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Proposed Restaurant & Drive-thru
Former Car Showroom
Broad Street, Leek ST13 5NS

Noise Impact Assessment

Client:

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

Prepared by: ……

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1. BRIEF FOR CONSULTANCY

1.1. Travel to site in Leek 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 at receptor façades during the most sensitive proposed opening hours, and compare with local authority criteria.

1.3. Provide amended technical report based on latest 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 mixed development, including an A3/A5 unit.

2. SUMMARY

2.1. McDonald's Restaurants is proposing to construct a new restaurant and drive-thru as part of a mixed use application on the site of a car showroom in Broad Street, Leek. An assessment of noise from external mechanical plant has been carried out, based on 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 generally within the local authority at receptors R2 and R3, but due to the close proximity of receptor R1 the plant noise could have a significant impact during late evening and overnight periods. Consequently the following mitigation measures have been recommended:

- Limit evening opening hours to 23:00
- Fit post-fan silencer to extract discharge duct
- Install quieter plant units where available and/or carry out local attenuation to specific units , such as acoustic enclosure around fan motors

2.3. Subject to the recommended limited operating hours, noise from the restaurant car park has been demonstrated to be within ambient conditions and should have no adverse impact. Similarly no significant impact is predicted from the proposed COD units or noise of vehicles using the drive-thru facility.

2.4. Notwithstanding the findings a number of 'good practice' management recommendations have also 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 amended document demonstrates that if the recommendations herein are implemented the latest 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 develop the site of a vehicle sales and service centre on Broad Street in Leek, constructing a new restaurant with drive-thru facility and six terraced houses. 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 externally mounted mechanical plant and from and vehicles in the car park and vehicles using the drive-thru facility.

3.3. The application site is split into two halves with the residential area to the north and the A3/A5 development to the south. This assessment relates to the latter only. The restaurant will be a bespoke design based on the latest single-storey SO60 McDonald's design with a plant deck at 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.

3.4. There will be a drive-thru lane running around two sides of the restaurant with two side-by-side customer order display (COD) units in the north-eastern corner of the A3/A5 site. A customer car park will be sited to the west of the building and have the capacity for approximately 28 vehicles. Entry and exit to the site will be via Broad Street on the southern boundary of the site.

3.5. The restaurant site is that currently occupied by the car showroom and service buildings. All current structures will be demolished as part of the development and the current access to the site off Sneyd Street to the west will be removed.

3.6. The area around the site is mainly commercial but there are a number of houses and flats to in close proximity to the site on Broad Street and Sneyd Street.

3.7. Loven Acoustics has been commissioned to carry out an assessment of the impact of noise from the operation of the mechanical 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 – 27-53 Broad Street - two-storey terraced houses to the south of the site. The front façades of these properties overlook the site at distances of approximately 35m from the proposed restaurant car park, 17m from the drive-thru lane at the closest point, 45m from the proposed CODs and 20m from the external plant location within the roof of the restaurant building.

Receptor R2 – 76-78 Broad Street and one or two first-floor flats above 80-82 Broad Street adjacent to the western boundary of the site. The rear façades overlook the site at distances of approximately 10m from the proposed restaurant car park, 5m from the drive-thru lane at the closest point, 50m from the proposed CODs and 40m from the external plant location within the roof of the restaurant building.

Receptor R3 – 18 Sneyd Street - a two-storey detached house to the north of the proposed restaurant. The gable end façade of this property overlooks the site at distances of approximately 5m from the proposed restaurant car park (closest space), 5m from the drive-thru lane at the closest point, 30m from the proposed CODs and 40m from the externally venting plant location within the roof of the restaurant building.

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

Figure 1 in the appendix shows the relative receptor locations.

4.2. Following a discussion with Denis Colgan, Environmental Health Officer (EHO) with Staffordshire Moorlands DC and technical consultee to the planners, the appropriate criteria for assessment for mechanical plant noise was agreed to be that of BS 4142: 2014 which assess the likely impact of noise on residential receptors based on a comparison with the existing background noise levels.

4.3. For the assessment of noise from the use of vehicle movements on site in the drive-thru lane and car park a comparison will be made with the existing ambient noise conditions. This is deemed reasonable as the character of the noise generated will be the same as the ambient noise source of passing and local traffic. However for the assessment of COD speakers the tonal character will be considered.

4.4. It was considered that a base-line noise survey measured continuously from a typical Friday to Monday period would provide suitable background and ambient noise data for the assessment.

5. EXISTING NOISE ENVIRONMENT

5.1. A baseline survey was carried out between Friday 13th to Monday 16th March 2015, to measure the existing noise environment affecting the identified receptors, including background (dBL_{A90}) measurements. The measurement period encompassed the quietest period of the week required for assessment.

5.2. The measurement positions were as follows:

P1 – Close to the boundary with Broad Street opposite the R1 receptors. The microphone height was 3m at a distance of approximately 2m from the road kerb. Broadband measurements were taken in 15-minute averages. This position accurately represents the noise environment experienced by the R1 receptors.

P2 – Close to the boundary with Sneyd Street to the rear of the R2 receptors. The microphone height was 3m at a distance of approximately 3m from the road kerb. Broadband measurements were taken in 30-minute averages. It was considered that this position accurately represents the noise environment experienced by the R2 and R3* receptors.

***Note:** Although the P2 location is closer to Broad Street than the R3 receptor, a proportion of traffic noise at P2 was shielded by the building shells of 76-82 Broad Street, whilst there is an open pathway for traffic noise to the R3 façades. It was noted that when sample measurements were taken at the P2 and R3 positions there was only around 1dB difference in the overall noise levels, which is insignificant, and following the demolition of the car showroom and construction of the restaurant the clear pathway for Broad Street traffic noise to R3 will increase.

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

5.4. Table 1 below shows a summary of representative 'noise-sensitive' periods including the quietest 15-minute periods, based on the most frequent lowest L_{A90} 'background' level measured. 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 P1 and P2 measurement locations

Measurement position / period	Start Time	dB L_{Aeq}	dB L_{Amax}	dB L_{A10}	dB L_{A90}
P1					
Sunday peak	12:00	69.9	85.3	73.2	59.8
Sunday night	22:00	63.4	79.0	68.1	40.4
	23:00	58.8	77.6	60.0	32.0
	00:00	60.7	79.5	59.8	30.5
	02:00	52.3	76.5	44.4	24.6
Sunday morning	05:00	58.3	79.2	58.8	32.9
	06:00	62.0	83.1	62.6	34.2
	07:00	63.8	83.7	65.3	40.3
P2					
Sunday peak	12:00	63.5	77.7	66.9	55.7
Sunday night	22:00	58.5	76.7	60.2	39.1
	23:00	53.2	76.4	53.8	32.4
	00:00	56.1	79.7	55.4	32.3
	02:00	46.3	72.8	47.2	29.2
Sunday morning	05:00	50.5	71.5	51.7	36.9
	06:00	54.2	73.4	57.2	37.3
	07:00	56.6	77.9	58.6	39.3

5.5. It was noted that traffic on Broad Street generated the dominant noise affecting the measurement location, and passing vehicles generated the maxima values shown. However as the data indicate the traffic levels reduce significantly overnight. The values in Table 1 represent the quietest ambient noise levels and will be utilised in the activity and plant noise assessments for the relevant receptors. However it should be noted that BS 4142: 2014 suggests that background noise levels that are representative of the assessment period are used, rather than the quietest individual level. This will be reflected in the assessment in Table 3.

