LOVEN
acoustics

Date: 27th April 2015

Our Ref: LA/1430/01R/ML

Proposed Restaurant & Drive-thru
Great Homer Street District Centre, North Liverpool

Noise Impact Assessment

Client: McDonald's Restaurants Ltd.
6 Victoria Road
Sutton Coldfield
B72 1SY

Prepared by: .....

Martin Loven BSc (Hons) MIOA

Martin Loven BSc (Hons) MIOA
14 Friends Field, BURES, CO8 5LH
T: 01787 227920 M: 07891 865856 E: enquiries@lovenacoustics.co.uk
www.lovenacoustics.co.uk

CONTENTS

Martin Loven BSc (Hons) MIOA
14 Friends Field, BURES, CO8 5LH
T: 01787 227920 M: 07891 865856 E: enquiries@lovenacoustics.co.uk
www.lovenacoustics.co.uk

1. BRIEF FOR CONSULTANCY

1.1. Travel to site in Liverpool and carry out baseline noise survey in location representative of identified receptors.

1.2. Using survey data, generic car park and drive-thru activity noise data and manufacturers' or measured noise information for external plant, predict the specific noise impact of the proposed restaurant and drive-thru at receptor façades during the most sensitive proposed opening hours, and compare with local authority criteria.

1.3. Provide technical report based on proposed layout, presenting findings and conclusions, including any recommended mitigating measures necessary to meet local authority criteria, in a format suitable as a supporting document for a planning application for A3/A5 use.

2. SUMMARY

2.1. McDonald's Restaurants is proposing to build a new restaurant and drive-thru facility at the site of the new Great Homer Street District Centre in North Liverpool. An assessment of noise from external fixed plant has been carried out, based on typical local authority criteria. Noise from drive-thru traffic and car park activity has been compared with the existing ambient noise environment measured at locations representative of the closest receptor façades during the quietest proposed operating times.

2.2. The assessment found that the cumulative specific noise from the external plant is predicted to be at least 4dB below the quietest measured background (L_{A90}) level at the closest receptor facades if the site were to be open 24-hour, 7 days a week. According to the assessment criteria of BS 4142: 2014, the predicted levels indicate that the plant noise will have a low impact and is unlikely to disturb residents during the quietest overnight conditions.

2.3. Noise from the restaurant car park has been demonstrated to be within ambient conditions and should have no adverse impact at any time. Similarly no significant impact is predicted from the proposed COD units or noise of vehicles using the drive-thru facility.

2.4. A number of 'good practice' management recommendations have been made to further mitigate any potential car park activity noise. It has been recommended that goods deliveries are restricted to between 07:00 and 19:00 in order to protect local amenity from any loud impulsive noises inherent in the unloading process.

2.5. In conclusion, it is considered that this document demonstrates that the proposed development may be considered viable from a noise perspective, with noise from the operations meeting local authority criteria, and no adverse impact predicted on local residents.

3. INTRODUCTION

3.1. McDonald's Restaurants is proposing to construct a new restaurant with drive-thru facility within the site of the new Great Homer Street District Centre in North Liverpool, currently in early construction phase. The operating hours of the restaurant and drive-thru are not finalised at this stage but may be up to 24-hour daily.

3.2. The local planning authority requires a noise impact assessment to determine what effect the operation will have on the nearest noise-sensitive receptors, specifically noise from roof-mounted external plant and from customers and vehicles in the car park and vehicles using the drive-thru facility.

3.3. The restaurant will be the latest two-storey DO160 McDonald's design with a two-storey plant deck below roof level housing the kitchen extract and air-conditioning plant, as well as refrigeration condenser units. The plant deck will be enclosed within the outer roof parapet, formed by a solid panelled upstand. There will be a drive-thru lane running around two sides of the restaurant with two side by side customer order display (COD) units close to the southern boundary. Customer car parking will be sited to the east and west of the building and have the capacity for approximately 37 vehicles.

3.4. The application site is situated off Scotland Road dual-carriageway on the western central edge of the Centre, with a number of new retail and commercial businesses to the north and east . Ingress to the site will be via the internal roads of the overall development, off a link road between Great Homer Street and Scotland Road.

3.5. Scotland Road, the A59, is the primary route from the M58 motorway to the city centre and as such is very busy with mixed traffic throughout the day and overnight. The road is lined with commercial and some residential properties, and opposite the application site there is a closed pub and a row of closed shops, with no evidence of current occupation.

3.6. However to the immediate south of the site is the small recent residential development of Wilcock Close, which has been identified as the closest noise-sensitive receptor properties.

3.7. Loven Acoustics has been commissioned to carry out an assessment of the impact of noise from the operation of the roof-top plant, traffic using the drive-thru and activities in the car park and provide a report with the information needed to support a planning application for the new A3/A5 development.

4. RECEPTORS & NOISE LIMITING CRITERIA

4.1. The closest affected residential receptors to assess were determined to be as the following:

Receptor R1 – Two-storey terraced houses on Wilcock Close due south of the site. The northern end façades of these properties face the site at distances of approximately 10m from the proposed restaurant car park, 12m from the drive-thru lane at the closest point, 15m from the proposed CODs and 30m from the plant deck of the new restaurant building. There is a 2m high brick wall separating the residential development from the site, which will be retained.

Receptor R2 – Whilst existing buildings opposite the site across Scotland Road are apparently currently unoccupied, future development is likely, and may be residential. Consequently it is deemed reasonable to assess the potential for noise impact at this location. The existing front façades overlook the site across Scotland Road at distances of approximately 30m from the proposed restaurant car park, 45m from the drive-thru lane at the closest point, 65m from the proposed CODs and 60m from the plant deck of the new restaurant building. These distances will be used for the assessment.

It was considered that all other residential receptors nearby would be less affected than the receptor groups above.

4.2. The appropriate criteria for assessment for roof-top plant is that of BS 4142: 2014 '*Methods for rating and assessing industrial and commercial sound*', which compares the specific noise from the operations of the plant (rating noise), with the existing background noise at the identified receptor properties. From this comparison it is possible to determine the likely impact in accordance with the standard's criteria.

4.3. BS 4142 is not considered an appropriate standard to use for the assessment of noise from customers using the drive-thru and potential activities in the car park, but it was deemed reasonable to compare the noise levels based on the predicted traffic flow at noise-sensitive times, with the existing ambient and maxima noise levels experienced at the receptor façades.

