Environmental Noise Assessment

Proposed McDonald's with drive thru
Tesco superstore
Crescent Road
Wrexham
LL13 8HF



On Behalf of

Project Ref: 7065-15| Rev: 1 | Date: 30th June 2025

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Revision	Date	Description
2	11-4-25	Site layout drawing updated to 8612-SA-2723-P004

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1 Executive Summary

It is proposed to construct a new single storey McDonald's restaurant (NG100) on existing parking area at the eastern end of Tesco's superstore site, Crescent Road, Wrexham. The new restaurant will have a drive thru lane with side-by-side Customer Order Displays (COD) and 18 designated car parking spaces. It is proposed to trade 24-hours per day.

This Noise Impact Assessment, which has been commissioned by McDonald's, to accompany the planning application to assess the potential impact of noise created by vehicles using the drive thru lane & dedicated parking spaces, from the roof plant as well as from deliveries, against existing sound levels.

McDonald's site lies to northeast of Tesco Superstore, across an area of overflow parking. Across Crescent Close, to the eastern site boundary are houses at a lower level.

A five-day survey, over a weekend, has been carried out to establish current ambient sounds, which can be classified as being "moderate" at 47 dB L_{Aeq} during the day dropping back to 45 dB L_{Aeq} overnight and were controlled predominately by intermittent local traffic and more distant road noise. Background sound levels were in the mid-40's dB L_{A90} during the day, dropping to mid-30's dB L_{A90} by night.

This existing environmental soundscape will provide a moderate degree of masking of both fixed plant and site activity noise given a reasonable separation distances to the neighbours, however the table below does set out the mitigation measures being required for this site;

Mitigation Item	Required
Limit trading hours	×
Acoustic boundary fence required 3.5m along the eastern and southern boundaries and 2.4m high on part of the western	✓
Plant attenuation –	
kitchen extract fan discharge silencer 900 x 900 x 2400mm long	✓
kitchen extract fan acoustic enclosure	✓
FAI silencers on AHU's S1 & S2 1800mm long	✓
Danfoss chiller & freezer condensers can to be used	✓
ABS drinks cooler condenser can be installed	✓
Customer Order Displays fitted with ambient level control	✓
Limit deliveries hours to between the hours of 7am to 11pm	×

Table 1 summary of mitigation requirements

With these mitigation measures in place noise from the proposed development can be minimised and reduced to prevent any *adverse impact* on the neighbours.

2 Introduction

2.1 Overview

It is proposed to construct a new single storey McDonald's restaurant (NG100) on existing parking area at the eastern end of Tesco's superstore site, Crescent Road, Wrexham. The new restaurant will have a drive thru lane with side-by-side Customer Order Displays (COD) and 18 designated car parking spaces. It is proposed to trade 24-hours per day.

This Noise Impact Assessment, which has been commissioned by McDonald's, accompanies this planning application for a drive-thru restaurant and assesses the potential impact of noise created by vehicles using the drive thru lane & dedicated parking spaces, from the roof plant as well as from deliveries, against existing sound levels.

2.2 Objectives

To monitor existing sound levels closest to the neighbours and assess the likely mitigation that will be required to protect any adverse impacts on the neighbours from the noise generated by this proposed development.

Customer vehicles using the drive thru lane, making their orders at the Customer Order Displays as well as parking in the 18 dedicated parking spaces outside the restaurant will inevitably make some noise that could impact on the neighbours. The sound of the three weekly deliveries will also need to be considered and whether deliveries at night are appropriate. These sources will be individually and collectively assessed within this report.

The restaurant requires mechanical services equipment to ventilate the kitchen and keep the building warm in winter and cool in summer. This equipment will be located on the roof of the single storey restaurant building. Noise from this equipment will also be looked at and suitable mitigation detailed to ensure it does not disturb the neighbours.

This report will set out a summary of the necessary mitigation measures that will be required to ensure compliance with local and National planning policy.

3 Planning Policy

3.1 Wrexham County Borough Council

Wrexham County Borough Council's Unitary Development Plan (Adopted February 2005) Policy GDP1 for All New Developments should;

> *f) Ensure the safety and amenity of the public and safeguard the environment from the adverse effects of pollution of water, land or air, hazards from industry and quarrying, and associated noise, odour or vibration arising from development*

3.2 National Planning Policy Framework (NPPF)

The NPPF[1] sets out governmental planning policy for England. The NPPF states that, with respect to noise, planning policies and decisions should aim to;

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

The Framework also states that consideration should be given to the Noise Policy Statement for England[2].