5.6. Tables 12 and 13 and Charts 1 and 2 in Appendix 2 show the full survey data at both measurement positions.

6. SPECIFIC NOISE ASSESSMENT

External mechanical plant

6.1. The new restaurant will have a number of items of external plant associated with normal operations located on the S60-based 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
- Air Handling Units (AHU) – S1 – Nordair Niche 240
  S2 – Nordair Niche 150
- Chiller condensers (x2) – Scutts
- Air con condensers (x4) – Mitsubishi PUHZ-RP250

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	70	50	59	67	64	63	61	65	56
Chiller condensers (x2)	65	59	60	60	59	62	58	53	51
Air Con condensers (x4)	58	67	65	56	53	53	50	45	46
Cumulative level (all plant running)	**77**	**73**	**74**	**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 limited tonal characteristics, specifically at 250Hz. This is not totally discrete, but may require a correction under the new BS 4142 assessment methodology. However the plant noise is steady and continuous with low impulsivity.

6.3. Table 3 below summarises the BS 4142: 2014 assessment of plant noise from the plant deck 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**	**Receptor R3**
Specific noise from plant at 1m distance - cumulative (Table 2) dB L_{Aeq} (1)		77	77	77
Distance correction (20m / 40m / 40m)		-26	-32	-32
Shielding from plant deck parapet		-10 (2)	-11 (2)	-12 (2)
Acoustic feature correction: tonal		+2 (3)	+2 (3)	+2 (3)
Acoustic feature correction: impulsivity		0 (4)	0 (4)	0 (4)
Cumulative level at external receptor façades with all plant running (BS 4142 Rating Level)		43	36	35
Representative background noise level (L_{A90})	Peak Day (12:00)	60	56	56
	Sunday (22:00)	40	39	39
	Sunday (23:00)	32	32	32
	Sunday (00:00)	30	31	31
	Sunday (overnight)	26 (5)	30 (5)	30 (5)
Difference	Peak Day (12:00)	**-17**	**-20**	**-21**
	Sunday (22:00)	**+3**	**-3**	**-4**
	Sunday (23:00)	**+11**	**+4**	**+3**
	Sunday (00:00)	**+13**	**+5**	**+4**
	Sunday (overnight)	**+17**	**+6**	**+5**
Uncertainty	Uncertainty is considered to be low in this instance. 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 and 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) Representative / frequently occurring values

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 R2 and R3 the impact is low to moderate up to midnight. During the quietest overnight period the impact is significantly adverse. For receptor R1 however the impact is greater due to the closer proximity of the plant to the receptor façades. Therefore a combination of mitigation measures and restricted operating hours will be required to meet the criteria. This will be discussed in a later section.

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 similar McDonald's restaurants indicates that there are generally 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.

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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
00:00	24	24	0	5	5	0
01:00	4	4	0	6	6	0
02:00	8	8	0	16	16	0
03:00	8	8	0	20	20	0
04:00	2	2	0	8	8	0
05:00	15	13	2	17	10	7
06:00	9	4	5	111	66	45
07:00	45	32	13	117	71	46
08:00	51	37	14	105	71	34
09:00	64	45	19	95	64	31
10:00	44	24	20	123	69	54
11:00	56	32	24	66	43	23
12:00	97	58	39	130	81	49
13:00	103	64	39	133	72	61
14:00	78	49	29	128	75	53
15:00	89	56	33	84	50	34
16:00	99	57	42	115	64	51
17:00	113	74	39	110	64	46
18:00	101	62	39	97	57	40
19:00	81	52	29	68	45	23
20:00	73	45	28	51	33	18
21:00	49	34	15	59	45	14
22:00	34	26	8	32	24	8
23:00	24	19	5	24	24	0

6.8. As a worst case, if the numbers highlighted in the table are utilised for assessing the typical peak daytime and overnight frequency, the predicted noise levels generated over the reference periods of 1 hour during daytime and 15 minutes overnight 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

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6.10. Utilising the above data and the vehicle numbers highlighted in Table 4, the overall noise level (L_{Aeq}) during the 1-hour and 15-minute reference periods 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**		
	Peak daytime	Late evening (up to midnight)	Overnight (midnight to 06:00)
Eat-in (CP) vehicle numbers per hour highlighted in Table 4	61	8	7
25-sec vehicle noise from Table 5	54dB L_{Aeq}		
Logarithmic extrapolation for reference periods 1-hour & 15-min	50	41	41

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. Tables 7a - 7c below assess impact based on the periods in the above table.

Table 7a. Predicted car park vehicle noise –**Peak daytime** - dB L_{Aeq} / dB L_{Amax}

Details	**Receptor R1 facades**	**Receptor R2 facades**	**Receptor R3 facades**
Extrapolated car park noise (Table 6) dB $L_{Aeq,\ 1\ hour}$ / dB L_{Amax} (@5m)	50 / 72		
Distance correction (35m / 10m / 5m)	-17	-6	0
Shielding / Orientation	0(1)	0	-3(2)
Level at receptor façades (dB $L_{Aeq,\ 15mins}$ / dB L_{Amax})	33 / 55	44 / 66	47 / 69
Measured ambient noise at 12:00 Sunday (dB $L_{Aeq,15min}$ / L_{Amax} from Table 1)	70 / 85	63 / 78	63 / 78
Difference (L_{Aeq} / L_{Amax})	**-37 / -30**	**-19 / -12**	**-16 / -9**

(1) 27-41 Broad St shielded by restaurant building
(2) End façade facing site blank so orientation correction for front and rear facades

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Table 7b. Predicted car park vehicle noise –**Late evening** (up to 00:00) - dB L_{Aeq} / dB L_{Amax}

Details	Receptor R1 facades	Receptor R2 facades	Receptor R3 facades
Extrapolated car park noise (Table 6) dB $L_{Aeq,\ 1\ hour}$ / dB L_{Amax} (@5m)	50 / 72		
Distance correction (35m / 10m / 5m)	-17	-6	0
Shielding / Orientation	0	0	-3
Level at receptor façades (dB $L_{Aeq,\ 15mins}$ / dB L_{Amax})	33 / 55	44 / 66	47 / 69
Measured ambient noise at 23:00 Sunday (dB $L_{Aeq,15min}$ / L_{Amax} from Table 1)	59 / 77	53 / 76	53 / 76
Difference (L_{Aeq} / L_{Amax})	**-26 / -22**	**-9 / -10**	**-6 / -7**

