Noise Impact Assessment

Client: Mr Harry Backhouse

Site Address: Outbarn
Clough Bottom Farm
Talbot Bridge
Clitheroe
Lancashire
BB7 3NA

Job Reference: 340HB

Date: 08/06/15

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Quality Assurance

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Document Reference:	**340HB**

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1. Introduction

NOVA Acoustics Ltd has been commissioned by Mr Harry Backhouse to provide a noise assessment in support of planning application, No. 3/2015/0302, for the variation of condition 6 of planning permission No. 3/2012/0490, to allow use as a wedding venue for up to 40 days per year. The alteration of use will potentially increase the ambient noise profile of the area, which may result in the amenity of local residents being reduced. This report presents the results of the environmental noise survey undertaken in order to measure the prevailing ambient noise levels with and without the wedding venue in operation. This comparison allows a noise impact analysis to be undertaken and appropriate noise control measures to be defined.

2. Background

The building in question, The Outbarn, currently operates as a training centre, with the proposed change of use to host weddings on 40 days per year. The venue will typically be available for use for the clients from 14:00 on the day. The typical operation will be for the evening entertainment to begin from 19:00 and finish at 00:00. The last guests are expected to leave by 01:00am. The Outbarn is located on the land of Mr Harry Backhouse's at Clough Bottom Farm; the surrounding area is primarily farmland and the Outbarn is surrounded by fields on all sides. Being a rural location there are limited noise sources affecting the ambient noise profile of the area. The lane in which Clough Bottom Farm lies, leads to a private road and facilitates the few dwellings along it, with limited traffic. Other secondary noise sources are from the surrounding farms operating plant/machinery and birdsong. The area has a very low noise profile.

Figure 1.0 outlines the noise sensitive receptors (NSR's) that have been identified as having potential risk to their amenity through the operation of the Outbarn.

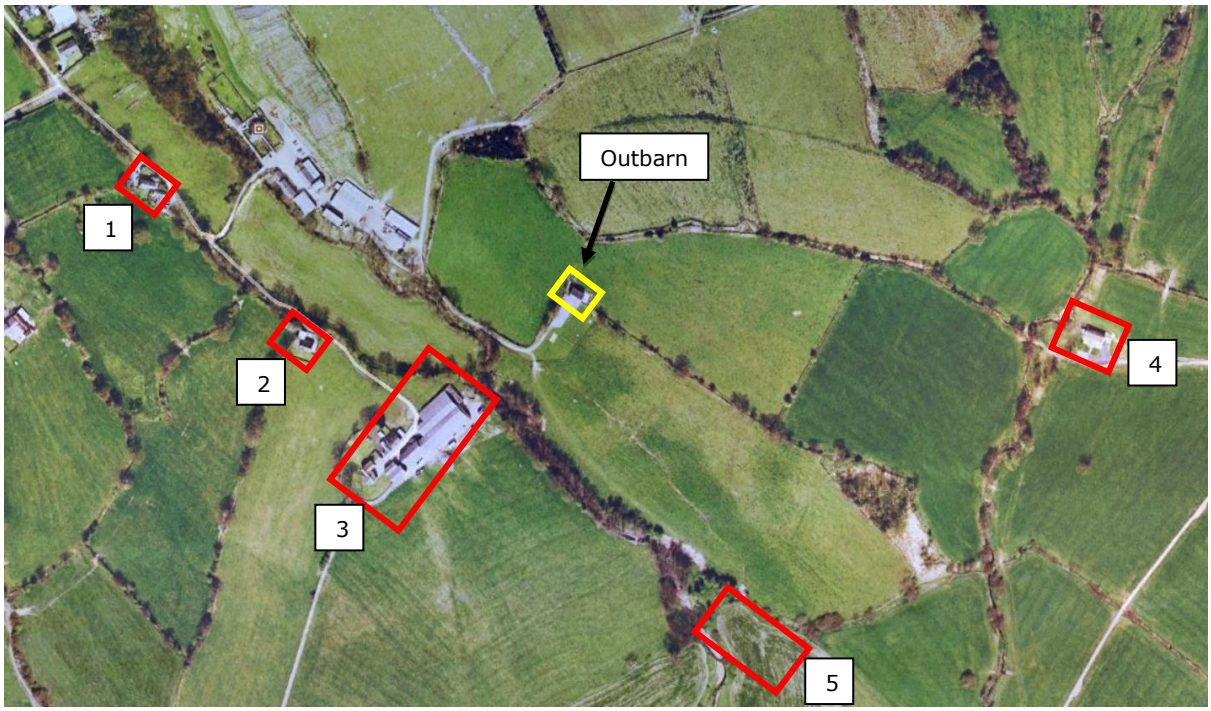


Figure 1.0

Distance to NSR's
1 – Moor End – Distance: 371m
2 – Oakmere – Distance: 235m
3 – Rigglesmire – Distance: 136m
4 – Sandy Ford – Distance: 461m *(Not shown on map)*
5 – Cow Hey – Distance: 340m

Table 1.0

NSR's 1 – 3 have been chosen due to the proximity to the barn and NSR's 4 – 5 have been chosen due to the direction the venue is facing. The main façade of the venue is shown in Figure 2.0 and is predominantly double glazing, which is the weakest point of the building. The doors also remain open during nicer weather to allow guests to be outside, this occurs whilst music is playing at a lower level, the doors were predominantly closed during the louder evening entertainment. NSR's 4 – 5 are defined as higher risk due to this.

Figure 2.0

3. Legislation, Policy and Guidelines

The methodology within this report has been discussed and agreed with Mr James Russell, Head of Environmental Health at Ribble Valley Council. The following legislation, policy and guidance will be used to provide a basis for this noise impact assessment.

3.1 NPPF (National Planning Policy Framework) and NPSE

The NPPF is the overarching planning and policy document that applies to all new developments in England. The guidance and assessment criteria given (or referred to) in this document can therefore be applied to all standards in terms of assessing the suitability of granting planning permission with respect to noise impact.

The NPPF states that planning policies and decisions should aim to:

- Avoid noise giving rise to significant adverse impact on health and quality of life as a result of a new development;
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from new developments, including through the use of conditions.
- Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions placed upon them because of changes in nearby land uses since they were established; and
- 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.

With specific reference to noise impact, the NPPF document refers to the noise policy statement for England (NPSE). The NPSE provides guidance which enables decisions to be made regarding the acceptable noise burden to place on society, using three key phrases – the No Observed Effect Level (NOEL), the Lowest Observed Adverse Effect Level (LOAEL) and the Significant Observed Adverse Effect Level (SOAEL).

In order to provide a consistent frame of reference (and to allow a view to be taken on the suitability of the application with reference to the relevant planning guidance), the levels criteria given in other relevant documents used in assessment will be re-framed in terms of the following:

NOEL: The level of noise impact below which no effect can be detected, and there would be no discernible negative effect on health or quality of life.

LOEL: The lowest level of noise impact which adverse effect on health or quality of life can be detected. Designing noise impacts to be less than or equal to LOAEL should see that any adverse effects on health or quality of life are negligible.

SOAEL: The level above which significant adverse effect to health and quality of life occur. Designs should always seek to avoid a noise impact, which would be categorised as SOAEL.

3.2 Draft Guidelines for Noise Impact (2002)

A joint working party of the Institute of Acoustics and Institute of Environment Management and Assessment has produced a draft guidance document on noise impact assessment called Guidelines for Noise Impact Assessment. Although these guidelines are at a draft stage at present they are of use for this assessment. The Working Party has set out an example of how changes in noise level may be assessed, as shown in Table 3.2.

Sound Level Change dB(A)	**Subjective Response**	**Impact Description**
0.0	No change	None
0.1 – 2.9	Imperceptible change in loudness	Slight

3.0 – 4.9	Perceptible change in loudness	Moderate
5.0 – 9.9	Up to a doubling or halving of loudness	Substantial
10.0 or more	More than doubling or halving in loudness	Severe

Table 3.2

The draft guidelines state that the assessor should set out assessment criteria specific to each assessment. However, the above criteria reflect key benchmarks of human response to changes in noise level. For example, a 3dB (A) change is generally taken to be the smallest change perceptible to the human ear and a 10dB (A) change is heard as a doubling or halving of the loudness of a source. The 5dB (A) category has been included as it provides a greater definition of the assessment of changes in noise level.

The above impact scale is used in the assessment of construction noise and the changes in road traffic noise.

4. Environmental Noise Survey

4.1. Objectives

The purpose of this report is to:

- Determine the existing noise climate in the location of the proposed wedding venue.
- Determine the noise level during an event at each of the NSR's
- Analyse the variation in noise levels considering overall noise levels and the 1/3 octave frequency bands between 63Hz to 160Hz.
- Detail the proposed attenuation/design necessary to protect the amenity of the occupants of the surrounding NSR's.

4.2. Measurement Procedure

A long term environmental measurement was undertaken at one position, Measurement Position 0 (MP0), as shown in Appendix A. This locations was chosen in order to collect data representative of the typical background noise levels whilst no events were in progress. Continuous monitoring was undertaken for the duration of the survey from 12:00pm on the 22nd May 2015 to 18:50 23rd May 2015. The noise levels at MP0 were extremely low due to the rural location.

Short term manned monitoring was undertaken across NSR's 1 - 5, these are labelled as MP1 – MP5, as shown on indicative site plan in Appendix A. A schedule of monitoring was carried out during an event, to gain a sample of noise levels at all 5 NSR's. NSR's 1 – 3 were defined as lower risk so 30 – 40 minute periods were sampled during the evening. NSR's 4 – 5 were defined as higher risk, so 1 hour measurements were undertaken with a second sound level meter during the evening.

Weather conditions were dry with light winds and therefore suitable for the measurement of environmental noise. The measurement procedure generally complied with BS7445:1991

"Description and measurement of environmental noise, Part 2 – Acquisition of data pertinent to land use"

4.3. Equipment

The equipment was calibrated before and after use and no abnormalities were observed.
The equipment used was as follows:

- Class 1 Svantek 977 Sound Level Meter
- Class 1 SV31 Calibrator
- Class 1 Cesva SC420 Sound Level Meter
- Class 1 Cesva CB05 Calibrator

Traceable calibration certificates can be provided on request.

