00	61.3	44.1	62.5	80.6	84.3
22/05/2008 19:00	01:00:00	61.4	43.1	61.8	83.5	86.1
22/05/2008 20:00	01:00:00	63.2	42.7	61.7	85.4	87.8
22/05/2008 21:00	01:00:00	60.0	40.8	54.0	86.1	88.5
22/05/2008 22:00	01:00:00	58.4	39.2	52.9	81.1	82.7
22/05/2008 23:00	01:00:00	55.0	36.2	44.6	80.8	82.0
23/05/2008 00:00	01:00:00	48.6	38.9	43.8	72.9	74.9
23/05/2008 01:00	01:00:00	42.3	38.3	42.0	67.0	68.9
23/05/2008 02:00	01:00:00	45.7	38.2	42.7	68.4	69.9
23/05/2008 03:00	01:00:00	43.3	38.6	42.4	65.6	67.7
23/05/2008 04:00	01:00:00	58.3	41.7	61.0	79.8	82.6
23/05/2008 05:00	01:00:00	59.5	43.6	58.6	80.4	81.8
23/05/2008 06:00	01:00:00	62.4	44.0	62.3	84.2	90.8
23/05/2008 07:00	01:00:00	61.2	46.6	61.1	81.7	84.5
23/05/2008 08:00	01:00:00	61.6	47.3	60.9	81.7	84.4

TABLE C3 SUMMARY OF MEASURED NOISE LEVEL DATA FOR MEASUREMENT LOCATION 3 – FREE-FIELD, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{ASmax}	L_{AFmax}
22/05/2008 11:00	01:00:00	47.4	41.5	50.4	63.8	69.4
22/05/2008 12:00	01:00:00	46.3	39.8	49.5	59.0	64.8
22/05/2008 13:00	01:00:00	45.7	39.1	47.7	67.8	73.8
22/05/2008 14:00	01:00:00	46.6	38.3	47.2	74.0	79.8
22/05/2008 15:00	01:00:00	42.0	35.3	44.2	63.4	69.1
22/05/2008 16:00	01:00:00	40.8	33.4	43.6	62.0	68.7
22/05/2008 17:00	01:00:00	44.7	33.9	45.6	66.5	73.1
22/05/2008 18:00	01:00:00	45.4	35.0	45.9	67.1	71.6
22/05/2008 19:00	01:00:00	47.2	33.0	44.4	70.8	73.4
22/05/2008 20:00	01:00:00	48.5	34.2	48.5	68.2	72.9
22/05/2008 21:00	01:00:00	42.6	29.8	42.5	70.0	73.3
22/05/2008 22:00	01:00:00	36.2	26.1	37.3	60.7	67.2
22/05/2008 23:00	01:00:00	34.2	25.4	32.7	55.6	59.6
23/05/2008 00:00	01:00:00	33.9	24.8	32.4	53.8	57.1
23/05/2008 01:00	01:00:00	34.0	24.7	30.7	55.4	56.7
23/05/2008 02:00	01:00:00	36.4	24.6	30.5	58.5	60.9
23/05/2008 03:00	01:00:00	26.9	24.6	27.4	42.6	50.6
23/05/2008 04:00	01:00:00	53.9	30.2	57.0	74.6	79.7
23/05/2008 05:00	01:00:00	49.1	38.5	52.0	66.1	69.4
23/05/2008 06:00	01:00:00	45.4	35.9	48.9	57.7	62.6
23/05/2008 07:00	01:00:00	47.7	37.0	48.5	68.2	75.2
23/05/2008 08:00	01:00:00	46.8	36.6	49.5	64.2	68.2
23/05/2008 09:00	01:00:00	44.4	35.1	47.3	63.0	68.9
23/05/2008 10:00	01:00:00	43.8	35.3	46.2	63.0	68.8