4.4. It was considered that a continuous base-line noise survey over a number of days would provide suitable background and ambient noise data for the assessment. The survey was forcibly truncated due to vandalism of the monitoring equipment on what was thought to be a secure site. However, fortunately the meter was abandoned on site and there were over three days of data intact. After analysis of the data there was a clear consistency to the daytime and night-time noise levels so the available data was considered sufficient for the assessment.

5. EXISTING NOISE ENVIRONMENT

5.1. A baseline survey was carried out between Thursday 2nd April and Sunday 5th April 2015, to measure the existing noise environment affecting the identified receptors, including night-time background (dBL_{A90}) measurements. The measurement period encompassed the quietest period of the week required for assessment.

5.2. The measurement position was as follows:

P1 – Close to the northern façades of the receptor R1 receptor group at a height of 3m. It was considered that this position accurately represented the noise environment experienced by the receptor R1 group. Continuous broadband measurements were taken in 30-minute averages over the 3-day period.

5.3. Survey methodology details are shown in Appendix 1 of this report.

5.4. Table 1 below shows a summary of representative periods including the quietest 30-minute periods, based on the lowest L_{A90} 'background' level measured over the three days and nights of data obtained. Figure 1 in Appendix 2 shows the measurement positions in relation to the identified receptors.

Table 1. Summary of quietest existing ambient noise levels at the measurement locations

Measurement Position	Day	Start Time	dB L_{Aeq}	dB L_{Amax}	dB L_{A10}	dB L_{A90}
P1	Thursday	23:00	61.8	81.8	65.3	52.8
	Friday	00:00	60.7	80.8	64.2	51.9
Quietest L_{A90} & L_{Aeq}	Friday	04:00	57.5	71.3	62.0	44.4
	Sunday	06:00	59.3	70.1	63.3	47.1
	Sunday	07:00	61.8	73.1	65.7	52.8

Martin Loven BSc (Hons) MIOA
14 Friends Field, BURES, CO8 5LH
T: 01787 227920 M: 07891 865856 E: enquiries@lovenacoustics.co.uk
www.lovenacoustics.co.uk

5.5. It was noted that traffic on Scotland Road generated the dominant noise affecting the measurement location, and passing vehicles generated the maxima values shown. The values highlighted in bold in Table 1 represent the quietest ambient and background noise levels measured at each receptor position and will be utilised in the activity and plant noise assessments. As the A59 traffic noise was clearly dominant, the data will be extrapolated to provide the information to assess receptor R2 group, taking into account suitable distance corrections.

5.6. Table 12 and Chart 1 in Appendix 2 shows the full survey data at position P1. It can be seen in Chart 1 that at the end of the survey period there was significant disturbance to the measurements prior to the meter being removed from the measurement location and vandalised. The extreme data has not been utilised in the assessment calculations.

6. SPECIFIC NOISE ASSESSMENT

Roof-top plant

6.1. The new restaurant will have a number of items of external plant associated with normal operations located on the DO160 enclosed plant deck. The specific items to be installed are listed below, and Table 2 summarises the manufacturers' noise data (normalised to a distance of 1m).

- Kitchen extract – RHF BW9/500 – lower level
- Air Handling Units (AHU) – S1 – Nordair Niche 250 – lower level
  S2 – Nordair Niche 150 – upper level
  S3 – Nordair Niche 150 – upper level
  S4 – Nordair Niche 90 – upper level
- Chiller condensers (x2) – Fosters – lower level
- Air con condensers (x5) – Mitsubishi PUHZ-RP250 – upper level

Martin Loven BSc (Hons) MIOA
14 Friends Field, BURES, CO8 5LH
T: 01787 227920 M: 07891 865856 E: enquiries@lovenacoustics.co.uk
www.lovenacoustics.co.uk

Table 2. Specific site-acquired plant noise data (dB L_{eq})

Specific plant noise	Over-all level per unit (@1m)	Octave band centre frequency (Hz)							
	L_{Aeq}	63	125	250	500	1k	2k	4k	8k
Kitchen Extract	72	72	73	75	70	64	60	55	49
AHU S1	72	53	67	68	64	68	66	61	59
AHU S2 / S3	70	50	59	67	64	63	61	65	56
AHU S4	71	60	69	68	67	66	63	63	60
Chiller condensers (x2)	65	59	60	60	59	62	58	53	51
Air Con condensers (x5)	58	67	65	56	53	53	50	45	46
Cumulative level (all plant running)	**79**	**73**	**76**	**77**	**72**	**72**	**69**	**69**	**63**

6.2. It should be noted that although the octave data shown above are not specifically utilised in the assessment methodology, they are shown to demonstrate that the cumulative plant has no discrete tonal characteristics (i.e. 5+dB higher than adjacent higher and lower octave band centre frequencies) which would generally increase perception and annoyance and would attract significant penalties under BS 4142 criteria.

6.3. Table 3 below summarises the BS 4142: 2014 assessment of plant noise from the plant deck enclosure at the façades of the identified receptor groups based on cumulative effect of items running continuously for opening times up to 24-hour. The BS 4142 subjective method has been applied. As a worst case, it is assumed that all plant may be running simultaneously, although in practice this will rarely occur.

Table 3. Predicted plant noise impact on receptors BS 4142: 2014 methodology – dB

Details		Receptor R1	Receptor R2
Specific noise from plant at 1m distance - cumulative (Table 2) dB L_{Aeq} (1)		79	79
Distance correction (30m / 60m)		-29	-35
Shielding from plant deck parapet		-12 (2)	-10 (2)
Acoustic feature correction: tonal		+2 (3)	+2 (3)
Acoustic feature correction: impulsivity		0 (4)	0 (4)
Cumulative level at external receptor façades with all plant running (BS 4142 Rating Level)		40	36
Representative background noise level (L_{A90})	Thursday (23:00)	53	55 (5)
	Friday (00:00)	52	54 (5)
	Friday (04:00)	44	46 (5)
	Sunday (06:00)	47	49 (5)
	Sunday (07:00)	53	55 (5)
Difference	Thursday (23:00)	**-13**	**-19**
	Friday (00:00)	**-12**	**-18**
	Friday (04:00)	**-4**	**-10**
	Sunday (06:00)	**-7**	**-13**
	Sunday (07:00)	**-13**	**-19**
Uncertainty	Uncertainty is considered to be low in this instance for the following reasons:- • The noise source will be steady and continuous • The background data shows good correlation over the 3-4 day period • The measurement locations accurately represented the receptor façades • The weather was prevailing and did not affect results. • Instrumentation shift was within 0.1dB		

(1) Actual on-time 1hr during day, 15-minutes at night (23:00 - 07:00)
(2) Attenuation from plant well walls / parapet.
(3) Tonal character judged to be just audible
(4) No discernible impulsivity as noise steady
(5) Extrapolated from P1 data - B/G +2dB (ambient/max +7dB)

Martin Loven BSc (Hons) MIOA
14 Friends Field, BURES, CO8 5LH
T: 01787 227920 M: 07891 865856 E: enquiries@lovenacoustics.co.uk
www.lovenacoustics.co.uk

6.4. The differences shown between the background and rating noise levels in the table above indicate the extent to which the noise is likely to impact on the local residents. According to BS 4142 assessment criteria, a rating level around +10dB or more above background is likely to indicate significant adverse impact, +5dB moderate adverse impact and levels not exceeding background will have a low impact.