5. Results

5.1. Background Noise Survey

The $L_{Aeq,\ 5min}$, $L_{Amax,\ 5min}$, $L_{A10,5min}$ and $L_{A90,5min}$ acoustic parameters and 1/3 octave data between the 63 and 160Hz bands were measured through the duration of the survey. The measured noise levels are shown as a time history in Appendix B. A summary is presented in Table 5.1 for the background noise measurement position for the relevant operating hours of the venue.

	Background Noise Survey								
Time	**$L_{Aeq,t}$**	**$L_{Amax,t}$**	**$L_{A10,t}$**	**$L_{A90,t}$**	**63Hz**	**80Hz**	**100Hz**	**125Hz**	**160Hz**
18:00 – 19:00	45.3	70.1	46.2	42.5	42.9	44.9	47.3	42.3	35.9
19:00 – 20:00	48.6	63.2	50.5	44.7	38.9	47.3	45.0	36.5	33.5
20:00 -21:00	48.1	62.4	49.8	45.5	40.8	45.0	47.1	41.1	32.6
21:00 – 22:00	38.6	62.7	38.5	36.3	38.4	38.8	45.0	45.3	38.5
23:00 – 00:00	36.3	43.4	36.7	36.1	32.5	31.2	29.7	28.2	29.2
00:00 – 01:00	**36.0**	**42.5**	**36.1**	**35.9**	**30.3**	**28.0**	**28.4**	**28.5**	**25.6**
01:00 – 02:00	35.9	41.3	35.9	35.7	32.0	28.4	25.5	23.7	24.6

Table 5.1

Discussion:

The noise levels shown in table 5.1 indicate that the background noise environment is very low, especially during the 23:00 – 02:00 period. The background noise levels that will be used as representative of the area and proposed period of use of the venue are highlighted within the table.

5.2. Ambient Noise Survey

The $L_{Aeq,\ 10sec}$, $L_{Amax,\ 10sec}$ acoustic parameters and 1/3 octave data were measured through the duration of the survey. The measured noise levels are shown as a time history and can be found in

Appendix C. A summary is presented in Table 5.2 for the ambient noise measured at NSR's 1 – 5 during the event.

		Ambient Noise Survey						
Time	**NSR**	**$L_{Aeq,t}$**	**$L_{Amax,t}$**	**63Hz**	**80Hz**	**100Hz**	**125Hz**	**160Hz**
20:15-20:50	1	49.2	68.1	45.2	44.2	43.5	42.4	39.5
22:35-23:25	1	34.2	56.4	39.6	37.0	36.3	33.0	30.6
19:40-20-10	2	48.0	63.3	44.4	44.1	40.6	39.1	39.5
21:36-22:30	2	45.5	66.4	40.9	37.2	35.9	32.5	29.1
19:00-19:27	3	52.5	87.5	44.1	43.1	43.6	40.1	40.7
20:57-21:30	3	47.5	69.1	43.7	40.2	36.6	33.9	33.3
23:00-01:44	3	40.7	68.4	45.6	39.2	37.0	34.0	31.6
19:20-20:27	4	46.1	79.7	42.1	40.9	40.8	38.9	38.6
22:00-23:00	4	35.3	63.0	38.9	35.1	31.6	29.1	26.2
00:25-02:00	4	38.3	82.5	42.3	39.4	37.8	36.8	35.6
20:50-21:50	5	48.3	84.3	39.7	38.8	34.6	31.5	29.3
23:15-00:15	5	35.6	65.2	38.2	35.8	32.5	31.9	28.1

Table 5.2

5.3. Source Noise Survey

The $L_{Aeq,\ 5min}$, $L_{Amax,\ 5min}$, acoustic parameters and 1/3 octave data were measured within the venue during operation. The measured noise levels are shown as a time history and can be found in Appendix D, a summary is presented in Table 5.3.

	Source Noise Survey						
Time	**$L_{Aeq,t}$**	**$L_{Amax,t}$**	**63Hz**	**80Hz**	**100Hz**	**125Hz**	**160Hz**
22:06-22:08	91.9	99.0	89.2	85.0	81.6	84.9	83.7

Table 5.3

6. Noise Criteria

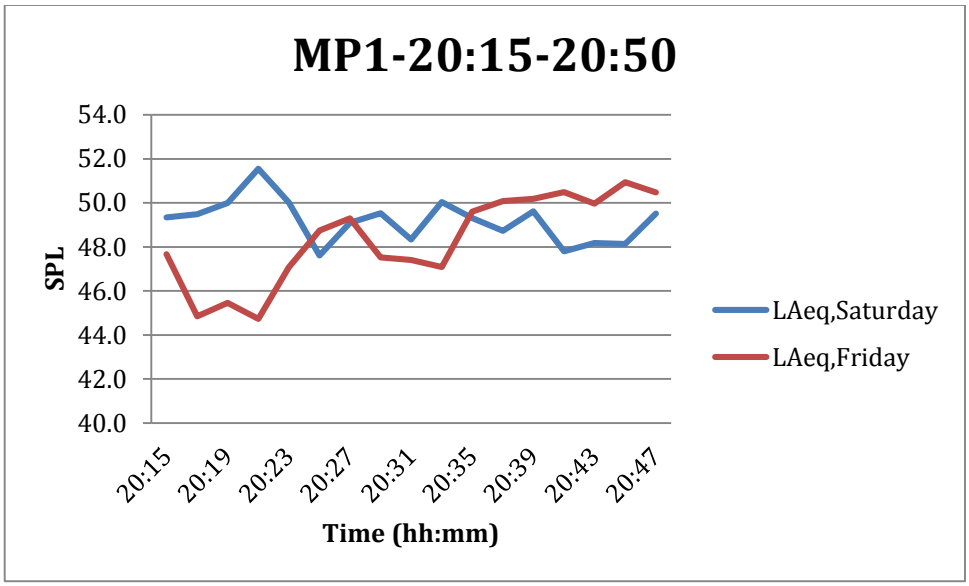
The noise criteria to ensure minimal impact from the wedding venue is for the specific noise level from the music noise to be 5dB below the background noise level (LA90,t). This requirement has to be met for an overall 'A' weighted value and between 63Hz and 160Hz.

7. Noise Impact Assessment

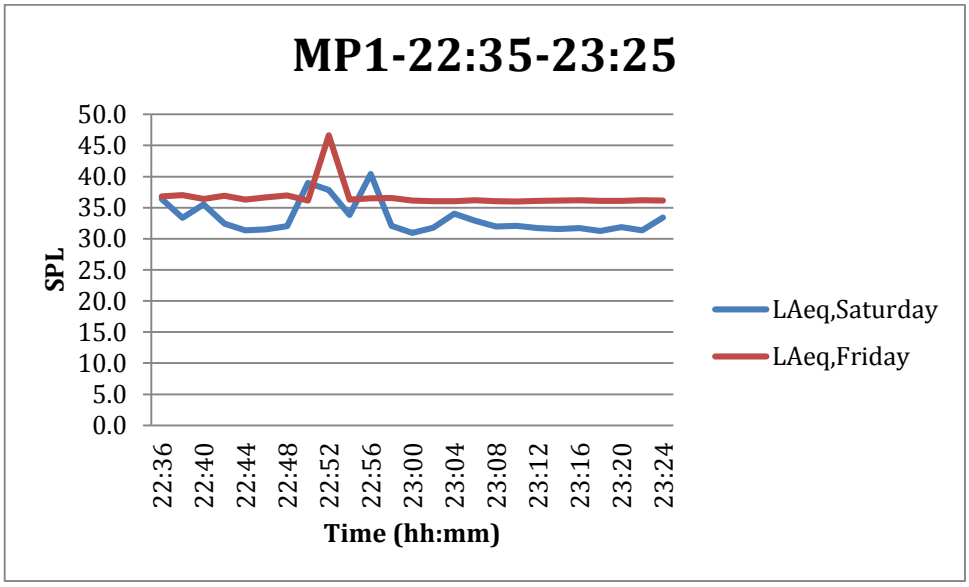
7.1. Noise profile comparison between Friday 22nd and Saturday 23rd

The noise profile of the area between the day in which the venue was in operation, Saturday, and the day before, Friday, has been compared . The following plots show this comparison in terms of LAeq for all the measurements taken at every NSR.