Table 7c. Predicted car park vehicle noise –**Overnight** (00:00-06:00) - dB L_{Aeq} / dB L_{Amax}

Details	Receptor R1 facades	Receptor R2 facades	Receptor R3 facades
Extrapolated car park noise (Table 6) dB $L_{Aeq,\ 1\ hour}$ / dB L_{Amax} (@5m)	50 / 72		
Distance correction (35m / 10m / 5m)	-17	-6	0
Shielding / Orientation	0	0	-3
Level at receptor façades (dB $L_{Aeq,\ 15mins}$ / dB L_{Amax})	33 / 55	44 / 66	47 / 69
Measured ambient noise at 23:00 Sunday (dB $L_{Aeq,15min}$ / L_{Amax} from Table 1)	52 / 76	46 / 72	46 / 72
Difference (L_{Aeq} / L_{Amax})	**-19 / -21**	**-2 / -6**	**+1 / -3**

6.12. It can be seen from the 'Difference' values in the tables above that noise from the car park is predicted to be generally significantly lower than both the current ambient (L_{Aeq}) and maxima (L_{Amax}) noise values measured at the closest receptor façades based on the quietest night-time periods allowing for the potential of 24-hour opening times. It is possible that vehicle noise may be audible at the receptor R3 façades during overnight periods, but 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.

6.15. 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

6.16. Utilising the above data and the drive-thru vehicle numbers highlighted in Table 4, the overall noise level (L_{Aeq}) during the 1-hour and 15-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.

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

Details	Measurement period		
	Peak daytime	Late evening (up to midnight)	Overnight (midnight to 06:00)
Drive-thru (DT) vehicle numbers per hour highlighted in Table 4	81	26	20
20-sec vehicle noise from Table 8	53dB L_{Aeq}		
Logarithmic extrapolation for reference periods 1-hour & 15-min	50	45	43

6.17. 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 – dB L_{Aeq} / dB L_{Amax}

Details	Receptor R1 facades			Receptor R2 facades			Receptor R3 facades		
	Peak Day	Late eve	Over-night	Peak Day	Late eve	Over-night	Peak Day	Late eve	Over-night
Extrapolated DT noise (Table 9) dB L_{Aeq} / dB L_{Amax} (@10m)	50 / 60	45 / 60	43 / 60	50 / 60	45 / 60	43 / 60	50 / 60	45 / 60	43 / 60
Distance correction (closest approach - 17m / 5m / 5m)	-4			+6			+6		
Shielding	0			0			0		
Level at receptor façades dB L_{Aeq} / dB L_{Amax}	46 / 56	41 / 56	39 / 56	56 / 66	51 / 66	49 / 66	56 / 66	51 / 66	49 / 66
Measured baseline noise level (from Table 1) L_{Aeq} / L_{Amax}	70 / 85	59 / 77	52 / 76	63 / 78	53 / 76	46 / 72	63 / 78	53 / 76	46 / 72
Difference (L_{Aeq} / L_{Amax})	**-24 / -29**	**-18 / -21**	**-13 / -20**	**-7 / -12**	**-2 / -10**	**+3 / -6**	**-7 / -12**	**-2 / -10**	**+3 / -6**

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6.18. It can be seen in Table 10 that the impact of drive-thru traffic on all receptors is predicted to generally be significantly less than the current ambient noise levels and maxima events at the receptor locations. However for the overnight values at receptors R2 and R3, the noise levels are expected to be above ambient by up to 3dB, due to the close proximity of the drive-thru lane. As for use of the car park, up to late evening (midnight) 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

6.19. The latest layout provided shows that there are two COD units proposed in a side-by-side configuration, situated on the northern side 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.

6.20. The latest proposed location of the units is such that the speakers will be directing sound away from receptors R1 and R2 and at 90^0 to the receptor R3 rear façade. Therefore to objectively determine the specific impact at the application site, measurements taken of the speaker sound level from an operating COD at a typical operational McDonald's restaurant may be utilised, measured 2m directly in front of the speaker.

6.21. Based on the predicted maximum frequency of vehicles using the drive-thru during the peak daytime and night-time periods 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.

6.22. 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 – dB L_{Aeq} / dB L_{Amax}

Details	Receptor R1 façades @45m			Receptor R2 façades @50m			Receptor R3 Façades @30m		
	Peak Day	Late eve	Over-night	Peak Day	Late eve	Over-night	Peak Day	Late eve	Over-night
Measured typical COD noise @2m dB L_{Aeq} / dB L_{Amax}	64 / 71	64 / 71	64 / 71	64 / 71	64 / 71	64 / 71	64 / 71	64 / 71	64 / 71
Corrected values for 1 hr and 15-min L_{Aeq} period dB L_{Aeq} / dB L_{Amax}	60 / 71	55 / 71	54 / 71	60 / 71	55 / 71	54 / 71	60 / 71	55 / 71	54 / 71
Distance correction	-27			-28			-15		
Orientation correction	-10			-10			-3		
Tonal /character correction	+6 / 0			+6 / 0			+6 / 0		
Level at receptor façades dB L_{Aeq} / dB L_{Amax}	29 / 34	24 / 34	23 / 34	28 / 33	23 / 33	22 / 33	48 / 53	43 / 53	42 / 53
Measured baseline noise level (from Table 1) L_{Aeq} / L_{Amax}	70 / 85	59 / 77	52 / 76	63 / 78	53 / 76	46 / 72	63 / 78	53 / 76	46 / 72
Difference (L_{Aeq} / L_{Amax})	**-41 / -51**	**-35 / -43**	**-29 / -42**	**-35 / -45**	**-30 / -43**	**-24 / -39**	**-15 / -25**	**-10 / -23**	**-4 / -19**

6.23. It can be seen from the tables above that noise from the use of the COD units is predicted to be significantly below the existing ambient and maxima levels during the quietest periods measured and is consequently unlikely to have any noise impact on the receptor façades at any time up to 24-hour 7-day a week opening. Up to midnight on even the quietest day of the week it is not likely that the CODs will be audible at the receptor façades under normal conditions.

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7. DISCUSSION AND RECOMMENDATIONS

7.1. This assessment has predicted the noise impact of the proposed restaurant and drive-thru operations on the closest residential neighbours, based on the latest site layout provided. 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 local authority criteria, based on up to 24-hours, 7 days a week opening hours.