3.3 Noise Policy Statement for England (NPSE)

The NPSE aims to "Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development" and has three aims;

- Avoid significant adverse impacts on health and quality of life from environmental, neighbor and neighborhood noise within the context of Government policy on sustainable development
- Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbor and neighborhood noise within the context of Government policy on sustainable development

[1] Revised December 2024
[2] NPSE published by DEFRA March 2010

- Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighborhood noise within the context of Government policy on sustainable development.

NPSE shares the definitions from existing guidance. The WHO – Guidelines for Community Noise (2009), introduced the concepts of NOEL/LOAEL, where;

NOEL No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level there is no detectable effect on health and quality of life due to the noise.

LOAEL Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The Noise Policy Statement considers that noise levels above the SOAEL would be seen to have, by definition, significant adverse effects and would be considered unacceptable. Where the assessed noise levels fall between the LOAEL and the SOAEL noise levels, the Policy Statement requires that:

"all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development... .. This does not mean that such adverse effects cannot occur."

Where noise levels are below the LOAEL it is considered there will be no adverse effect. Once noise levels are below the NOEL there will be no observable change. No objective values are offered within the NPSE, as the document does indicate that each site should be considered on its own merits.

3.4 Planning Practice Guidance (PPG)

Further guidance was published by Department for Communities & Local Government in March 2014 relating to Noise and is known as Planning Practice Guidance (PPG) and requires Local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so consider:

- whether or not a significant adverse effect is occurring or likely to occur;
- whether or not an adverse effect is occurring or likely to occur; and
- whether or not a good standard of amenity can be achieved.

Noise is rated within this guidance in terms of its "Observed Effect Level" and provides the following table giving examples;

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level (NOEL)			
Not noticeable	No effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any changes in behaviour or attitude. Can slightly effect the acoustic character of the area but not such that there is a perceived change in quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an ability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep depreciation/awakening: loss of appetite. Significant. Medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 2 PPG Observed Effect Levels

3.5 BS7445 Description and measurement of environmental noise

BS7445-2:1991 (*description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use*) describes methods for the acquisition of data which provide descriptors that enable;

- a description of the environmental noise in a specified area of land to be made in a uniform way;
- the compatibility of any land use activity or projected activity to be assessed with respect to existing or predicted noise.

The requirements of this Standard will be used to ensure consistency in sound measurements and their interpretation.

3.6 BS4142 Method for rating and assessing industrial and commercial sound

BS4142:2015+A:2019 provides a method for assessing the likely impact industrial and commercial noise will have on residential neighbour that depends on the margin by which the Rating Level of the specific sound exceeds the back ground sound and the context in which the sound occurs.

The table below details the likely impact based on the excess of the background;

Difference between background sound and Rating Level	BS4142 Assessment
+10 dB	Indication of a significant adverse impact
+ 5 dB	Indication of an adverse impact
0 dB	Indication of low impact

Table 3 BS4142 impacts

BS4142 requires that character penalties, if any tonality, intermittency, impulsivity or "other characteristics" are present in the noise are added to the assessed $L_{Aeq,T}$ level of plant noise to provide a Rating Level (L_{ArTr}).

The table below summarizes acoustic feature penalties;

Acoustic Feature	Correction dB Just perceptible	Clearly perceptible	Highly perceptible
Tonality	2	4	6
Impulsivity	3	6	9
Intermittency		3	
Other characteristics		3	

Table 4 acoustic feature penalties

These penalties are additive, however the combine correction, for a clearly audible source would not be expected to be greater than 10 dB. Where the source is no louder than the background and has no readily perceptible features the Rating Level is often equal to the $L_{Aeq,T}$ level.

3.7 IEMA Guidelines for Environmental Noise Impact Assessment

The Institute of Environmental Management & Assessment (IEMA) has published its *Guideline for environmental Noise Impact Assessment*[3], which addresses the key principles for noise impact assessments and provides guidance for assessing the impact of noise.

The IEMA guidance recognizes that each situation is unique and care should be taken when applying quantitative criteria that the context of the site, its environs and the nature the noise sources to be assessed are considered.