7.1.1. Comparisons at NSR 1



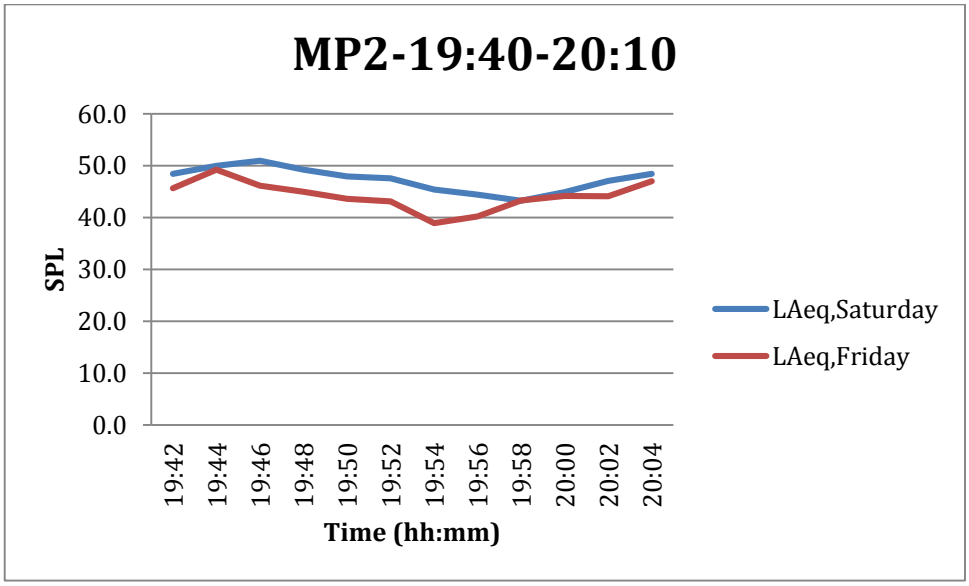
Plot 1



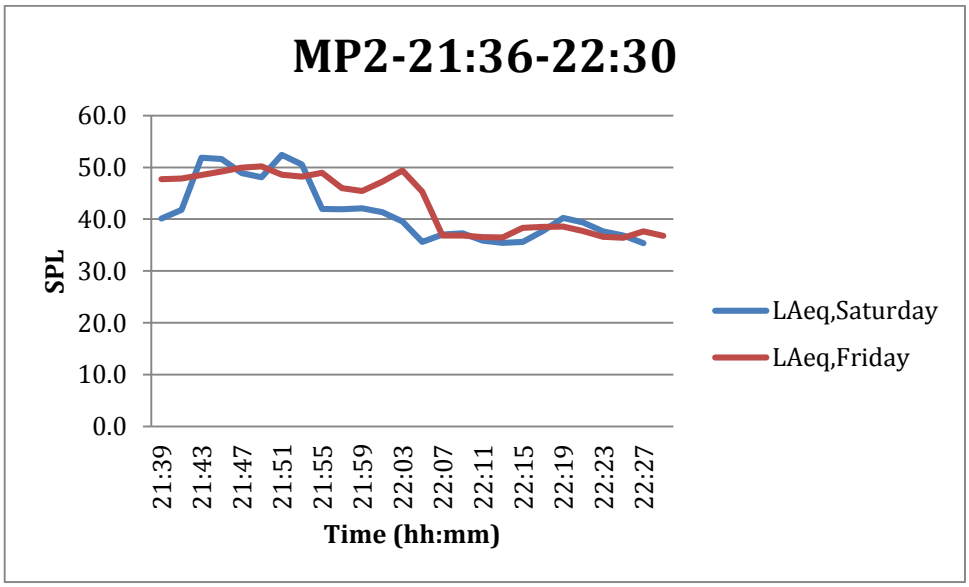
Plot 2

NSR1 is the second furthest receiver. Plots 1 and 2 show that there is not a significant increase in ambient noise levels due to the operation of the venue. What is more, for the majority of time, the levels are lower during the Saturday than during the Friday. This means that NSR1 is not a receiver affected by the operation from the wedding venue.

7.1.2. Comparisons at NSR 2



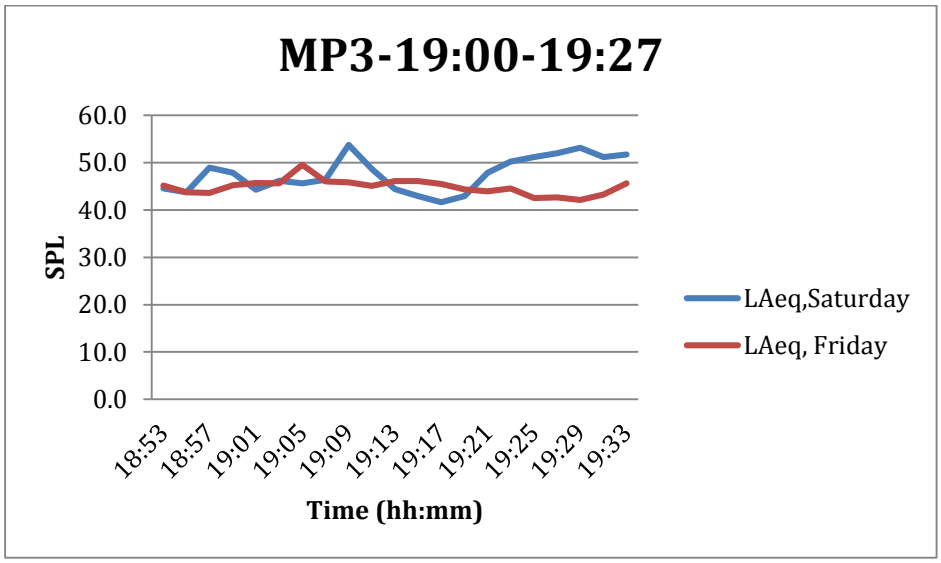
Plot 3



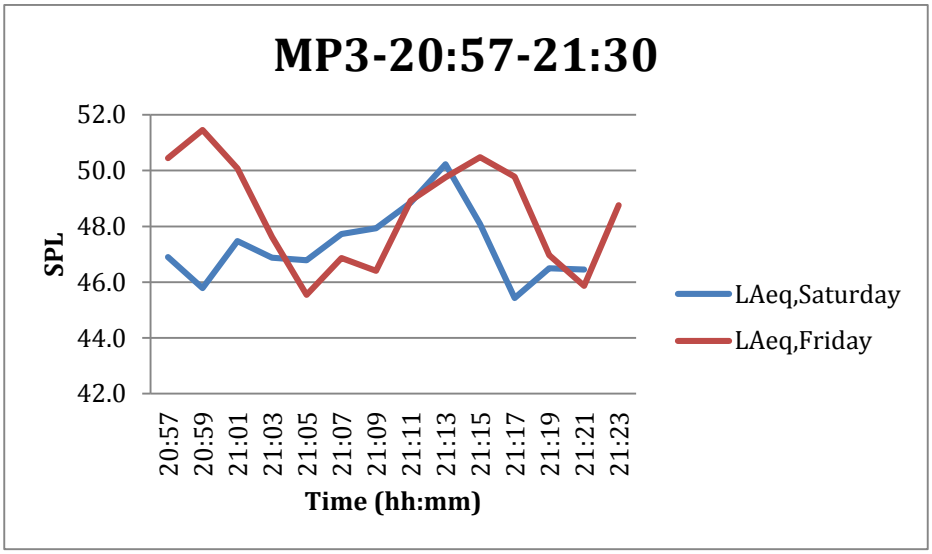
Plot 4

Plots 3 and 4 show the comparison at receiver 2. Plot 3 shows that the level during Saturday is, for almost that entire half an hour, above the levels on Friday. This measurement was taken between 19:40 and 20:10, at the beginning of the celebration. Plot 4 does not show a clear increase in ambient noise levels due to the operations of the venue. This measurement was taken between 21:36 and 22:30, the central time of the celebration, once the music was on and people were in and out the venue. The two curves show that for short periods of time, the levels on Saturday were above those on Friday, whereas for most of the time it was the opposite. Notes from the engineer onsite indicate that noise from the venue was slightly audible.

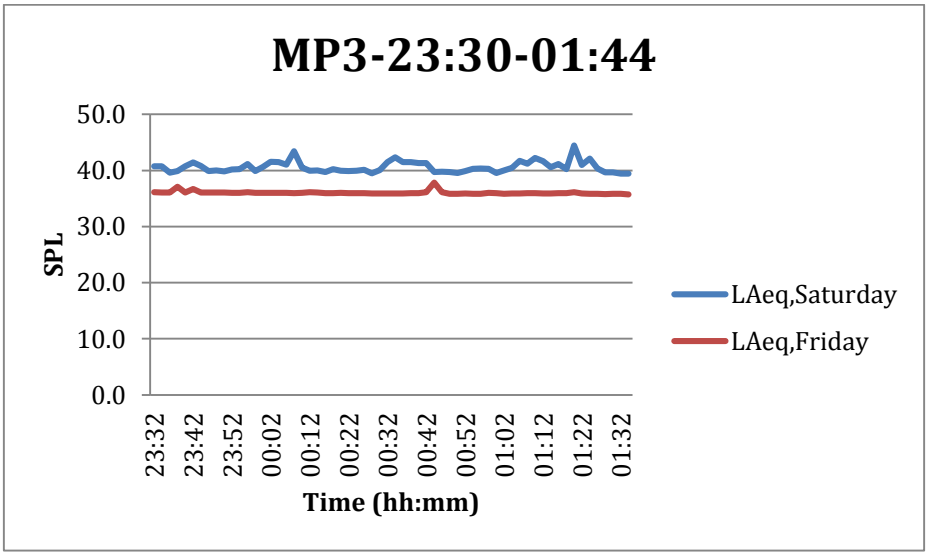
7.1.3. Comparisons at NSR 3



Plot 5



Plot 6

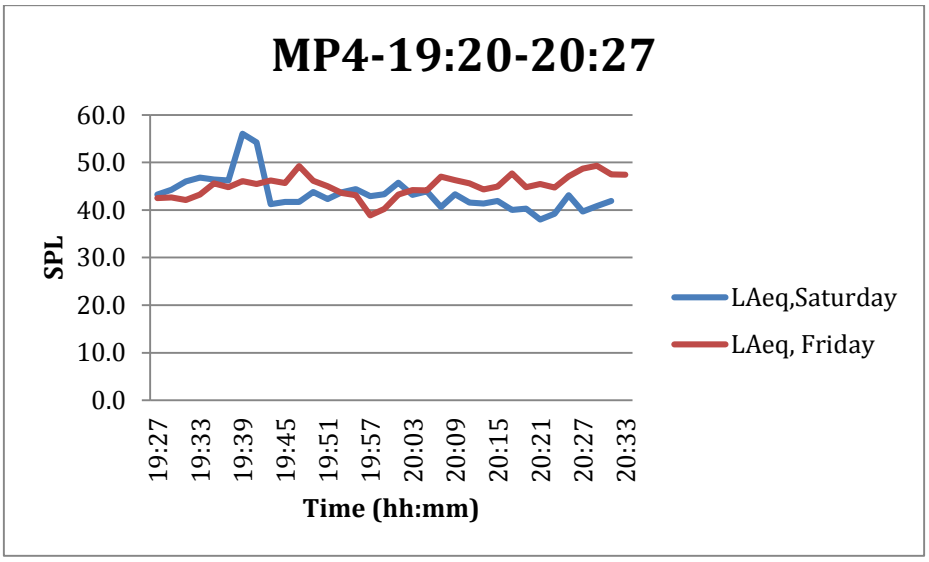


Plot 7

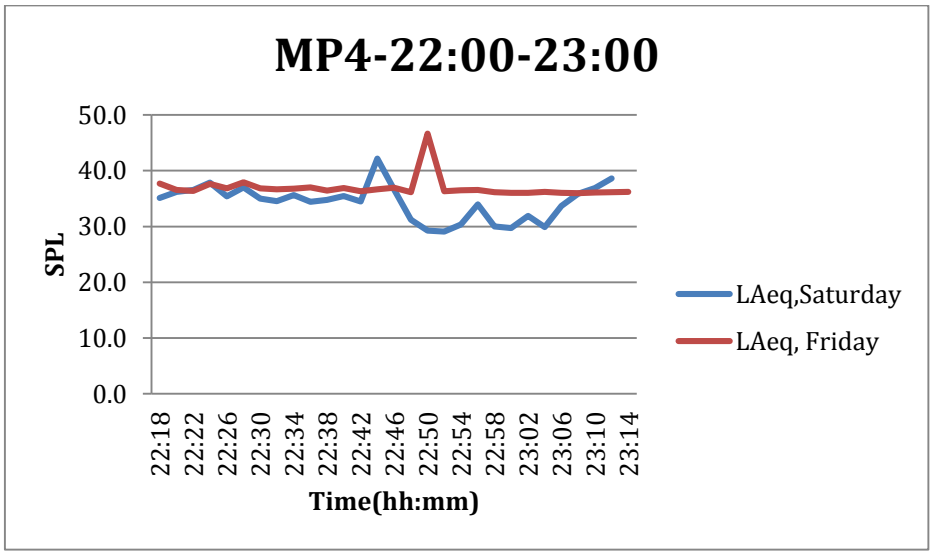
For receiver 3, plots 5 and 6 do not indicate an increase in ambient noise levels due to the operations in the venue. Plot 7 shows an increase in ambient noise levels of around 5dB. However, notes from the engineer onsite indicate that it was "very quiet" and that the dominant source of noise at that position at that time of the night was a stream that runs along the farm.