7.2. Noise generated by the proposed mechanical air-handling and extraction plant, situated in the plant well at the eastern end of the restaurant building, has been assessed against BS 4142: 2014 criteria. The assessment found that noise from the plant was likely to have a significant impact on the closest R1 residents and a moderate impact on R1 and R2 residents during late evening and overnight periods. In order to mitigate the noise to a level that would reduce the impact to a low to insignificant adverse level the following mitigating measures are recommended:

- Limit evening opening hours of the restaurant to 23:00 (allowing 1-hour cleaning / purging period). This has two connected effects. Firstly noise sensitivity is lower at this time as most people are only just going to bed. Secondly the ambient noise level is higher than it is during overnight periods.

- Install an in-line post-fan silencer in the kitchen extract exhaust duct. This should reduce the flue exhaust noise by up to 15dB.

- Select quieter plant where available or carry out localised shielding or enclosures around specific plant items such as the extract fan motors. This work should reduce plant unit noise by 5-10dB.

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 indicates that predicted noise levels at the receptor façades will generally be below the lowest existing ambient noise levels measured. Whilst traffic on the local roads subsides during the evening and overnight, it remains consistent and has a continual dominant effect on the local noise environment.

7.4. If the limitation in opening hours as recommended above is implemented, the noise impact from on-site customer traffic should be insignificant, as indicated in Table 7b. Staff traffic will be very low and is unlikely to be discernible as a discrete noise source under normal circumstances at any time.

7.5. Drive-thru traffic within the site, should also have no impact if the late-evening closing is limited to 23:00. Due to the character of noise being the same as the dominant noise source currently affecting the receptors, it is unlikely to be noticeable by local residents as a discrete noise source and will tend to blend into the ambient noise during any proposed opening period. However, due to the close proximity of the drive-thru lane to the receptors, the following mitigation would be recommended to reduce the impact from noisier vehicles during the proposed opening hours:

- Erect an acoustic barrier such as a close-boarded timber fence along the northern boundary of the restaurant area of the site, close to receptor R3, and the south-western boundary of the site adjacent to receptor R2. The height of the barrier should be at least 2m and should extend as shown on Figure 2 in the appendix.

7.6. Noise from the COD speakers has been demonstrated to be well within ambient noise conditions at any time, and is unlikely to be audible inside the receptor properties closest to the site.

7.7. 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 is generally dealt with diligently and effectively.

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

7.9. 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.

7.10. 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 the more noise-sensitive late-evening 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 noise-sensitive periods.

- Ensure that the 'night-time' volume levels on the COD speakers are set from after 21:00 and before 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.

7.11. In conclusion, it is considered that this document demonstrates that if the recommended limitation on opening hours and additional noise-control measures to the external plant are implemented, 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. It is considered that these points could be successfully conditioned in a planning approval.

7.12. Consequently it would be expected that operations on the site would 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:**

Friday 13th – Monday 16th March 2015

A1.2 **Location:**

Broad Street, Leek

A1.3 **Personnel Present:**

Martin Loven – Loven Acoustics

A1.4 **Weather:**

Dry, wind <1 m s^{-1}, 6^0C.

A1.5 **Instrumentation:**

Make	Description	Model	Serial no.	Calibration Expiry
Norsonic	Type 1 Sound Level Meter	NOR131	1310108	30/03/2017
Cirrus	Type 1 Sound Level Meter	CR811C	D21052FD	24/06/2016

Calibration levels before and after survey - 113.9dB - NOR131
93.8dB - CR811C

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

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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.

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APPENDIX 2

Figure 1. Site location plan showing baseline noise measurement positions with location of assessed receptors shaded blue.

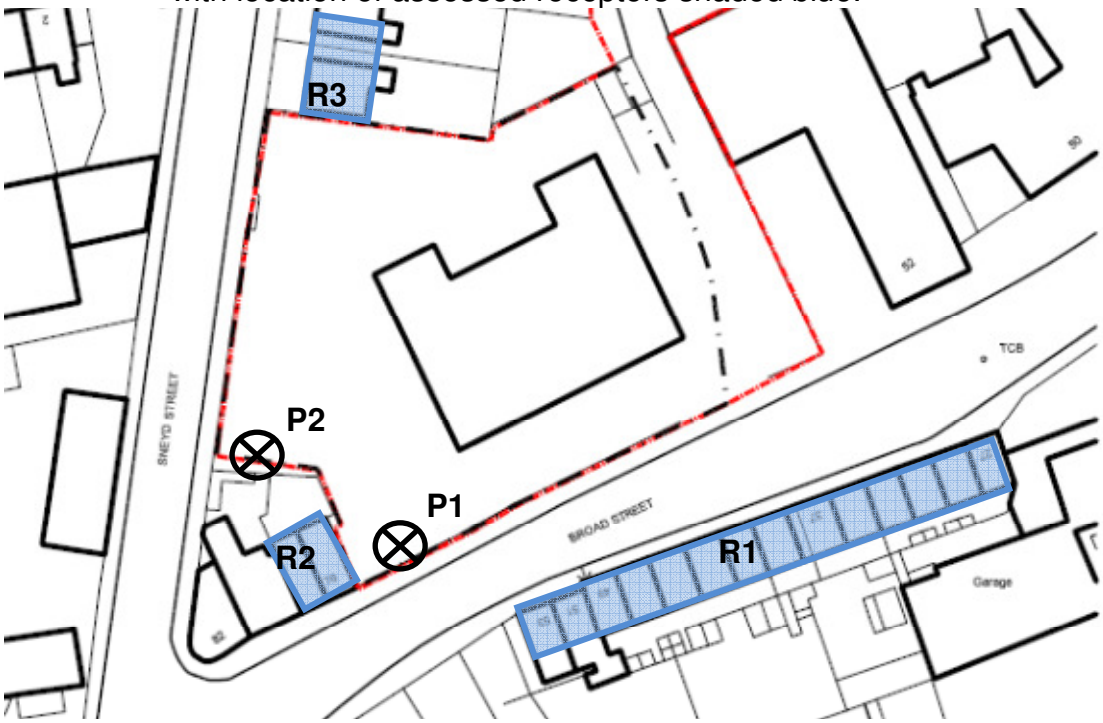

Figure 2. Proposed restaurant site layout, showing recommended extent of proposed 2m high acoustic barrier (red lines)