6.5. In this instance it can be seen that for receptors R1 and R2 the impact is predicted to be less than 'low' at all times, in consideration of the potential for 24-hour operation.

Car park activity noise

6.6. There are no definitive noise data available for potential car park use, as every activity and occasion would generate different noise levels. However, observation of a number of similar McDonald's restaurants over a cumulative period of many hours has demonstrated no significantly noisy activities in car parks late in the evening and over night or early in the morning, which are the sensitive periods for local receptors.

6.7. For the normal use of the car park during the noise-sensitive periods of the day the assessment will be based on the prediction data in the Transport Assessment produced by ADL Traffic Engineering. Although this assessment naturally deals with the peak day times, which is when noise sensitivity is at its lowest, ADL have provided trading data which indicates 24-hour traffic that may be expected at the application site during the busiest weekend nights. Table 4 below summarises the ADL traffic predictions during the most noise sensitive times assessed.

Table 4. Predicted traffic using car park (Eat-in) and drive-thru (DT)

Hour beginning	Friday			Saturday		
	Total	DT	Eat-in	Total	DT	Eat-in
23:00	32	17	15	21	16	5
00:00	13	7	6	21	10	11
01:00	2	2	0	12	8	4
02:00	3	3	0	9	5	4
03:00	1	1	0	5	4	1
04:00	1	1	0	8	2	6
05:00	7	6	1	5	1	4
06:00	25	14	11	21	12	9
07:00	61	39	22	41	30	11

Martin Loven BSc (Hons) MIOA
14 Friends Field, BURES, CO8 5LH
T: 01787 227920 M: 07891 865856 E: enquiries@lovenacoustics.co.uk
www.lovenacoustics.co.uk

6.8. As a worst case, if the numbers highlighted in the table above are utilised for assessing the typical late evening, early morning and overnight frequency, the predicted noise levels generated may be determined, based on generic vehicle noise data.

6.9. Sound measurements of typical car movements; arriving and leaving the centre of a car park, including door slams, have been measured at a distance of 5m, late at night during a survey of a similar McDonald's restaurant. The result is summarised in the table below and is the mean of four events.

Table 5. Vehicle car park noise (from 5m)

Measurement Location	dB L_{Aeq}	dB L_{Amax}
Car park (25 sec event)	53.5	71.7

6.10. Utilising the above data and the vehicle numbers highlighted in Table 4, the overall noise level (L_{Aeq}) during the 30-minute reference period may be calculated, based on a typical duration of 25-seconds per vehicle. The impulsive maximum of 71.7dB L_{Amax} is not affected by the number of events. Table 6 below summarises the predicted noise levels for each period.

Table 6. Car park vehicle noise – dB L_{Aeq}

Details	Measurement period		
	Late evening (up to midnight)	Overnight (midnight to 06:00)	Early morning (06:00 to 07:00)
Eat-in (CP) vehicle numbers per hour highlighted in Table 4	15	6	22
25-sec vehicle noise from Table 5	54dB L_{Aeq}		
Logarithmic extrapolation for 30-min reference period (dB L_{Aeq})	44	40	46

6.11. From these calculations the following impact assessment can be made, based on comparison with the existing ambient noise levels measured and incorporating a suitable distance correction and any relevant shielding. Table 7 below assess impact based on the periods in the above table.

Table 7. Predicted car park vehicle noise impact – up to 24-hour opening - dB L_{Aeq} / dB L_{Amax}

Details	Period of day	Receptor R1 facades	Receptor R2 facades
Extrapolated car park noise (Table 6) dB $L_{Aeq, 30mins}$ / dB L_{Amax} (@5m)	Late Eve	44 / 72	
	Overnight	40 / 72	
	Early morn	46 / 72	
Distance correction (10m / 30m)		-6	-15
Shielding correction		-5(1)	0
Level at receptor façades (dB $L_{Aeq, 30mins}$ / dB L_{Amax})	Late Eve	33 / 61	29 / 57
	Overnight	29 / 61	25 / 57
	Early morn	35 / 61	31 / 57
Lowest measured ambient noise (dB $L_{Aeq,30min}$ / L_{Amax} from Table 1)	Late Eve	61 / 81	68 / 88(2)
	Overnight	57 / 71	64 / 78(2)
	Early morn	59 / 70	66 / 77(2)
Difference (L_{Aeq} / L_{Amax})	Late Eve	**-28** / **-20**	**-39** / **-31**
	Overnight	**-28** / **-10**	**-39** / **-21**
	Early morn	**-24** / **-9**	**-35** / **-20**

(1) Shielding from existing 2m high brick wall
(2) Extrapolated data from P1 measurements - 10log distance correction

6.12. It can be seen that noise from the car park is predicted to be significantly lower than both the current ambient (L_{Aeq}) and maxima (L_{Amax}) noise values measured at the closest receptor façades based on the representative assessment periods allowing for the potential of 24-hour opening times. On the basis that the specific noise of vehicles in the car park is of the same character as the ambient noise affecting the receptors - that of passing traffic - it is considered unlikely that traffic in the car park will be distinguishable as a discrete source by the receptors under normal conditions.

Drive-thru noise

6.13. A typical McDonald's drive-thru generates relatively low levels of noise, as the vehicles by necessity drive very slowly round the circuit and do not open or close doors. The only other source of noise from the activity would be the use of the customer order display (COD) intercom units. However, both sources need to be assessed to determine the specific impact on the identified receptor groups.