According to the subjective analysis that the engineer carried out onsite, for NSR1-3, the noise coming from the venue was slightly audible at NSR2 and 3 but not audible at all at NSR1. The most audible sources of noise during day time were birdsongs and the stream marked as a blue line in appendix A. During night time birdsongs ceased and the prevailing source of noise was the stream and the noise from the venue was slightly audible at NSR3 and 2 and imperceptible at NSR1. The ambient noise level at these receivers during night time, from 22:00 on, can be characterised as "very quiet" both without the venue and with the venue in operation.

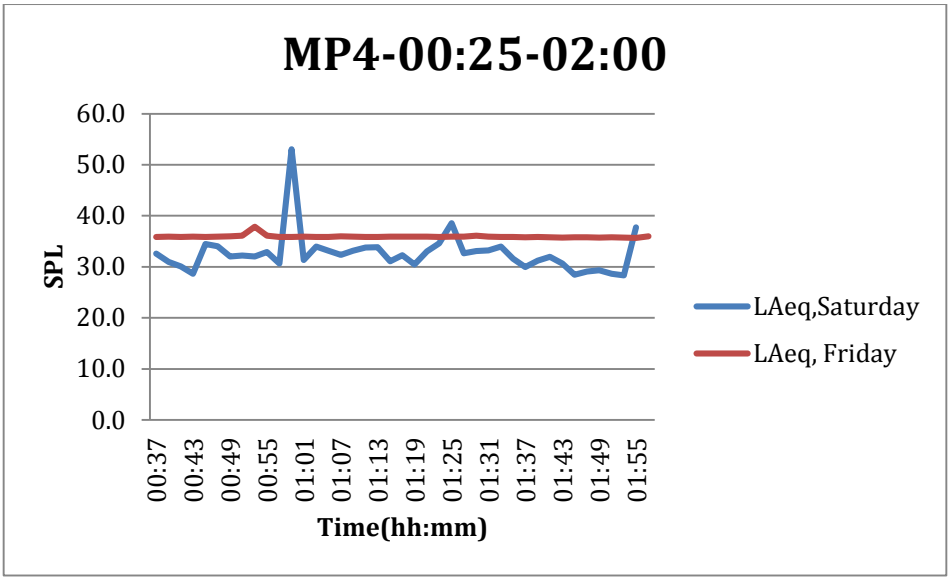
7.1.4. Comparisons at NSR 4



Plot 8



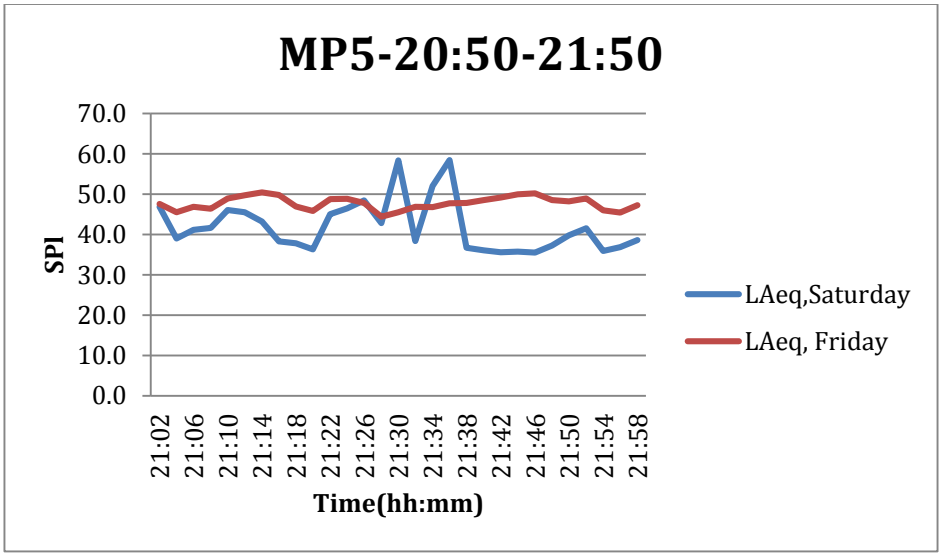
Plot 9



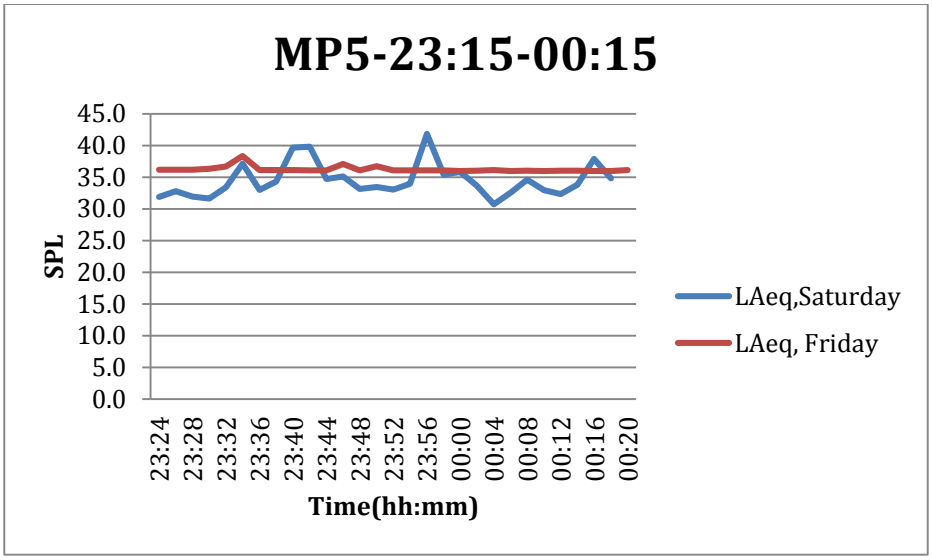
Plot 10

None of the plots above show an increase in ambient noise levels due to the operation of the venue. In fact, for the majority of the time, the ambient noise levels were greater on Friday than on Saturday. This is a positive indication for the preservation of the amenity of the area. Notes taken on site indicate that noise from the venue was audible at NSR4.

7.1.5. Comparisons at NSR 5



Plot 11



Plot 12

As well as with NSR4, the ambient noise levels during the Saturday were not greater than during the Friday and the noise from the venue was also audible. None of the plots above show correlation between the operation of the venue and a significant increase in ambient noise levels.

8. Recommendations

The main concern with the venue is directivity. The layout of the building projects the sound towards the east, which is the direction in which the NSR4 and NSR5 (southeast) are located. As it can be seen in Figure 2.0, the eastern wing of the building has a circular shaped façade and is predominantly glazing. These are the weakest points of the façade in terms of noise reduction and therefore pro-active management should be implemented to reduce the impact from them. Whilst amplified music is being played, the doors and windows should be closed, as much as practically possible, to minimise noise breakout.

To further control noise breakout a noise limiting device should be installed to control the noise emissions from the venue. A simulation of the noise emissions from the venue after the implementation of mitigation measures has been carried out. The acoustic software SoundPlan Essential 3.0 has been used to model the venue and its surroundings and to predict the noise levels at the sensitive receivers. A reduction in noise emission levels has been implemented according to the reduction that would be obtained with the installation of a limiter. The modelling has considered a worst case scenario, with all doors on the eastern façade being open.

Table 8.0 shows a comparison between the noise levels at the measurement positions without and with the sound limiter.

Noise levels at receivers					
Measured Noise Level		**Limiter 90dBA**		**Limiter 85dBA**	
NSR 1	21.1	NSR 1	18.2	NSR 1	13.2
NSR 2	26.1	NSR 2	23.2	NSR 2	18.2