TABLE C4 SUMMARY OF MEASURED NOISE LEVEL DATA FOR MEASUREMENT LOCATION 4 – FREE-FIELD, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{ASmax}	L_{AFmax}
26/04/2006 19:39	00:05:00	50.8	39.3	48.5	70.9	74.6
26/04/2006 19:44	00:05:00	43.0	40.1	44.2	57.2	64.8
26/04/2006 19:49	00:05:00	46.3	42.1	47.9	57.2	60.0
26/04/2006 19:54	00:05:00	52.9	41.7	47.2	72.4	76.4
26/04/2006 19:59	00:05:00	50.5	41.7	47.7	69.7	72.8
26/04/2006 20:04	00:05:00	57.2	40.9	49.3	75.3	79.4
26/04/2006 20:09	00:05:00	49.1	42.5	47.4	68.0	71.4
26/04/2006 20:14	00:05:00	46.3	41.9	49.3	51.7	55.3
26/04/2006 20:19	00:05:00	50.6	41.9	48.6	70.0	72.9
26/04/2006 20:24	00:05:00	60.0	41.9	53.1	79.1	81.4
26/04/2006 20:29	00:05:00	45.8	41.7	48.8	50.8	54.4
26/04/2006 20:34	00:05:00	42.6	40.4	42.6	47.0	50.4
27/04/2006 01:29	00:05:00	38.9	36.1	38.2	57.7	65.9
27/04/2006 01:34	00:05:00	38.4	36.6	39.4	43.2	48.3
27/04/2006 01:39	00:05:00	34.7	33.2	36.0	38.0	40.8
27/04/2006 01:44	00:05:00	34.7	33.1	36.3	40.7	44.6
27/04/2006 01:49	00:05:00	35.7	33.7	35.7	45.4	48.7
27/04/2006 01:54	00:05:00	36.0	35.1	36.5	42.1	47.3

TABLE C5 SUMMARY OF MEASURED NOISE LEVEL DATA FOR MEASUREMENT LOCATION 5 – FREE-FIELD, dB

Period Start	Duration	$L_{Aeq,T}$	$L_{A90,T}$	$L_{A10,T}$	L_{ASmax}	L_{AFmax}
11/05/2006 12:00	01:00:00	45.9	40.4	48.0	63.1	68.1
11/05/2006 13:00	01:00:00	58.4	40.1	53.1	81.0	82.3
11/05/2006 14:00	01:00:00	57.6	42.6	60.7	77.3	78.7
11/05/2006 15:00	01:00:00	42.8	38.5	45.0	59.2	60.7
11/05/2006 16:00	01:00:00	43.5	39.7	44.8	63.3	69.5
11/05/2006 17:00	01:00:00	47.9	41.0	45.0	71.4	75.0
11/05/2006 18:00	01:00:00	42.1	37.8	43.7	56.8	59.8
11/05/2006 19:00	01:00:00	46.7	40.9	47.5	71.5	77.8
11/05/2006 20:00	01:00:00	46.4	41.7	47.5	67.4	73.5
11/05/2006 21:00	01:00:00	51.6	35.4	45.8	81.3	88.9
11/05/2006 22:00	01:00:00	41.5	34.6	43.4	57.8	59.4
11/05/2006 23:00	01:00:00	38.5	33.8	40.2	59.7	64.3
12/05/2006 00:00	01:00:00	37.0	32.2	39.2	52.3	53.7
12/05/2006 01:00	01:00:00	35.4	32.2	37.2	45.0	46.5
12/05/2006 02:00	01:00:00	38.4	32.6	39.2	53.4	55.4
12/05/2006 03:00	01:00:00	39.2	33.3	40.0	54.7	57.0
12/05/2006 04:00	01:00:00	50.8	32.0	49.0	81.4	89.8
12/05/2006 05:00	01:00:00	46.6	39.8	48.7	66.1	72.0
12/05/2006 06:00	01:00:00	45.4	40.8	46.4	66.3	71.9
12/05/2006 07:00	01:00:00	47.2	43.2	48.9	59.5	62.4
12/05/2006 08:00	01:00:00	48.1	40.7	49.3	71.2	75.6
12/05/2006 09:00	01:00:00	45.0	39.8	47.4	58.0	64.2
12/05/2006 10:00	01:00:00	46.3	40.9	48.0	69.5	75.7
12/05/2006 11:00	01:00:00	47.7	40.6	46.6	70.4	76.2

Appendix D Limitations To This Report

NOTES ON LIMITATIONS

This report has been prepared for the titled project or named part thereof and should not be used in whole or part and relied upon for any other project without the written authorisation of WSP Environmental Limited. WSP Environmental Limited accept no responsibility or liability for the consequences of this document if it is used for a purpose other than that for which it was commissioned. Persons wishing to use or rely upon this report for other purposes must seek written authority to do so from the owner of this report and/or WSP Environmental Limited and agree to indemnify WSP Environmental Limited for any and all loss or damage resulting therefrom. WSP Environmental Limited accepts no responsibility or liability for this document to any other party other than the person by whom it was commissioned.

The findings and opinions expressed are relevant to the dates of the site works and should not be relied upon to represent conditions at substantially later dates. Opinions included therein are based on information gathered during the study and from our experience. If additional information becomes available which may affect our comments, conclusions or recommendations WSP Environmental Limited reserve the right to review the information, reassess any new potential concerns and modify our opinions accordingly.