Drive-thru traffic

6.14. Using data from a noise survey undertaken of vehicles using a typical drive-thru at another McDonald's site, it is possible to objectively assess noise from vehicles using the proposed drive-thru at the application site. Table 8 below summarises the results of a similar drive-thru facility traffic noise survey. The duration of each event represented the period of dominance, approximately 20 seconds for actual vehicle movement time in the drive-thru lane (excluding waiting times). The mean is the logarithmic average of the results, representing a reasonable average value for assessment purposes.

Table 8. Summary of drive-thru traffic noise - (dB $L_{eq,T}$)

Drive-thru events @ 10m	**Overall levels**	
	$L_{Aeq, 20s}$	**L_{Amax}**
Van	53	61
Car	51	56
Van	54	63
Car	52	56
Mean value	53	60

6.15. Utilising the above data and the drive-thru vehicle numbers highlighted in Table 4, the overall noise level (L_{Aeq}) during the 30-minute reference periods may be calculated, based on a typical duration of 20-seconds per vehicle. As for car park traffic the impulsive maximum value is not affected by the number of events. Table 9 below summarises the predicted noise levels for the three time periods as per the car park assessment.

Martin Loven BSc (Hons) MIOA
14 Friends Field, BURES, CO8 5LH
T: 01787 227920 M: 07891 865856 E: enquiries@lovenacoustics.co.uk
www.lovenacoustics.co.uk

Table 9. Drive-thru vehicle noise – dB L_{Aeq}

Details	Measurement period		
	Late evening (up to midnight)	Overnight (midnight to 06:00)	Early morning (06:00 to 07:00)
Drive-thru (DT) vehicle numbers per hour highlighted in Table 4	17	8	39
20-sec vehicle noise from Table 8	53dB L_{Aeq}		
Logarithmic extrapolation for 30-min reference periods	43	40	47

6.16. From these calculations the following impact assessment can be made, based on comparison with the existing ambient noise levels measured and incorporating a suitable distance correction. Table 10 assesses the impact based on potential 24-hour opening

Table 10. Predicted drive-thru vehicle noise impact – up to 24-hour opening

- dB L_{Aeq} / dB L_{Amax}

Details	Period of day	Receptor R1 facades	Receptor R2 facades
Extrapolated drive-thru noise (Table 9) dB $L_{Aeq, 30mins}$ / dB L_{Amax} (@10m)	Late Eve	43 / 60	
	Overnight	40 / 60	
	Early morn	47 / 60	
Distance correction (12m / 45m)		-2	-13
Shielding correction		0(1)	0
Level at receptor façades (dB $L_{Aeq, 30mins}$ / dB L_{Amax})	Late Eve	41 / 58	30 / 47
	Overnight	38 / 58	27 / 47
	Early morn	45 / 58	34 / 47
Lowest measured ambient noise (dB $L_{Aeq,30min}$ / L_{Amax} from Table 1)	Late Eve	61 / 81	68 / 88(2)
	Overnight	57 / 71	64 / 78(2)
	Early morn	59 / 70	66 / 77(2)
Difference (L_{Aeq} / L_{Amax})	Late Eve	**-20** / **-23**	**-38** / **-41**
	Overnight	**-19** / **-13**	**-37** / **-31**
	Early morn	**-14** / **-12**	**-32** / **-30**

(1) No significant shielding from 2m high brick wall at 1st floor level
(2) Extrapolated data from P1 measurements - 10log distance correction

Martin Loven BSc (Hons) MIOA
14 Friends Field, BURES, CO8 5LH
T: 01787 227920 M: 07891 865856 E: enquiries@lovenacoustics.co.uk
www.lovenacoustics.co.uk

6.17. It can be seen in Table 10 that the impact of drive-thru traffic on all receptors is predicted to be significantly less than the current ambient noise levels and maxima events at the receptor locations. As for use of the car park, it is considered unlikely that under normal circumstances vehicle noise in the drive-thru lane will be distinguishable as a discrete source at the receptor properties.

COD units

6.18. At this site there are two COD units proposed in a side-by-side configuration, situated at the southern end of the restaurant building. The installation of two CODs is ostensibly to alleviate long queues during peak daytime periods when noise sensitivity is at its lowest, but during periods of higher sensitivity - late evening to early morning, it is unlikely that the two units will be regularly used simultaneously.

6.19. The proposed location of the units is such that the speakers will be directing sound at 90^0 to the receptor R2 façades, but will direct sound towards the R1 receptors. Therefore to objectively determine the specific impact at the application site, measurements taken of the sound level from an operating COD at a typical operational McDonald's restaurant may be utilised, measured 2m directly in front of the speaker.

6.20. Based on the predicted maximum frequency of vehicles using the drive-thru during the three assessment periods, 30-minute L_{Aeq} of the specific noise can be calculated and assessed against ambient conditions. As for the drive-thru traffic noise a similar calculation for corrected 'on-time' may be utilised, extrapolating typical 20-second periods of COD use. The corrected values are shown in the table below; as before maxima values are unaffected by average durations.

6.21. Table 11 below shows the measured data and the predicted impact on the façades of the closest identified receptors, based on the distance and orientation of the speakers to the receptors. The table data summarises the impact for up to 24-hour 7-day operation.

Table 11. Predicted COD speaker noise impact – up to 24-hour opening - dB L_{Aeq} / dB L_{Amax}

Details	Period of day	Receptor R1 facades	Receptor R2 facades
Measured typical COD noise @2m (dB L_{Aeq} / dB L_{Amax})		64 / 71	
Corrected values for 30-min period (dB L_{Aeq} / dB L_{Amax})	Late Eve	54 / 71	
	Overnight	50 / 71	
	Early morn	57 / 71	
Distance correction (15m / 65m)		-17	-30
Shielding correction		0(1)	0
Directivity correction		0	-3(2)
Level at receptor façades (dB $L_{Aeq, 30mins}$ / dB L_{Amax})	Late Eve	37 / 54	21 / 38
	Overnight	33 / 54	17 / 38
	Early morn	40 / 54	24 / 38
Lowest measured ambient noise (dB $L_{Aeq,30min}$ / L_{Amax} from Table 1)	Late Eve	61 / 81	68 / 88(3)
	Overnight	57 / 71	64 / 78(3)
	Early morn	59 / 70	66 / 77(3)
Difference (L_{Aeq} / L_{Amax})	Late Eve	**-24** / **-27**	**-47** / **-50**
	Overnight	**-24** / **-17**	**-47** / **-40**
	Early morn	**-19** / **-16**	**-35** / **-39**

(1) No significant shielding from 2m high brick wall at 1st floor level
(2) Direction of speakers at 90^0 to façades
(3) Extrapolated data from P1 measurements - 10log distance correction

6.22. It can be seen from the tables above that noise from the use of the COD units is predicted to significantly below the existing ambient and maxima levels during the quietest periods measured and is consequently unlikely to have any adverse impact on the receptor façades at any time up to 24-hour 7-day a week opening.