NSR 3	38.1	NSR 3	35.2	NSR 3	30.2
NSR 4	37.1	NSR 4	33.6	NSR 4	28.6
NSR 5	36.5	NSR 5	34.2	NSR 5	29.2

Table 7.2

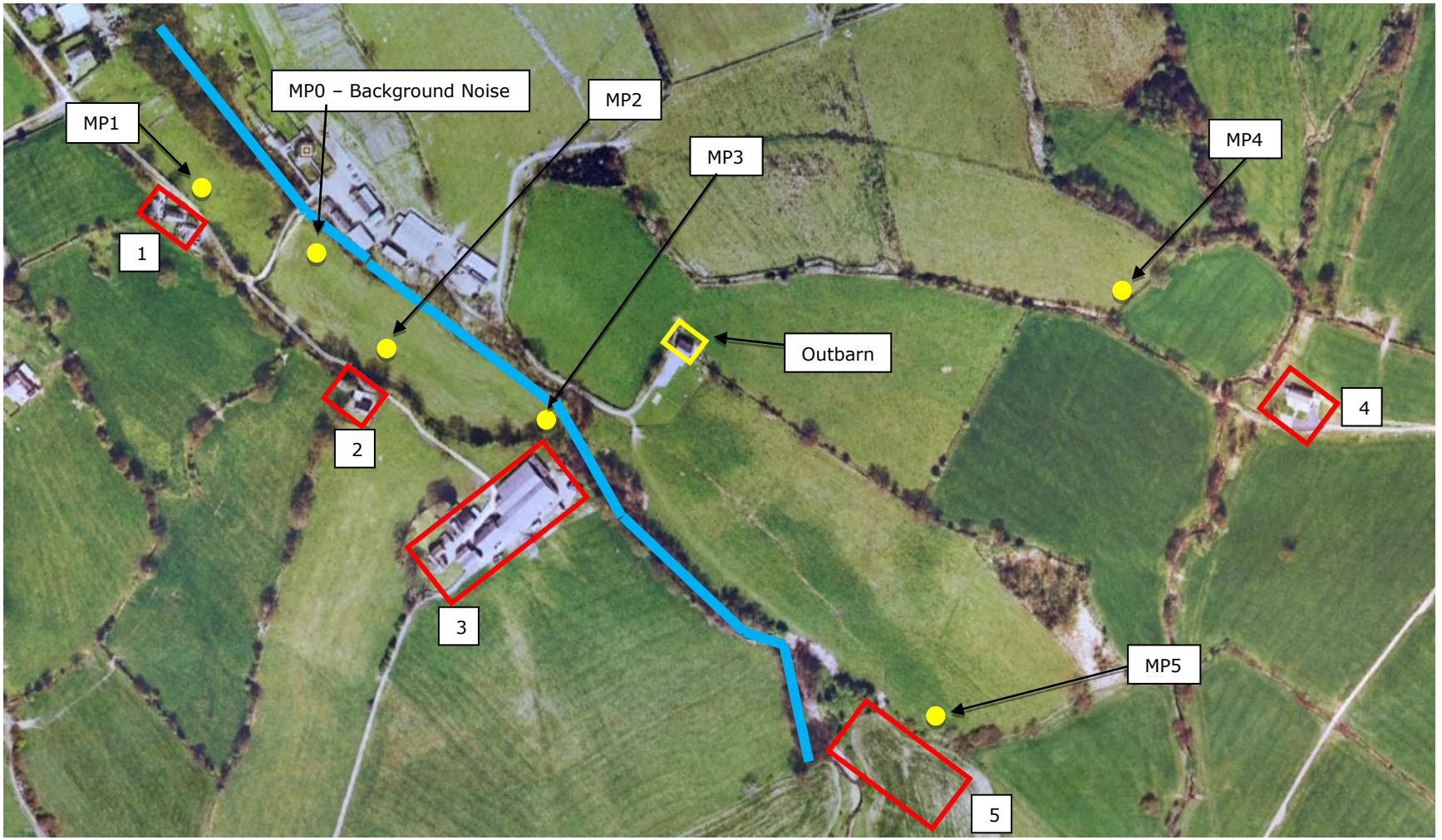
The limit set for the noise levels at the receivers is to be 5dBA below background noise, which is 30.9 dBA. It can be seen in table 8.0 that the 85dBA limit, shows the levels at each NSR fall within the required noise criteria. Noise maps depicting the receivers and the area are shown in appendices E and F. The noise limit as predicted should be in the range of 85 – 90dB(A), this will need calibrating on site to ensure the music noise is not perceptible on the boundary positions used for NSR 1 – 5.

9. Conclusion

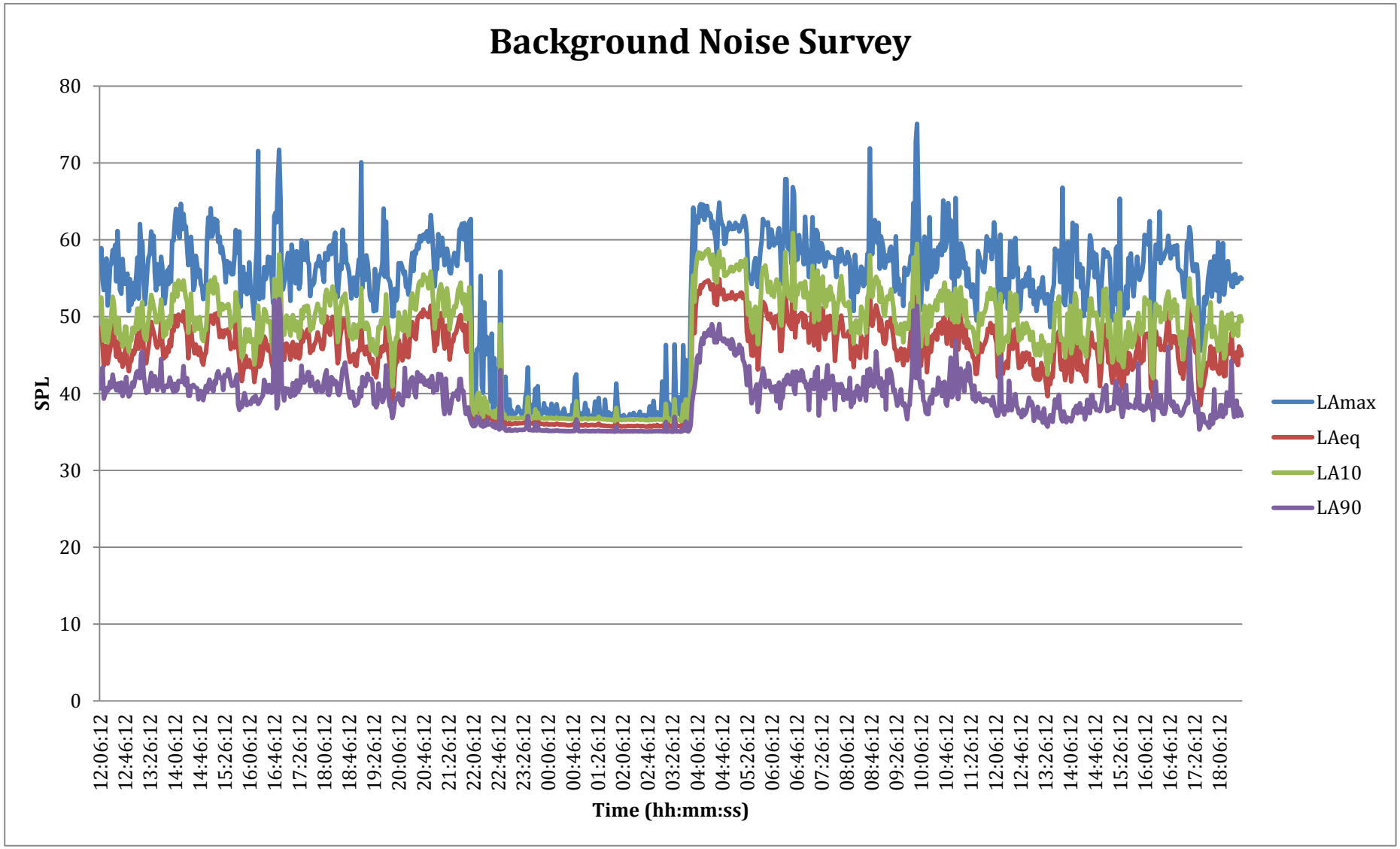
An environmental noise survey has been undertaken at Outbarn, Clough Bottom Farm, Talbot Bridge, Clitheroe, Lancashire BB7 3NA. The environmental noise survey involved two phases. In the first phase the noise profile of the area was monitored while the source under study was not in operation. In the second phase, measurements were undertaken while the source was in operation in order to compare the ambient noise levels to those obtained in the first phase.

The comparison allowed an assessment of the effect of the source upon the amenity of the sensitive receivers and recommendations are provided in section 8.0.