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

Date/ Day	Time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}	Date/ Day	Time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
13/03/15	13:15	77.1	94.8	80.1	63.4	4/03/15	00:00	61.7	81.6	64.9	38.9
Friday	13:30	72.1	97.4	74.8	63.3	Sat'day	00:15	63.3	82.6	65.8	40.1
	13:45	71.4	85.8	74.8	61.3		00:30	62.4	78.7	65.3	36.5
	14:00	71.0	82.5	74.6	61.3		00:45	64.4	91.7	64.6	35.5
	14:15	69.5	82.2	72.9	61.0		01:00	62.7	80.7	65.5	34.9
	14:30	71.1	86.8	74.1	61.1		01:15	62.8	84.0	63.9	34.3
	14:45	70.1	86.1	73.5	61.1		01:30	61.5	82.3	62.1	35.1
	15:00	70.8	84.2	74.0	60.6		01:45	59.7	80.5	59.8	31.0
	15:15	70.4	91.4	72.4	60.2		02:00	59.9	81.2	58.7	30.0
	15:30	70.4	87.5	73.7	60.9		02:15	58.6	79.5	57.7	30.0
	15:45	71.3	89.0	73.9	60.9		02:30	58.8	79.4	59.5	31.8
	16:00	70.9	84.8	74.0	60.6		02:45	58.7	83.4	54.6	29.3
	16:15	70.6	83.5	73.7	61.3		03:00	57.3	79.1	53.3	29.5
	16:30	70.4	86.0	73.7	61.2		03:15	60.3	79.4	59.9	29.4
	16:45	70.0	86.5	73.0	61.7		03:30	56.0	75.5	54.6	29.1
	17:00	70.5	83.6	73.7	62.0		03:45	59.1	82.4	56.0	29.3
	17:15	70.2	87.7	72.9	59.6		04:00	56.2	77.7	51.8	28.5
	17:30	71.7	91.5	73.9	63.2		04:15	60.1	84.6	55.7	28.7
	17:45	70.3	87.9	73.3	61.2		04:30	59.5	81.2	57.5	29.8
	18:00	70.4	83.0	73.5	60.5		04:45	58.4	78.9	57.5	30.1
	18:15	70.1	83.3	73.6	60.2		05:00	59.4	77.3	60.4	32.0
	18:30	69.0	82.5	72.6	58.8		05:15	61.2	83.6	61.7	34.6
	18:45	69.0	79.8	73.0	57.3		05:30	64.2	83.2	66.9	39.6
	19:00	69.0	82.5	73.0	58.2		05:45	66.4	87.2	69.4	44.7
	19:15	68.9	81.2	72.8	58.1		06:00	62.1	83.6	61.6	36.1
	19:30	67.9	81.1	72.0	56.2		06:15	65.4	83.4	69.2	41.6
	19:45	68.4	82.3	72.2	55.7		06:30	67.7	84.4	71.2	44.9
	20:00	67.8	82.0	72.0	56.2		06:45	67.5	86.3	71.9	45.8
	20:15	67.5	85.7	71.8	53.9		07:00	67.2	83.9	71.2	48.9
	20:30	67.6	82.9	71.6	53.2		07:15	65.2	80.7	69.7	41.4
	20:45	66.9	79.9	71.6	52.5		07:30	68.8	84.3	72.7	50.5
	21:00	66.4	79.6	71.2	51.3		07:45	67.8	83.7	72.3	52.9
	21:15	65.0	78.3	70.1	46.3		08:00	69.3	85.7	73.7	56.2
	21:30	65.1	80.1	70.4	45.7		08:15	69.1	86.5	73.5	55.1
	21:45	64.2	82.2	68.8	43.8		08:30	70.0	83.5	74.1	57.2
	22:00	66.4	82.9	71.2	44.4		08:45	70.0	83.1	74.0	58.5
	22:15	65.5	81.1	70.6	44.1		09:00	70.5	82.7	74.3	59.2
	22:30	65.2	83.3	70.1	41.8		09:15	70.9	89.7	74.1	59.0
	22:45	63.2	78.1	67.4	40.4		09:30	71.0	87.5	74.4	59.4
	23:00	62.5	76.8	67.6	39.2		09:45	72.2	104.7	73.8	60.2
	23:15	64.9	81.3	69.2	41.6		10:00	70.4	83.4	73.5	61.5
	23:30	64.6	78.7	69.2	38.0		10:15	70.3	83.8	73.6	60.7
	23:45	63.5	81.5	67.4	38.8		10:30	69.7	80.6	72.9	61.8

Continued...

Table 12. .... continued

Date/ Day	Time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}	Date/ Day	Time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
14/03/15	10:45	68.6	77.9	72.0	61.4		21:30	65.8	81.6	70.5	48.8
Sat'day	11:00	68.2	84.5	70.7	60.5		21:45	64.6	79.1	69.5	47.2
	11:15	72.0	98.7	72.2	60.3		22:00	65.0	80.0	69.8	48.5
	11:30	70.5	85.1	73.5	61.5		22:15	64.7	79.1	69.6	43.5
	11:45	67.8	80.4	71.1	60.6		22:30	62.5	75.9	67.4	41.0
	12:00	67.9	80.3	71.0	60.2		22:45	64.4	78.3	69.5	39.9
	12:15	69.4	85.1	73.1	60.1		23:00	63.0	76.4	67.9	39.5
	12:30	70.4	84.5	73.5	60.8		23:15	63.2	77.7	68.1	39.2
	12:45	70.2	84.7	73.4	61.0		23:30	65.4	81.6	69.7	49.2
	13:00	69.3	83.3	72.7	60.3		23:45	63.4	84.2	67.6	35.7
	13:15	69.6	82.0	72.9	60.8	15/03/15	00:00	61.6	78.5	66.0	36.4
	13:30	70.4	83.4	73.8	61.1	Sunday	00:15	62.1	79.0	65.8	34.6
	13:45	70.7	82.5	73.6	61.7		00:30	61.2	81.0	63.5	35.1
	14:00	70.4	84.9	73.5	60.4		00:45	63.9	83.9	67.3	36.6
	14:15	69.6	81.7	72.8	60.5		01:00	62.2	79.5	66.1	36.4
	14:30	70.2	78.0	73.6	61.6		01:15	62.6	82.9	64.4	33.1
	14:45	70.3	82.2	73.5	59.8		01:30	60.4	79.5	61.7	32.2
	15:00	69.4	78.7	72.7	60.7		01:45	61.7	82.0	63.2	31.9
	15:15	70.0	82.9	73.3	61.6		02:00	60.6	80.8	60.3	31.4
	15:30	70.2	79.4	73.7	60.0		02:15	60.7	78.3	61.7	30.5
	15:45	70.2	82.0	73.6	61.1		02:30	59.2	81.7	57.8	29.2
	16:00	70.1	84.3	73.1	61.0		02:45	59.8	78.1	60.1	29.5
	16:15	70.4	82.9	73.6	62.0		03:00	56.2	76.5	52.8	28.4
	16:30	70.4	83.4	73.9	59.9		03:15	56.3	78.1	52.7	28.4
	16:45	69.8	83.5	73.1	59.9		03:30	55.3	82.5	36.9	27.2
	17:00	71.4	93.2	73.9	60.8		03:45	57.7	79.9	51.6	29.2
	17:15	70.1	83.0	73.5	58.7		04:00	51.0	75.4	40.5	28.1
	17:30	70.0	85.8	73.6	58.7		04:15	53.9	75.3	48.5	28.1
	17:45	68.9	80.3	72.8	57.4		04:30	54.0	78.5	38.2	28.4
	18:00	69.5	83.3	73.3	57.7		04:45	53.5	77.0	47.9	29.1
	18:15	68.5	80.7	72.4	57.5		05:00	58.3	79.2	58.8	32.9
	18:30	69.7	85.6	73.3	59.3		05:15	59.7	81.0	58.4	34.2
	18:45	68.5	84.9	72.5	55.6		05:30	58.6	78.1	59.3	34.2
	19:00	68.2	81.2	72.3	56.2		05:45	61.7	81.2	63.0	37.9
	19:15	69.1	87.8	73.1	56.0		06:00	62.0	83.1	62.6	34.2
	19:30	68.7	84.8	72.6	55.4		06:15	62.1	81.1	63.8	40.1
	19:45	69.0	90.0	72.7	55.7		06:30	64.3	85.0	67.4	42.3
	20:00	67.8	85.5	71.9	52.7		06:45	60.3	79.2	61.6	39.0
	20:15	67.3	78.4	72.0	54.3		07:00	63.8	83.7	65.3	40.3
	20:30	65.6	80.8	70.6	47.6		07:15	62.8	78.6	66.8	37.6
	20:45	66.4	77.7	71.3	50.7		07:30	65.8	83.6	70.3	48.7
	21:00	65.0	80.1	70.2	49.7		07:45	67.2	85.6	71.2	46.3
	21:15	65.7	83.3	70.7	47.7		08:00	65.5	82.5	70.5	46.1