Martin Loven BSc (Hons) MIOA
14 Friends Field, BURES, CO8 5LH
T: 01787 227920 M: 07891 865856 E: enquiries@lovenacoustics.co.uk
www.lovenacoustics.co.uk

7. DISCUSSION AND CONCLUSIONS

7.1. This assessment has predicted the noise impact of the proposed restaurant and drive-thru operations on the closest residential neighbours. The specific noise sources assessed include vehicle noise in the restaurant car park for eat-in customers and from the drive-thru lane and COD unit speakers. External plant noise has also been assessed against the background noise levels, based on potential 24-hours, 7 days a week opening hours.

7.2. Noise generated by the proposed external plant, located within the plant well of the two-storey restaurant building is predicted to have an impact at least 4dB below and at least 10dB below the lowest measured background noise level measured at receptor R1 and R2 façades respectively. According to the criteria of BS 4142: 2014, this indicates a low impact and is consequently predicted to have no adverse effect on the local residents under normal circumstances.

7.3. Comparison of generic noise data of vehicles using an operational McDonald's drive-thru and normal car park activity, with the existing noise environment at the application site indicates that predicted noise levels at the receptor façades will be below the lowest existing ambient noise levels measured. Traffic on Scotland Road remains consistent and dominates the local noise environment throughout the day and night.

7.4. Traffic within the site, due to the character of noise being the same as the dominant noise source currently affecting the receptors, is unlikely to be noticeable by local residents as a discrete noise source and will tend to blend into the background, during any time of the day or night. Noise from the COD speakers has also been demonstrated to be well within ambient noise conditions at any time, and is unlikely to be audible inside the houses closest to the site.

7.5. It should also be noted that only noise that can be quantified can be objectively assessed. It is considered that noise from customers either in the car park or using the proposed outside patio area is a matter for the local restaurant management plan, and from experience with a number of McDonald's sites any situation that may arise is dealt with diligently and effectively. This is correlated by statistical data relating to the number of complaints received for noise issues from all McDonald's UK sites. This evidence will be available for corroboration if required.

7.6. Experience with other McDonald's sites also suggests that typically a high proportion of customers using McDonald's facilities during late evening to early morning hours are taxis, shift workers and emergency service crews, none of whom would be prone to causing anti-social behaviour or noise.

7.7. Similarly impulsive noise from goods vehicles and unloading are varied and not accurately assessable. However they may be adequately managed by restricting hours of deliveries. In this instance it is considered that there should be no deliveries outside of the hours 07:00 to 19:00. Deliveries within this period should have no adverse impact on local receptors.

7.8. Notwithstanding the findings of the assessment it is also recommended that a number of 'good practice' management measures are implemented to limit extraneous activity and noise generated in the restaurant car park late during more noise-sensitive periods. These may include the following measures:

- Install clear signage in the car park asking customers to respect the amenity of the neighbouring receptors and not shout or play loud music in cars.

- Assign a staff member to regularly patrol the car park in the evening, and when appropriate remind and if necessary enforce the sentiment of the displayed signage.

- By configuration of the external plant control systems, minimise the use of any air-handling units and air-conditioning condensers when not specifically needed for the comfort of customers and staff, especially during the quietest and most sensitive overnight periods.

- Ensure that the 'night-time' volume levels on the COD speakers are set from 22:00 to 07:00. This setting reduces the volume of the speakers in line with the reducing ambient noise level to maintain audibility without the potential to disturb neighbours.

7.9. In conclusion, it is considered that this document demonstrates that the operation of the proposed McDonald's restaurant and drive-thru facility may be considered viable from a noise perspective, with noise from the operations predicted to meet local authority criteria for noise and consequently have no adverse noise impact on the closest identified sensitive receptors, ensuring no loss of amenity for neighbouring residents.

APPENDIX 1
Survey, equipment and personnel details

A1.1 **Survey Date:**

Thursday 2nd April – Sunday 5th April 2015

A1.2 **Location:**

Scotland Road, Liverpool

A1.3 **Personnel Present:**

Martin Loven – Loven Acoustics

A1.4 **Weather:**

Dry, wind <1 m s^{-1}, 10^0C.

A1.5 **Instrumentation:**

Make	Description	Model	Serial no.	Calibration Expiry
Norsonic	Type 1 Sound Level Meter	NOR131	1310108	30/03/2017

All instrumentation conforms to current UK standards and was calibrated before and after use. Calibration is traceable via NAMAS to standards held at NPL.

A1.6 **Procedure:** See main report

Martin Loven BSc (Hons) MIOA
14 Friends Field, BURES, CO8 5LH
T: 01787 227920 M: 07891 865856 E: enquiries@lovenacoustics.co.uk
www.lovenacoustics.co.uk

Explanation of Noise Terms

A2.1 The L_{Aeq} indicates the average noise level and is the 'equivalent continuous' noise level over a sample period. It is the single parameter now commonly used to describe a noise environment. Most of the guidance on noise now uses 'L_{Aeq}' to define acceptable levels.

A2.2 The L_{Amax} represents the noisiest event affecting the site during each one-hour sampling period.