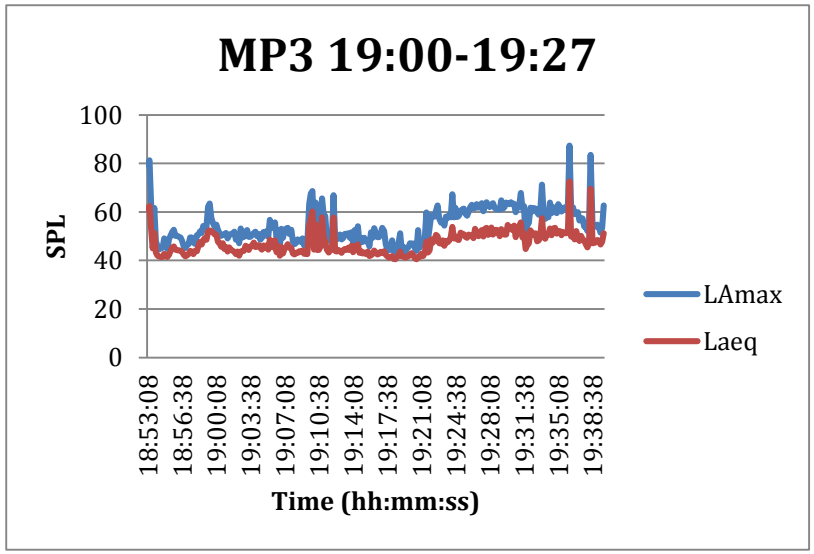
APPENDIX A – Measurement Positions

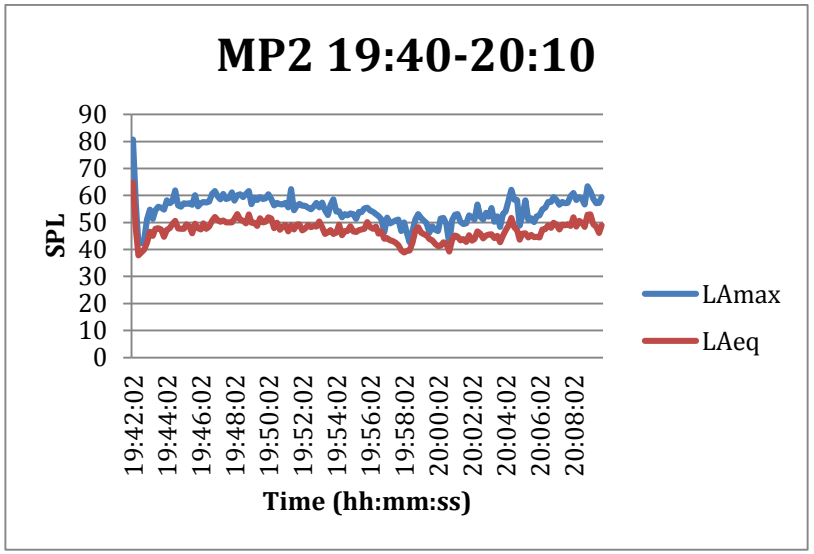


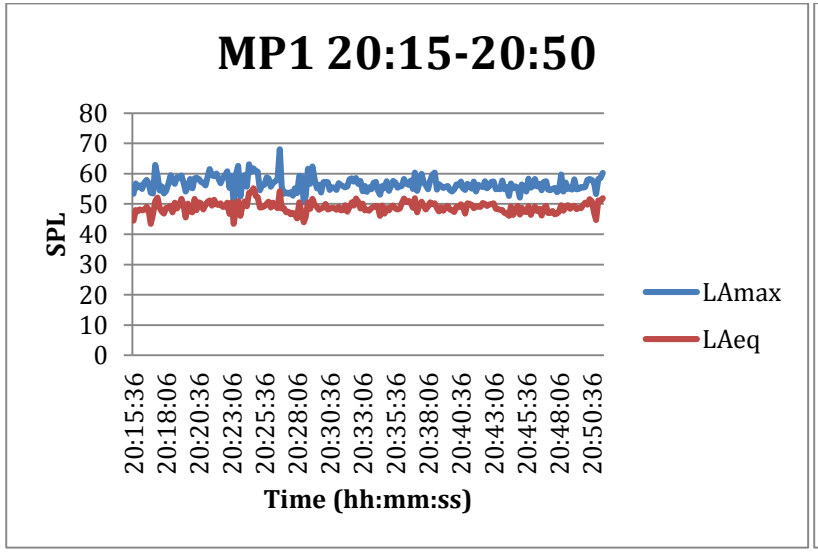
APPENDIX B – Background Noise Survey Time History

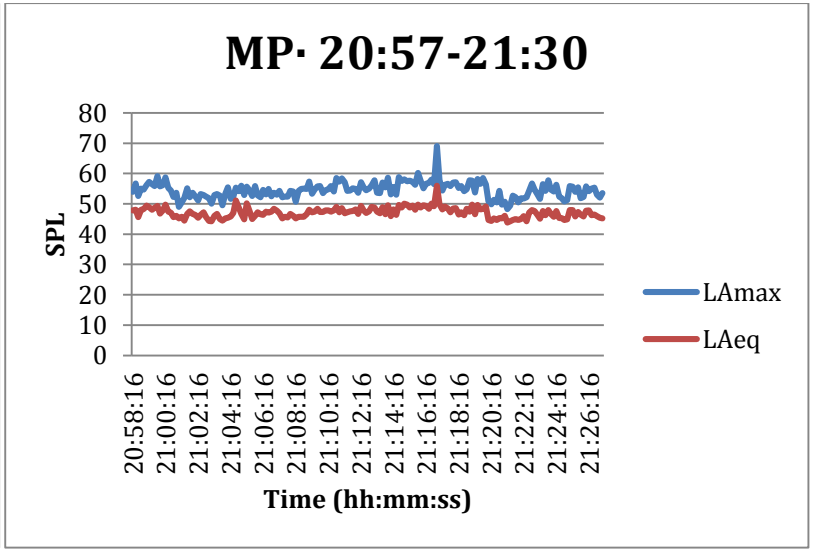


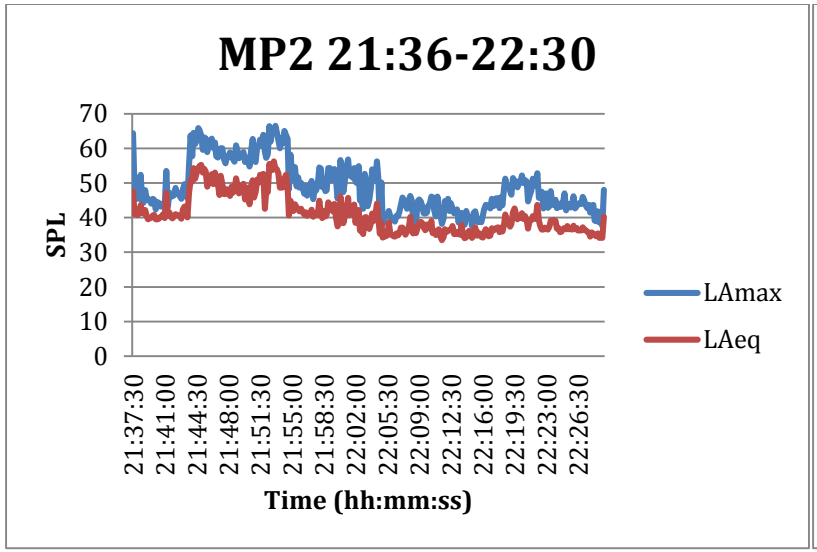
APPENDIX C – Ambient Noise Survey Time History