Continued...

Table 12. .... continued

Date/ Day	Time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}	Date/ Day	Time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
15/03/15	08:15	66.4	83.2	71.2	45.9		19:00	66.5	78.0	71.5	51.0
Sunday	08:30	66.5	81.3	71.6	47.9		19:15	66.7	78.8	71.8	50.9
	08:45	67.0	78.0	72.0	51.8		19:30	66.5	88.3	70.8	50.3
	09:00	68.8	83.4	73.1	55.9		19:45	67.0	81.7	71.6	50.8
	09:15	68.4	82.3	72.7	53.6		20:00	66.2	77.8	71.3	52.2
	09:30	68.8	81.6	73.1	56.2		20:15	65.7	79.3	70.8	50.5
	09:45	69.1	81.7	73.2	57.4		20:30	65.4	78.9	70.7	47.9
	10:00	68.9	80.4	72.9	57.5		20:45	65.3	79.5	70.4	46.7
	10:15	68.3	80.5	72.2	57.9		21:00	66.7	81.2	71.9	49.7
	10:30	68.7	85.4	72.7	58.1		21:15	64.0	80.5	68.5	42.3
	10:45	69.1	80.5	72.9	59.3		21:30	63.2	78.9	68.1	41.1
	11:00	69.8	79.9	73.2	59.7		21:45	63.7	78.5	68.7	41.2
	11:15	72.1	98.0	74.0	60.0		22:00	63.4	79.0	68.1	40.4
	11:30	70.4	80.8	73.9	61.5		22:15	63.3	83.4	66.8	38.7
	11:45	70.1	79.5	73.4	60.4		22:30	61.1	78.0	62.0	35.6
	12:00	69.9	85.3	73.2	59.8		22:45	59.6	78.8	60.5	32.8
	12:15	69.8	79.2	73.3	59.6		23:00	58.8	77.6	60.0	32.0
	12:30	71.9	94.3	73.8	61.9		23:15	58.1	78.0	58.2	30.5
	12:45	69.8	84.0	73.2	59.2		23:30	57.8	79.3	57.6	29.6
	13:00	69.9	80.2	73.1	60.9		23:45	61.9	80.4	63.2	31.0
	13:15	70.0	79.0	73.6	59.0	16/03/15	00:00	60.7	79.5	59.8	30.5
	13:30	69.9	79.7	73.5	59.5	Monday	00:15	58.5	77.1	59.1	30.4
	13:45	69.9	84.0	73.6	57.0		00:30	59.3	78.0	59.7	28.8
	14:00	69.9	82.3	73.5	59.2		00:45	58.7	82.8	54.6	26.1
	14:15	70.0	84.6	73.3	59.2		01:00	56.4	80.2	45.1	27.7
	14:30	70.5	90.6	73.6	60.0		01:15	56.9	79.8	52.1	27.6
	14:45	70.1	80.1	73.4	61.4		01:30	52.8	74.9	48.5	24.4
	15:00	70.2	82.4	74.0	58.2		01:45	55.0	77.9	52.5	26.1
	15:15	70.5	87.7	73.3	59.9		02:00	52.3	76.5	44.4	24.6
	15:30	70.3	85.2	73.6	60.1		02:15	54.7	79.7	47.6	26.5
	15:45	69.8	80.1	73.5	58.9		02:30	55.0	80.8	49.0	27.2
	16:00	70.0	86.7	73.3	59.3		02:45	55.2	77.5	46.2	27.2
	16:15	69.2	82.1	73.0	56.9		03:00	56.1	77.6	53.8	26.8
	16:30	69.1	80.1	73.0	58.5		03:15	54.1	78.6	43.6	27.6
	16:45	68.8	82.5	72.8	55.6		03:30	60.5	84.5	58.5	31.7
	17:00	68.5	79.5	72.6	55.3		03:45	59.4	85.0	55.4	28.9
	17:15	68.9	82.8	72.9	56.5		04:00	53.3	74.4	52.3	29.5
	17:30	68.2	80.1	72.8	52.6		04:15	59.0	79.7	57.9	31.6
	17:45	68.2	78.7	72.4	56.9		04:30	61.3	84.7	59.3	31.2
	18:00	67.2	79.9	71.7	52.0		04:45	59.0	81.0	57.9	33.4
	18:15	67.1	82.4	71.5	55.3		05:00	62.0	78.9	64.3	35.0
	18:30	68.0	78.4	72.5	55.3		05:15	65.3	84.2	68.8	45.7
	18:45	68.0	80.0	72.5	54.8		05:30	66.6	83.7	70.5	46.4

Continued...