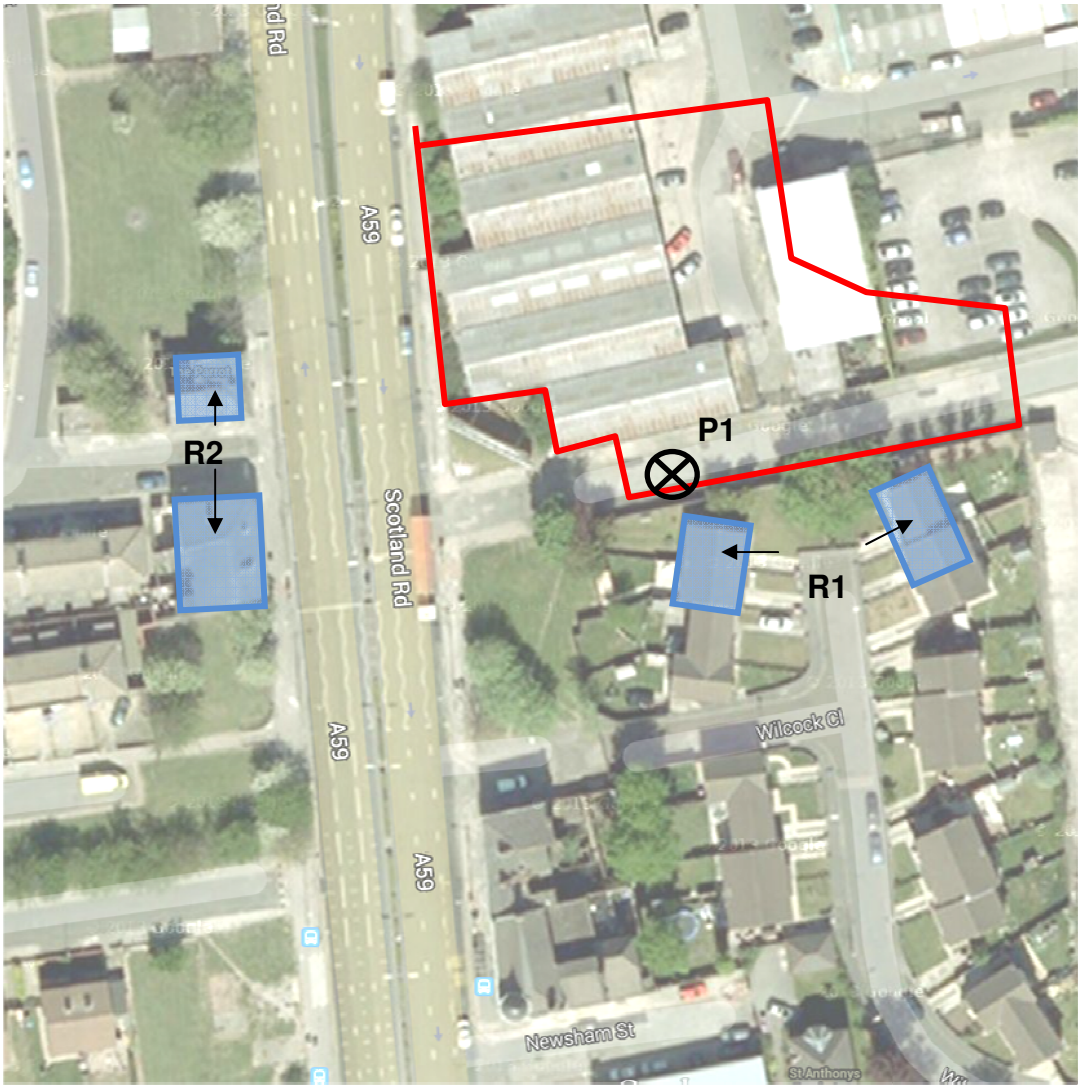
A2.3 The L_{A10} indicates traffic noise levels and is the noise level exceeded for 10% of the sample period. It gives a good indication of the spread of noise events in a given environment. Near a busy road, the L_{10} and the L_{eq} are closely correlated, with the L_{10} typically 2-4dB higher than the L_{eq}.

A2.4 L_{A90} indicates the noise level exceeded for more than 90% of the time and represents the background noise levels.

Martin Loven BSc (Hons) MIOA
14 Friends Field, BURES, CO8 5LH
T: 01787 227920 M: 07891 865856 E: enquiries@lovenacoustics.co.uk
www.lovenacoustics.co.uk

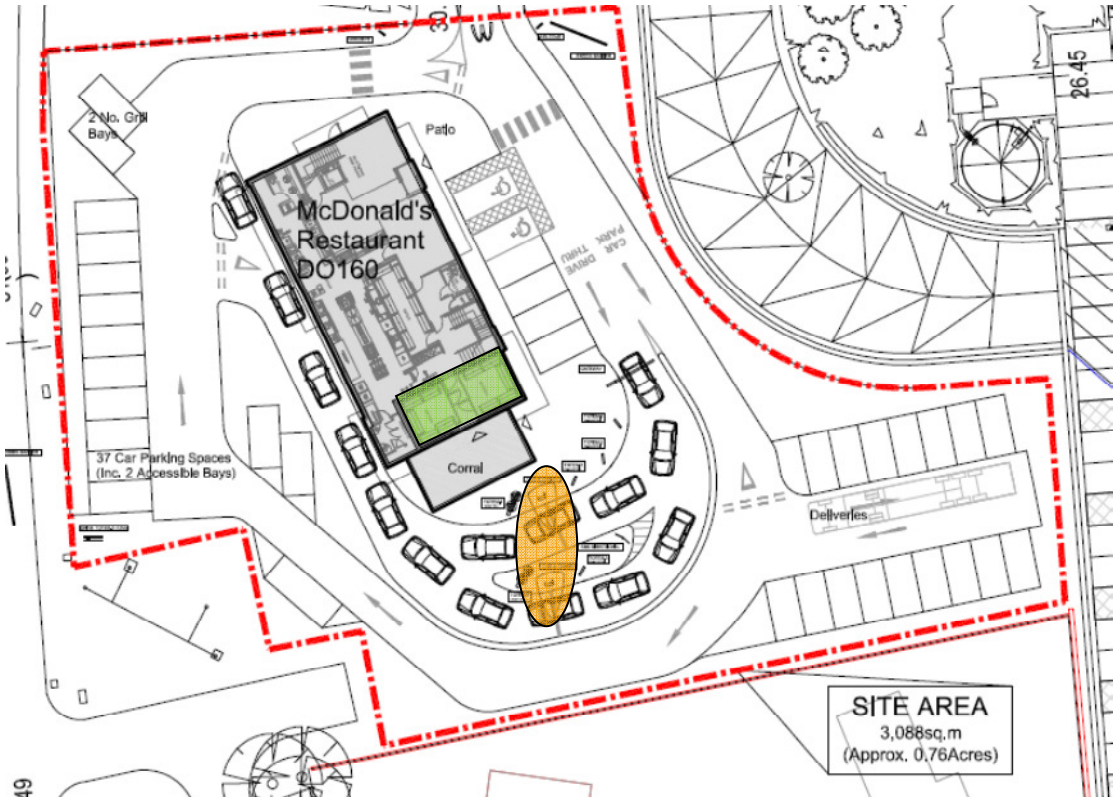
APPENDIX 2

Figure 1. Site location plan showing baseline noise measurement position with location of assessed receptors shaded blue. Approximate site outline in red.