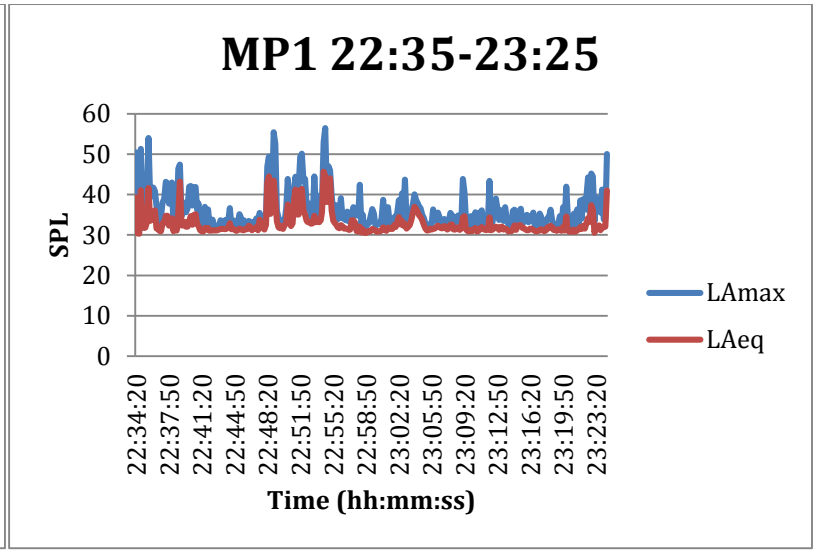


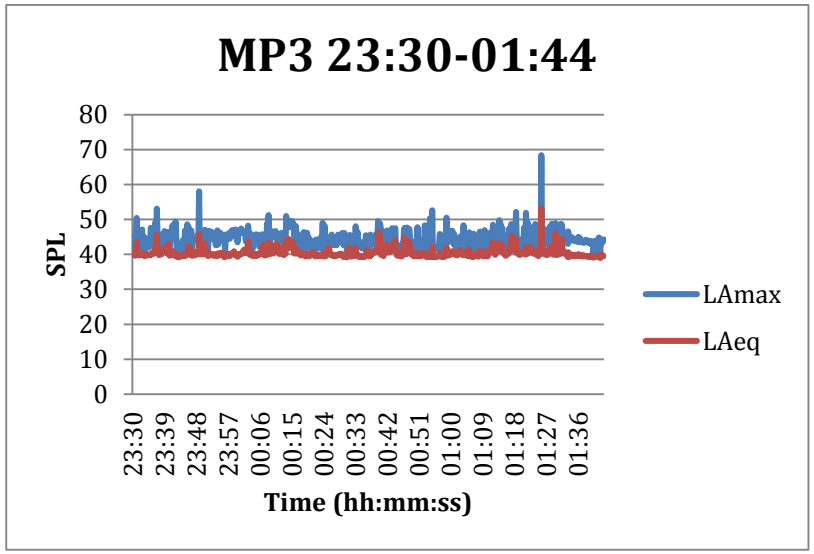


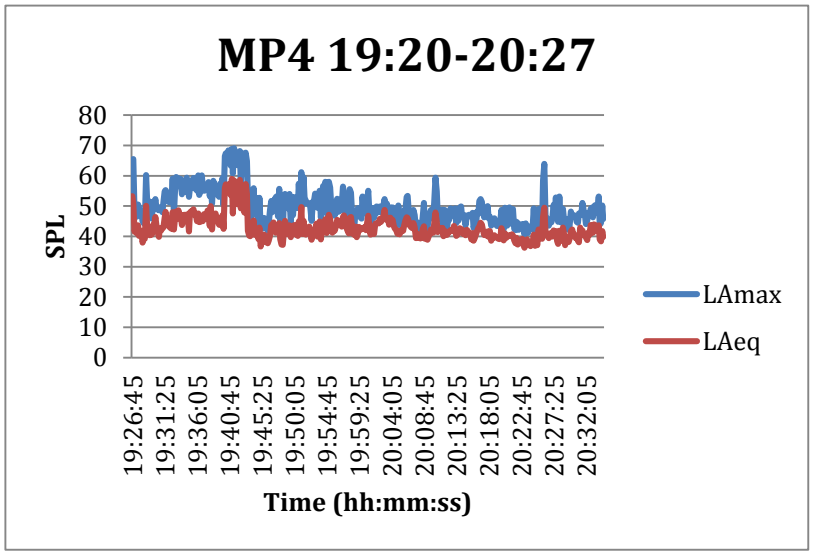


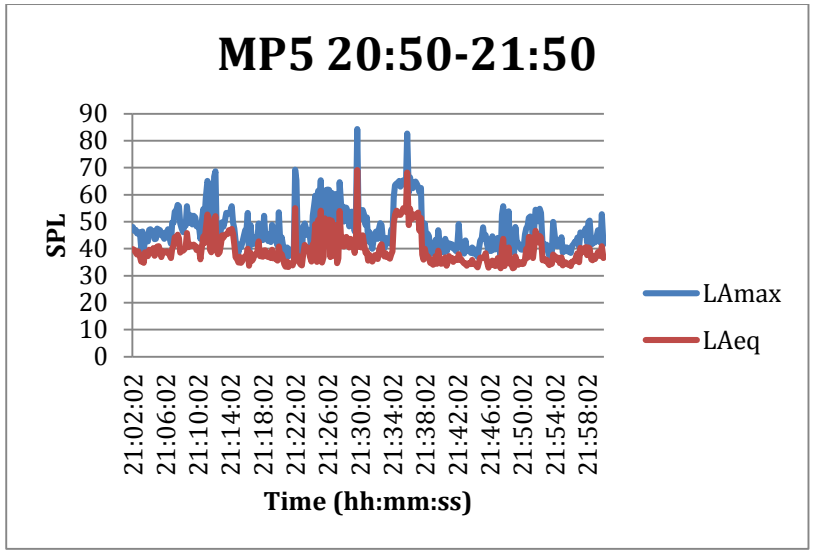


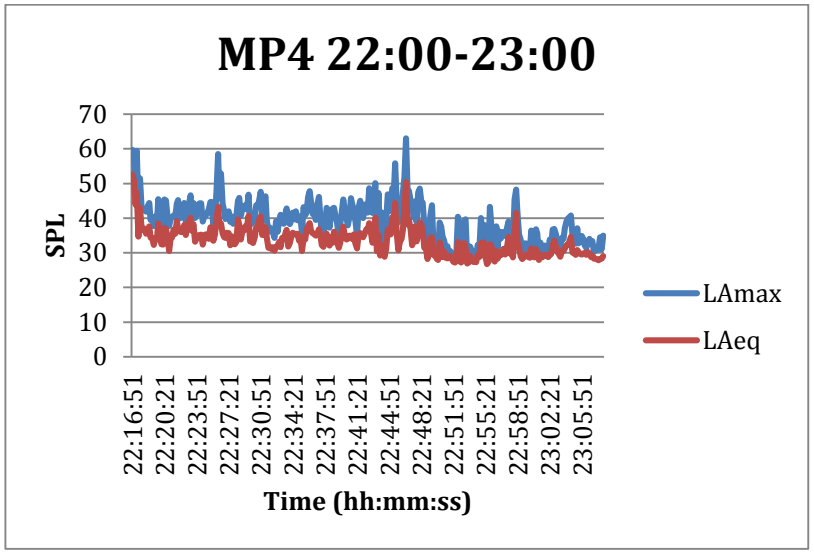

MP2 21:36-22:30
SPL
70
60
50
40
30
20
10
0
21:37:30
21:41:00
21:44:30
21:48:00
21:51:30
21:55:00
21:58:30
22:02:00
22:05:30
22:09:00
22:12:30
22:16:00
22:19:30
22:23:00
22:26:30
Time (hh:mm:ss)
LAmax
LAeq

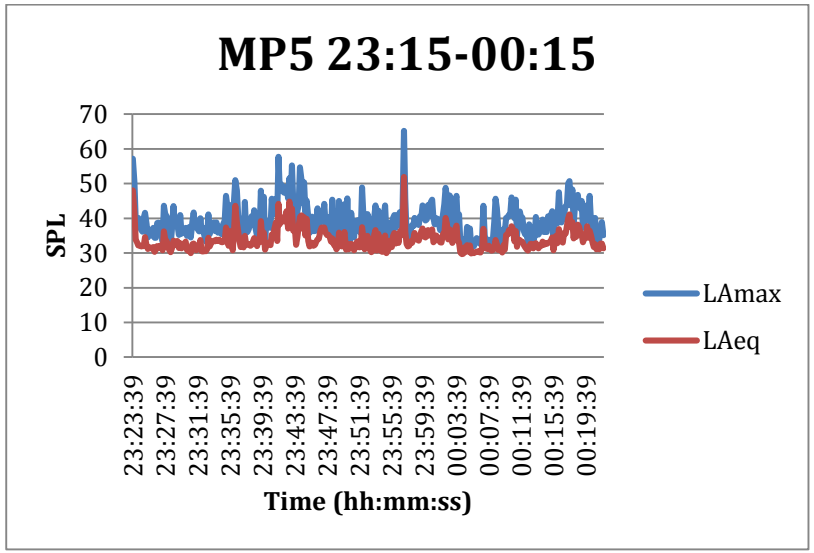

MP1 22:35-23:25
SPL
60
50
40
30
20
10
0
22:34:20
22:37:50
22:41:20
22:44:50
22:48:20
22:51:50
22:55:20
22:58:50
23:02:20
23:05:50
23:09:20
23:12:50
23:16:20
23:19:50
23:23:20
Time (hh:mm:ss)
LAmax
LAeq

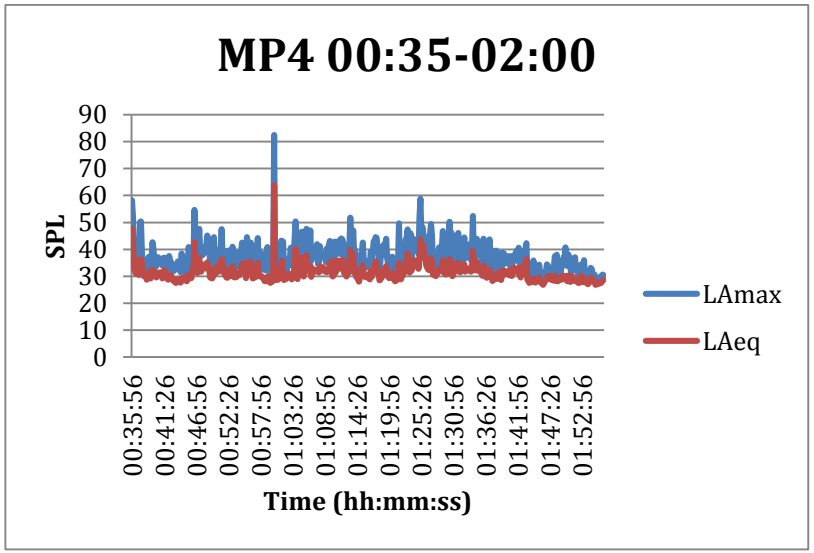

MP3 23:30-01:44
SPL
80
70
60
50
40
30
20
10
0
23:30
23:39
23:48
23:57
00:06
00:15
00:24
00:33
00:42
00:51
01:00
01:09
01:18
01:27
01:36
Time (hh:mm:ss)
LAmax
LAeq


MP4 19:20-20:27
SPL
80
70
60
50
40
30
20
10
0
19:26:45
19:31:25
19:36:05
19:40:45
19:45:25
19:50:05
19:54:45
19:59:25
20:04:05
20:08:45
20:13:25
20:18:05
20:22:45
20:27:25
20:32:05
Time (hh:mm:ss)
LAmax
LAeq


MP5 20:50-21:50
SPL
90
80
70
60
50
40
30
20
10
0
21:02:02
21:06:02
21:10:02
21:14:02
21:18:02
21:22:02
21:26:02
21:30:02
21:34:02
21:38:02
21:42:02
21:46:02
21:50:02
21:54:02
21:58:02
Time (hh:mm:ss)
LAmax
LAeq


MP4 22:00-23:00
SPL
70
60
50
40
30
20
10
0
22:16:51
22:20:21
22:23:51
22:27:21
22:30:51
22:34:21
22:37:51
22:41:21
22:44:51
22:48:21
22:51:51
22:55:21
22:58:51
23:02:21
23:05:51
Time (hh:mm:ss)
LAmax
LAeq

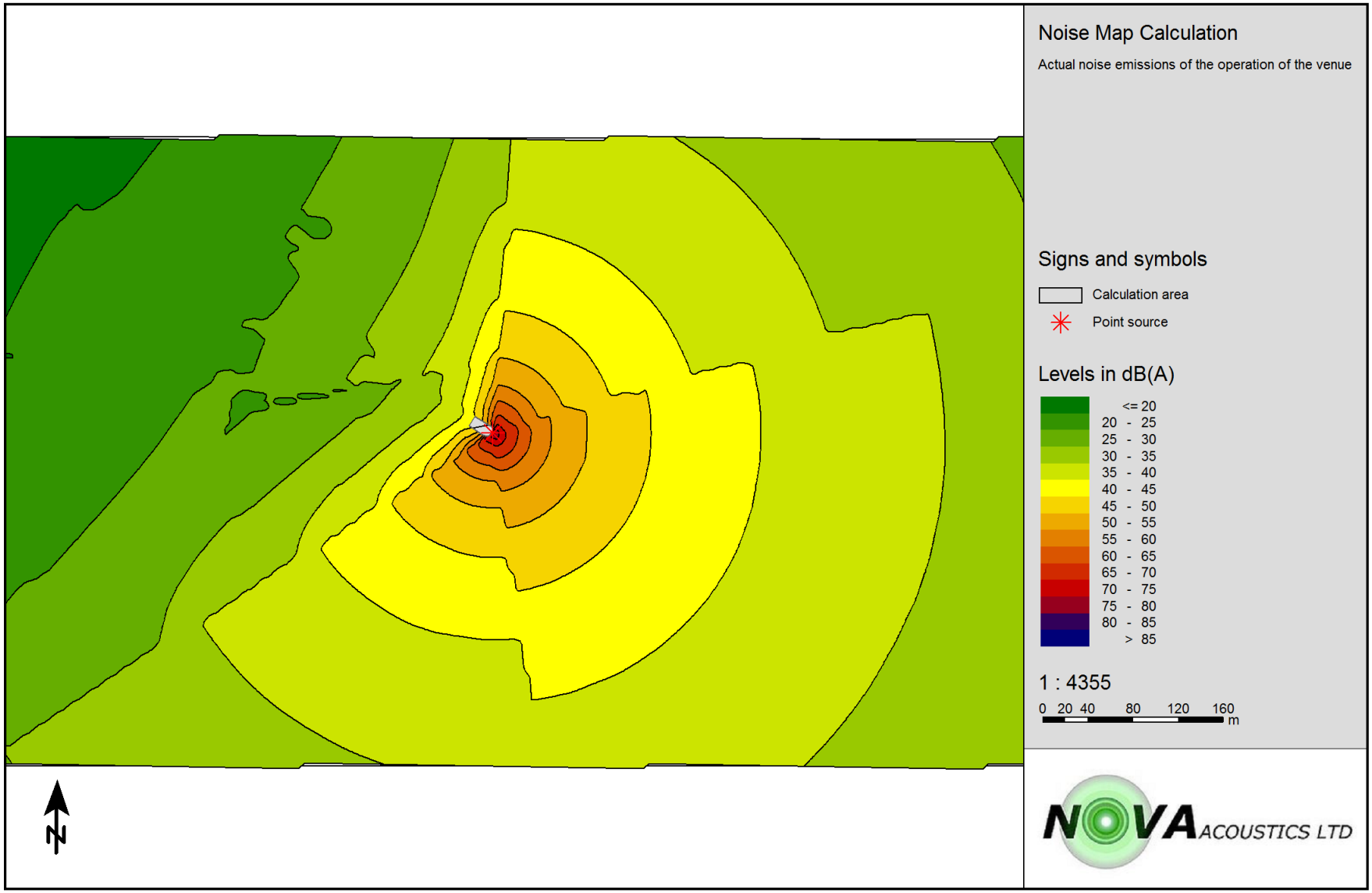

MP5 23:15-00:15
SPL
70
60
50
40
30
20
10
0
23:23:39
23:27:39
23:31:39
23:35:39
23:39:39
23:43:39
23:47:39
23:51:39
23:55:39
23:59:39
00:03:39
00:07:39
00:11:39
00:15:39
00:19:39
Time (hh:mm:ss)
LAmax
LAeq