Table 12. .... continued

Date/ Day	Time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
16/03/15	05:45	65.4	82.2	69.6	45.1
Monday	06:00	67.7	83.1	72.5	45.6
	06:15	69.4	83.9	73.9	50.4
	06:30	69.8	83.7	74.0	54.6
	06:45	70.6	84.9	74.6	56.0
	07:00	70.5	83.3	74.5	58.5
	07:15	72.5	85.7	76.3	61.1
	07:30	72.7	84.6	76.2	61.1
	07:45	72.5	86.1	75.9	62.2
	08:00	72.4	89.7	75.7	60.3
	08:15	72.1	83.4	75.7	60.3
	08:30	71.8	83.8	74.9	62.7
	08:45	69.4	85.3	72.6	61.0
	09:00	71.0	83.6	74.4	60.7
	09:15	71.5	86.0	74.8	61.3
	09:30	72.0	98.3	74.6	59.8
	09:45	71.0	85.7	74.2	59.5
	10:00	71.8	86.6	75.3	60.2
	10:15	70.9	83.5	73.9	61.1
	10:30	71.0	83.2	74.5	60.4
	10:45	72.0	94.4	73.4	60.4
	11:00	70.2	85.6	73.6	59.6
	11:15	70.5	85.3	73.9	59.0
	11:30	70.6	85.4	73.4	60.5
	11:45	70.0	90.3	73.1	60.7
	12:00	70.7	84.1	74.1	60.0
	12:15	70.9	86.6	74.3	59.5
	12:30	69.7	82.8	73.1	58.7
	12:45	70.0	83.1	73.7	59.5
	13:00	70.3	86.4	73.9	58.8
	13:15	70.8	83.5	73.8	58.6
	13:30	70.9	83.2	74.1	58.6
	13:45	70.6	83.4	73.9	59.3
	14:00	73.6	101.9	73.3	59.8
	14:15	68.9	84.1	72.8	57.0
	14:30	72.6	96.8	73.6	58.2
	14:45	70.2	87.5	73.5	58.6

Table 13. Baseline noise data at measurement position **P2** – dB(A).

Date/ Day	Time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}	Date/ Day	Time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
13/03/15	13:06	64.4	80.2	67.9	56.1		10:30	63.9	80.5	67.2	56.4
Friday	13:30	65.2	91.0	67.5	56.7		11:00	63.9	81.5	67.4	55.1
	14:00	63.9	84.5	66.9	56.4		11:30	63.9	77.7	67.3	56.3
	14:30	64.4	90.2	66.9	56.1		12:00	64.0	77.7	67.8	55.5
	15:00	63.6	78.4	67.1	55.8		12:30	63.5	79.9	67.2	56.1
	15:30	64.1	77.5	67.6	55.7		13:00	63.4	82.6	66.7	54.8
	16:00	64.3	78.0	67.6	57.4		13:30	63.1	77.8	66.5	55.9
	16:30	64.3	78.2	67.9	57.5		14:00	63.4	77.2	67.1	56.1
	17:00	64.5	84.4	67.9	56.2		14:30	63.7	77.7	67.2	55.1
	17:30	64.5	82.3	68.1	56.7		15:00	63.1	83.2	66.7	55.3
	18:00	64.0	82.0	67.2	55.8		15:30	63.1	76.7	66.8	55.6
	18:30	63.2	76.9	67.0	54.4		16:00	63.4	78.1	66.5	55.7
	19:00	62.9	76.5	66.9	52.8		16:30	64.3	82.7	67.8	55.4
	19:30	63.0	83.7	66.1	51.4		17:00	63.5	77.8	66.8	54.5
	20:00	61.0	77.6	64.3	50.1		17:30	62.8	76.7	66.2	54.0
	20:30	61.1	77.9	64.6	48.5		18:00	63.4	81.1	67.1	52.8
	21:00	60.8	77.4	64.0	45.5		18:30	62.9	82.7	66.1	53.8
	21:30	57.7	75.7	60.8	41.2		19:00	62.4	84.2	65.2	50.3
	22:00	59.8	78.8	63.0	40.3		19:30	62.5	80.1	65.8	50.6
	22:30	59.2	76.6	61.4	38.8		20:00	61.8	79.7	65.0	48.2
	23:00	58.1	85.9	60.3	37.3		20:30	60.3	77.2	62.6	46.1
	23:30	57.3	75.2	60.0	36.6		21:00	60.0	80.8	61.6	45.0
14/03/15	00:00	56.9	79.1	58.6	38.0		21:30	60.4	80.5	62.8	43.6
Sat'day	00:30	56.4	79.3	58.2	34.5		22:00	59.4	76.7	61.9	40.3
	01:00	54.7	73.7	57.1	35.1		22:30	59.1	80.1	60.6	38.6
	01:30	52.9	72.4	55.3	32.2		23:00	60.7	89.8	59.8	38.0
	02:00	50.7	71.5	52.0	30.6		23:30	57.8	76.9	60.3	39.1
	02:30	53.5	79.4	53.5	30.4	15/03/15	00:00	57.8	78.4	59.0	35.0
	03:00	49.4	73.2	50.3	30.1	Sunday	00:30	55.0	75.6	57.5	35.7
	03:30	48.1	67.8	48.7	29.7		01:00	56.6	74.4	58.7	34.2
	04:00	51.6	77.6	49.6	29.1		01:30	54.5	77.5	56.1	35.3
	04:30	54.0	78.9	51.7	29.8		02:00	54.1	79.1	54.6	35.7
	05:00	53.3	80.2	54.4	31.5		02:30	52.3	77.9	51.9	35.3
	05:30	57.2	76.8	59.9	40.4		03:00	48.8	73.5	49.2	35.2
	06:00	57.3	77.2	60.4	38.2		03:30	45.8	70.5	47.4	35.2
	06:30	57.5	74.1	60.9	41.1		04:00	47.8	72.3	47.9	35.4
	07:00	59.6	80.0	62.7	42.6		04:30	44.6	67.0	47.1	35.6
	07:30	60.2	78.2	63.3	46.1		05:00	50.5	71.5	51.7	36.9
	08:00	61.6	77.4	64.3	50.1		05:30	52.8	77.9	53.8	38.2
	08:30	62.4	76.9	65.8	52.3		06:00	54.2	73.4	57.2	37.3
	09:00	63.0	78.3	66.1	55.5		06:30	56.8	76.0	59.0	41.0
	09:30	63.5	78.0	66.8	55.6		07:00	56.6	77.9	58.6	39.3
	10:00	64.0	85.8	67.2	56.3		07:30	58.1	75.2	61.0	44.1

Continued...

Table 13. .... continued

Date/ Day	Time	L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
15/03/15	08:00	59.7	77.0	62.2	45.9
Sunday	08:30	59.4	77.1	62.2	44.5
	09:00	61.9	77.7	65.5	51.2
	09:30	62.4	78.3	65.9	52.3
	10:00	62.5	77.8	66.0	53.3
	10:30	63.6	78.4	67.6	53.3
	11:00	62.9	76.9	66.2	55.1
	11:30	63.7	80.0	66.8	56.5
	12:00	63.5	77.7	66.9	55.7
	12:30	64.2	82.4	67.8	55.3
	13:00	62.6	78.5	65.4	54.5
	13:30	63.1	81.8	66.3	54.3
	14:00	62.4	76.3	65.6	53.9
	14:30	64.3	92.1	66.9	55.5
	15:00	63.2	77.9	66.5	55.0
	15:30	63.1	80.7	65.8	54.5
	16:00	62.7	79.5	65.3	54.0
	16:30	62.5	77.1	65.2	53.2
	17:00	62.1	79.2	64.7	51.3
	17:30	63.1	87.5	65.6	49.5
	18:00	61.0	76.3	64.1	50.1
	18:30	60.9	75.6	63.6	49.7
	19:00	60.4	79.8	62.8	46.4
	19:30	61.0	80.5	63.8	49.1
	20:00	60.7	78.7	63.7	47.9
	20:30	59.1	79.1	61.8	44.8
	21:00	59.7	84.1	61.8	43.6
	21:30	58.3	75.5	60.7	40.3
	22:00	58.5	76.7	60.2	39.1
	22:30	55.3	79.1	56.9	34.5
	23:00	53.2	76.4	53.8	32.4
	23:30	53.2	74.8	53.9	30.9
16/03/15	00:00	56.1	79.7	55.4	32.3
Monday	00:30	52.4	78.7	51.7	29.6
	01:00	47.3	68.2	48.5	30.0
	01:30	48.4	75.9	47.5	28.3
	02:00	46.3	72.8	47.2	29.2
	02:30	49.9	74.8	47.5	34.3
	03:00	44.9	64.8	47.6	34.6
	03:30	52.7	76.1	51.7	35.6
	04:00	45.6	65.5	41.7	34.9