Martin Loven BSc (Hons) MIOA
14 Friends Field, BURES, CO8 5LH
T: 01787 227920 M: 07891 865856 E: enquiries@lovenacoustics.co.uk
www.lovenacoustics.co.uk

Figure 2. Proposed restaurant site layout**,** with location of plant well shaded green, and COD units shaded orange



Martin Loven BSc (Hons) MIOA
14 Friends Field, BURES, CO8 5LH
T: 01787 227920 M: 07891 865856 E: enquiries@lovenacoustics.co.uk
www.lovenacoustics.co.uk

Table 12. Baseline noise data at measurement position P1 – dB(A).

Date/Day	Time	LAeq	LAmax	LA10	LA90
2nd April 2015	14:30	68.1	88.3	71.2	59.1
Thursday	15:00	67.5	82.1	70.8	58.8
	15:30	74.1	101.6	72.4	60.3
	16:00	66.6	79.2	69.1	60.8
	16:30	65.9	80.3	68.3	60.2
	17:00	66.1	81.5	68.6	59.9
	17:30	66.0	81.2	68.4	59.9
	18:00	66.4	89.1	68.6	59.2
	18:30	65.6	78.1	68.1	59.7
	19:00	64.8	76.7	67.8	58.2
	19:30	64.4	81.8	67.4	58.4
	20:00	64.1	77.2	67.0	58.0
	20:30	63.9	74.2	66.9	57.7
	21:00	63.4	74.7	66.9	55.2
	21:30	63.3	80.1	66.4	56.7
	22:00	62.1	73.4	65.5	54.3
	22:30	62.3	79.2	65.7	54.1
	23:00	61.8	81.8	65.3	52.8
	23:30	61.7	80.4	65.1	52.5
3rd April 2015	00:00	60.7	80.8	64.2	51.9
Friday	00:30	62.1	87.7	65.3	49.2
	01:00	59.5	72.3	63.6	49.7
	01:30	60.5	81.8	64.6	49.1
	02:00	59.5	73.3	63.4	48.8
	02:30	59.4	77.6	63.2	47.1
	03:00	58.9	82.8	62.8	46.6
	03:30	57.5	71.9	61.8	45.2
	04:00	57.5	71.3	62.0	44.4
	04:30	58.2	74.7	61.8	46.5
	05:00	59.7	75.3	63.7	47.4
	05:30	60.6	81.1	63.9	50.7
	06:00	62.4	79.3	66.2	52.5
	06:30	63.2	72.8	66.8	55.3
	07:00	64.5	76.4	68.1	56.2
	07:30	64.4	73.7	67.9	56.4
	08:00	64.2	80.9	67.6	56.4
	08:30	64.7	75.2	68.1	56.8
	09:00	64.8	75.3	68.0	56.6
	09:30	65.3	79.8	68.2	58.2
	10:00	65.6	74.7	68.5	59.6
	10:30	66.2	75.3	69.0	59.9
	11:00	66.0	80.4	68.7	59.8

Continued....

Table 12 continued....

Date/Day	Time	LAeq	LAmax	LA10	LA90
3rd April 2015	11:30	66.7	80.2	69.3	60.6
Friday	12:00	66.7	79.0	69.4	60.4
	12:30	66.7	77.0	69.4	60.6
	13:00	66.8	78.9	69.6	59.8
	13:30	67.0	76.4	69.7	61.4
	14:00	67.5	78.0	70.1	61.5
	14:30	66.8	76.5	69.4	61.0
	15:00	67.6	74.6	70.3	62.8
	15:30	67.4	75.1	70.4	61.0
	16:00	67.4	78.7	70.0	61.3
	16:30	67.6	76.5	70.2	62.2
	17:00	67.5	75.3	70.2	62.3
	17:30	66.8	75.8	69.8	61.1
	18:00	67.3	83.8	69.8	61.3
	18:30	67.0	81.8	70.0	61.1
	19:00	66.6	77.0	69.4	61.0
	19:30	66.0	75.2	69.3	60.2
	20:00	65.3	74.2	68.3	59.3
	20:30	64.9	72.9	68.0	58.5
	21:00	63.9	71.7	67.1	58.0
	21:30	66.0	87.4	67.7	56.8
	22:00	63.4	74.8	66.7	56.1
	22:30	63.2	74.3	66.5	56.3
	23:00	62.4	73.6	65.9	53.4
	23:30	62.1	75.3	65.8	52.7
4th April 2015	00:00	61.2	71.1	64.6	52.9
Saturday	00:30	60.7	72.2	64.6	52.0
	01:00	60.5	74.0	64.3	51.9
	01:30	60.8	72.2	64.8	51.6
	02:00	60.2	73.2	64.1	49.4
	02:30	59.5	70.9	63.6	47.9
	03:00	59.0	71.6	62.8	48.9
	03:30	59.4	71.4	63.6	48.8
	04:00	59.2	73.3	63.1	48.7
	04:30	60.0	74.5	64.1	49.6
	05:00	59.4	71.1	63.8	48.7
	05:30	60.6	71.2	64.3	52.1
	06:00	61.7	73.8	65.3	53.5
	06:30	63.2	79.4	66.6	54.6
	07:00	64.2	77.1	67.5	56.6
	07:30	64.7	77.9	67.8	58.3
	08:00	65.1	76.1	67.9	58.9

Continued....

Table 12 continued....