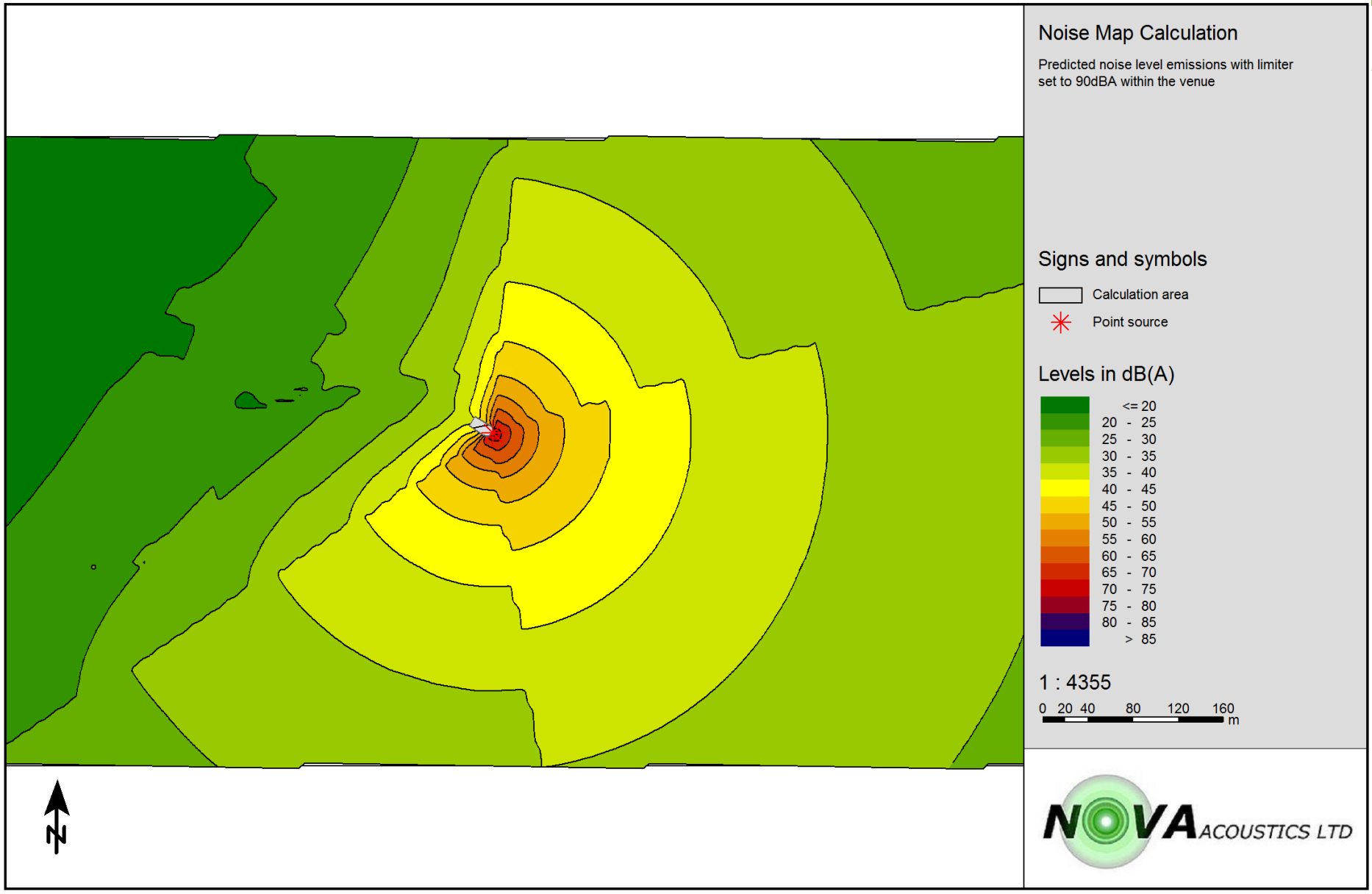

MP4 00:35-02:00
SPL
90
80
70
60
50
40
30
20
10
0
00:35:56
00:41:26
00:46:56
00:52:26
00:57:56
01:03:26
01:08:56
01:14:26
01:19:56
01:25:26
01:30:56
01:36:26
01:41:56
01:47:26
01:52:56
Time (hh:mm:ss)
LAmax
LAeq

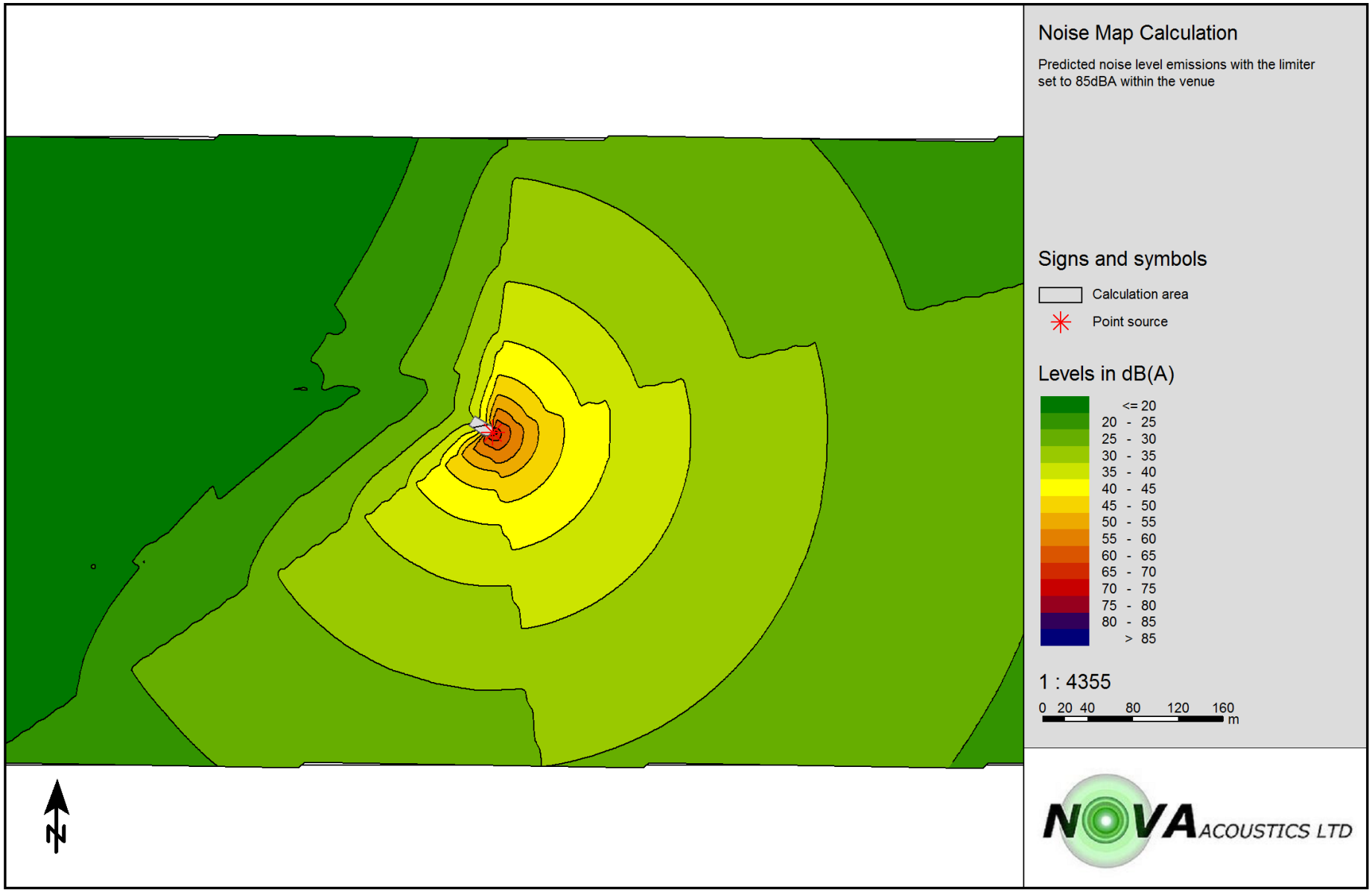
APPENDIX D – Photographs of the measurement positions

APPENDIX E – Single point noise calculation

APPENDIX F – Noise Maps




Noise Map Calculation
Predicted noise level emissions with limiter set to 90dBA within the venue
Signs and symbols
Calculation area
Point source
Levels in dB(A)
<= 20
20 - 25
25 - 30
30 - 35
35 - 40
40 - 45
45 - 50
50 - 55
55 - 60
60 - 65
65 - 70
70 - 75
75 - 80
80 - 85
> 85
1 : 4355
0 20 40 80 120 160
m
N
NOVA ACOUSTICS LTD


Noise Map Calculation
Predicted noise level emissions with the limiter set to 85dBA within the venue
Signs and symbols
Calculation area
Point source
Levels in dB(A)
<= 20
20 - 25
25 - 30
30 - 35
35 - 40
40 - 45
45 - 50
50 - 55
55 - 60
60 - 65
65 - 70
70 - 75
75 - 80
80 - 85
> 85
1 : 4355
0 20 40 80 120 160
m
N
NOVA ACOUSTICS LTD