Chart 1. Graph of **P1** data

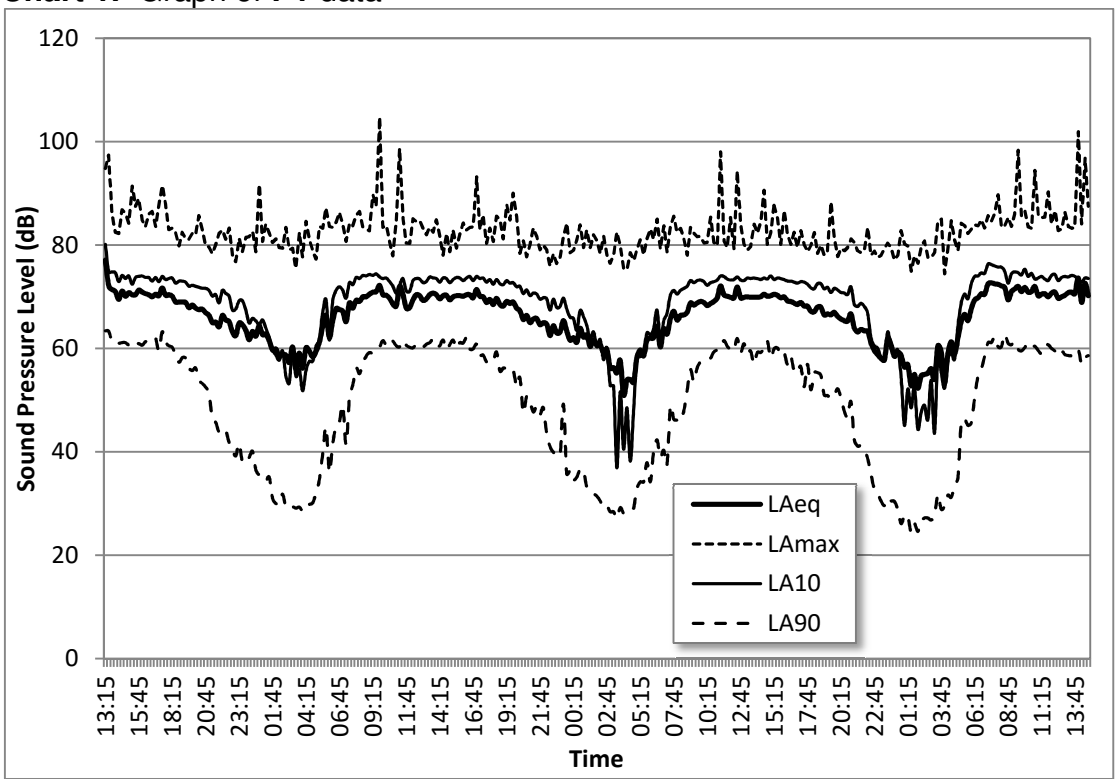
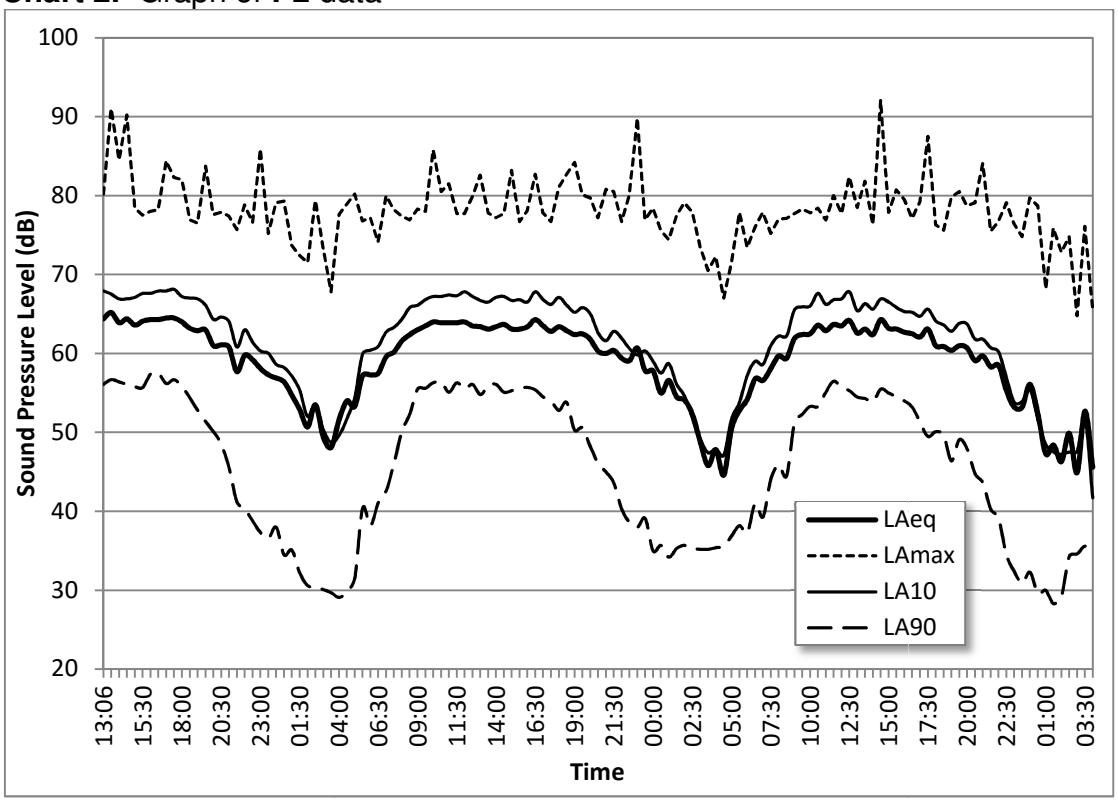


Chart 2. Graph of **P2** data



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