Date/Day	Time	LAeq	LAmax	LA10	LA90
4th April 2015	08:30	65.4	80.7	68.6	58.1
Saturday	09:00	65.3	81.4	68.3	58.6
	09:30	65.5	80.0	68.2	59.1
	10:00	65.2	74.8	68.3	58.7
	10:30	64.8	71.7	67.8	59.2
	11:00	65.1	75.9	68.1	59.3
	11:30	64.8	79.7	67.7	58.1
	12:00	65.2	79.0	68.0	58.3
	12:30	66.3	87.1	67.8	59.8
	13:00	65.3	74.4	68.1	59.6
	13:30	65.4	75.3	68.2	59.4
	14:00	65.3	75.5	67.8	60.0
	14:30	65.4	73.4	68.6	58.5
	15:00	65.3	77.1	68.2	59.0
	15:30	65.3	77.3	68.4	58.6
	16:00	65.0	77.0	67.9	57.4
	16:30	65.2	74.5	68.6	56.9
	17:00	66.5	81.8	69.1	59.9
	17:30	64.6	80.0	67.3	59.2
	18:00	66.0	76.5	68.7	59.8
	18:30	65.3	72.2	68.2	59.0
	19:00	65.7	85.7	68.6	56.4
	19:30	64.9	77.1	68.1	58.7
	20:00	64.0	72.5	67.2	57.5
	20:30	63.4	77.8	66.8	56.0
	21:00	62.1	78.7	65.7	54.1
	21:30	62.4	72.2	65.6	55.3
	22:00	62.6	74.5	66.0	53.7
	22:30	61.8	71.9	65.6	52.9
	23:00	62.0	75.3	65.5	53.2
	23:30	61.9	75.4	65.5	53.1
5th April 2015	00:00	60.8	70.0	64.4	53.0
Sunday	00:30	60.9	70.3	64.9	51.4
	01:00	60.3	71.2	64.0	51.7
	01:30	62.6	89.1	64.5	50.7
	02:00	59.3	67.9	63.1	47.6
	02:30	60.2	80.2	63.7	48.7
	03:00	60.0	69.3	64.1	48.7
	03:30	58.2	70.6	62.3	46.3
	04:00	59.2	70.9	62.8	47.1
	04:30	58.2	69.4	62.5	46.0
	05:00	59.2	72.3	63.2	47.8

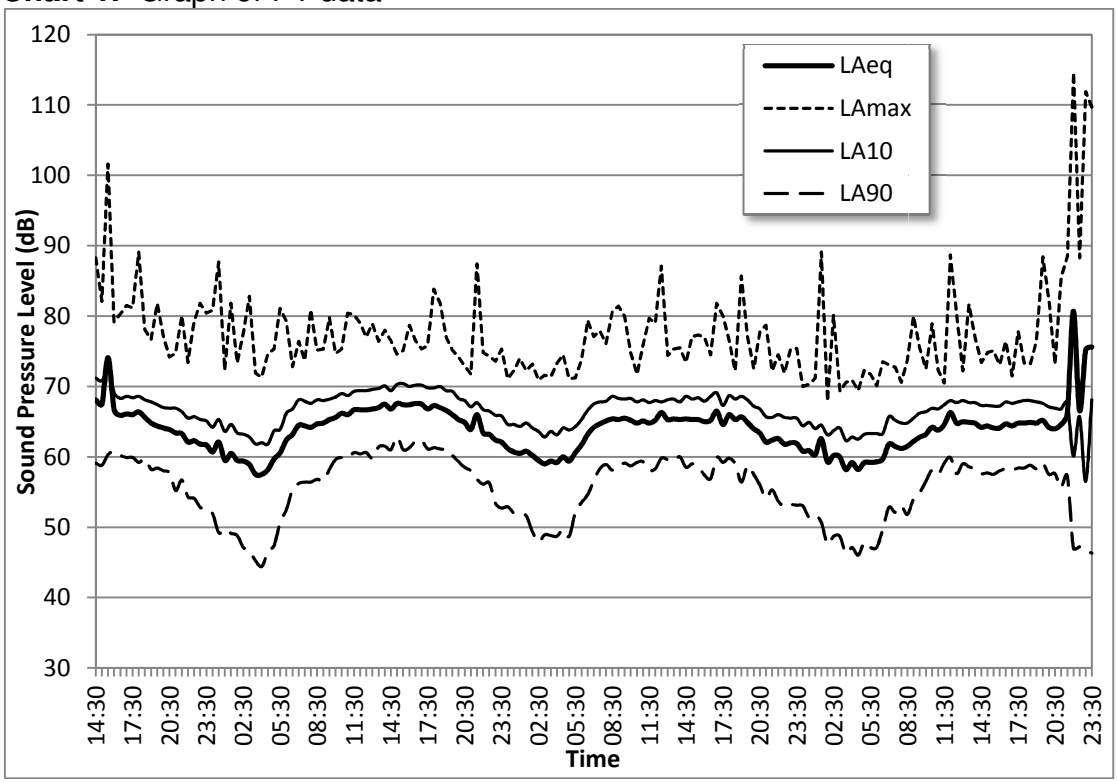
Continued....

Table 12 continued....

Date/Day	Time	LAeq	LAmax	LA10	LA90
5th April 2015	06:00	59.3	70.1	63.3	47.1
Sunday	06:30	59.7	73.5	63.3	49.7
	07:00	61.8	73.1	65.7	52.8
	07:30	61.5	72.7	65.2	52.1
	08:00	61.2	70.6	64.8	53.0
	08:30	61.5	73.8	64.8	51.8
	09:00	62.2	80.0	65.5	54.0
	09:30	62.8	75.5	66.2	54.9
	10:00	63.2	72.5	66.4	56.5
	10:30	64.2	78.9	66.9	58.1
	11:00	63.8	72.3	66.8	57.5
	11:30	64.6	70.5	67.4	59.1
	12:00	66.3	88.7	68.0	59.9
	12:30	64.8	80.1	67.7	57.6
	13:00	65.0	72.2	68.0	59.0
	13:30	64.9	81.7	67.7	58.6
	14:00	64.8	77.0	67.7	58.2
	14:30	64.2	73.4	67.3	57.6
	15:00	64.4	74.8	67.3	57.7
	15:30	64.1	75.1	67.2	57.5
	16:00	64.1	73.1	67.2	58.0
	16:30	64.7	76.4	67.8	58.3
	17:00	64.4	71.5	67.6	58.1
	17:30	64.8	77.8	67.8	58.4
	18:00	64.8	73.3	68.0	58.4
	18:30	64.9	73.2	68.0	58.8
	19:00	64.8	76.5	67.8	58.3
	19:30	65.2	88.4	67.6	59.1
	20:00	64.2	82.3	67.1	57.5
	20:30	64.0	73.2	66.9	57.6
	21:00	64.6	85.5	66.8	55.6
	21:30	66.1	88.5	67.7	57.3
	22:00	80.7	114.6	60.1	47.0
	22:30	66.6	88.3	65.7	47.2
	23:00	75.2	111.9	56.5	46.6
	23:30	75.6	109.7	68.1	46.3

Note: Figures in red indicate anomalous data due to vandalism of meter on site

Chart 1. Graph of P1 data



Martin Loven BSc (Hons) MIOA
14 Friends Field, BURES, CO8 5LH
T: 01787 227920 M: 07891 865856 E: enquiries@lovenacoustics.co.uk
www.lovenacoustics.co.uk