[3] Iema Guideline for Environmental Noise Impact Assessment version 1.2 (November 2014)

The table below sets out effect levels for changes in sound level (L_{Aeq}) for receptors of great and some sensitivity. However, this only applies to sources with broadly similar characteristics;

Category	Changes in sound level $L_{Aeq\ at}$ receptor of great sensitivity
Very substantial	+10 dB
Substantial	+5 dB
Moderate	+3 to 5 dB
Slight	+3 to 5 dB (receptor of some sensitivity)
None/Not Significant	<3 dB

Table 5 Effect Descriptors

In assessing the impact of noise created by the proposed development the increase in average noise level can be used to classify the likely impact, as shown in the table below;

Changes in sound level	Category
0 dB	No impact
+3 dB	Just perceivable
+5 dB	Noticeable
+10 dB	Twice as loud

Table 6 showing perceptions to change in sound levels

An example of how the impact arising from a change in sound levels could be evaluated is presented in the table below[4].

Long-term Impact Classification	Short-term Impact Classification	Sound level change dB L_{pAeqT} (positive or negative) T = either 16hr day or 8hr night
Negligible	Negligible	≥ 0 dB and < 1 dB
	Minor	≥ 1 dB and < 3 dB
Minor	Moderate	≥ 3 dB and < 5 dB
Moderate	Major	≥ 5 dB and < 10 dB
Major		≥ 10 dB

Table 7 showing relative significance of change in sound levels

From this it can be seen that for changes in, traffic noise for example, in the long term of less than 3 dB can be considered to have a *negligible impact*.

[4] Source HS2 Phase 1 Environmental Statement

3.8 Noise Criteria for on-site activity

The table below sets out the appropriate Standards by which each element of noise from the proposed development should be assessed by;

Noise Element	Assessment Standards	Criteria
Fixed plant	BS4142	*Rated level* no greater than background sound level
HGV deliveries	BS4142	*Rated level* no greater than background sound level
Customer cars on site	WHO Daytime	55 dB L_{Aeq} external amenity areas, 50 dB L_{Aeq} external sensitive facades
	WHO Night time	45 dB L_{Aeq} external sensitive facades & 60 dB L_{AFmax}
	IEMA	Ensure a Negligible Impact provided change in sound level less than 3 dB L_{Aeq}

Table 8 showing assessment criteria

4 Description potential noise impacts

The application, under consideration here, is to develop a portion of Tesco overflow car park, to create a McDonald's restaurant with drive thru lane open 24 hours a day.

The key noise impacts that this application raised are;

- Noise from external plant required to ventilate and condition the kitchen & customer areas as well as provide cooling for any food storage.
- Noise from HGV vehicle deliveries 3 times a week,
- Noise from the customer vehicles coming and going from the site.

The closest residential dwellings are some 35m to the east across Crescent Close and will have at most partial view of the side, but only from their upstairs windows, through the trees to the site which is at a lower level.

5 Development Plan

The proposed site layout is shown on SCUR architects drawing No. 7611-SA-2543 P1004D, an extract of which is shown below and a full copy at the rear of this report.



Figure 1 extract of proposed site plan

6 Sound Measurements

The site was inspected from midday on Wednesday 20th February 2019 and it was noted that;

- The proposed development site is currently part of Tesco's customer car park which is open 24 hours per day,
- The soundscape was made up of distant traffic on the adjacent road network, from vehicles and trolleys moving within Tesco's car park,
- The aerial view over page shows the site and the location of the neighbours.

A logging sound level meter (SLM) was set up on the southern boundary, close to the rear of Foyer, (residential hostel) as shown on the aerial view and photograph below;



Figure 2 aerial showing McDonalds site and neighbours



Figure 3 showing logging sound level meter

The sound meter/pre-amp/microphone were calibrated using a hand held calibrator before and after my survey which ran from midday on Wednesday 20th February 2019 over the weekend through to the following Monday morning, with no adverse variants being observed. Details of the equipment used are given in the table over page.

Meter Make	Model	Serial No.	Calibration Date	Calibration Certificate No.	Calibration due date
Rion	NA28	00881065	20-3-18	TCRT18/1233	20-3-19
Rion	NA52	00732148	26-7-18	TCRT18/1642	26-7-20
Castle	GA607	036821	06-4-18	TCRT18/1296	06-4-19

Table 9 survey equipment details

The weather during the survey was mixed but largely dry but with period light winds[5].

6.1 Sound measurements Ambient & Event

The chart below shows the L_{Aeq} and $L_{Amax,night}$ values recorded;

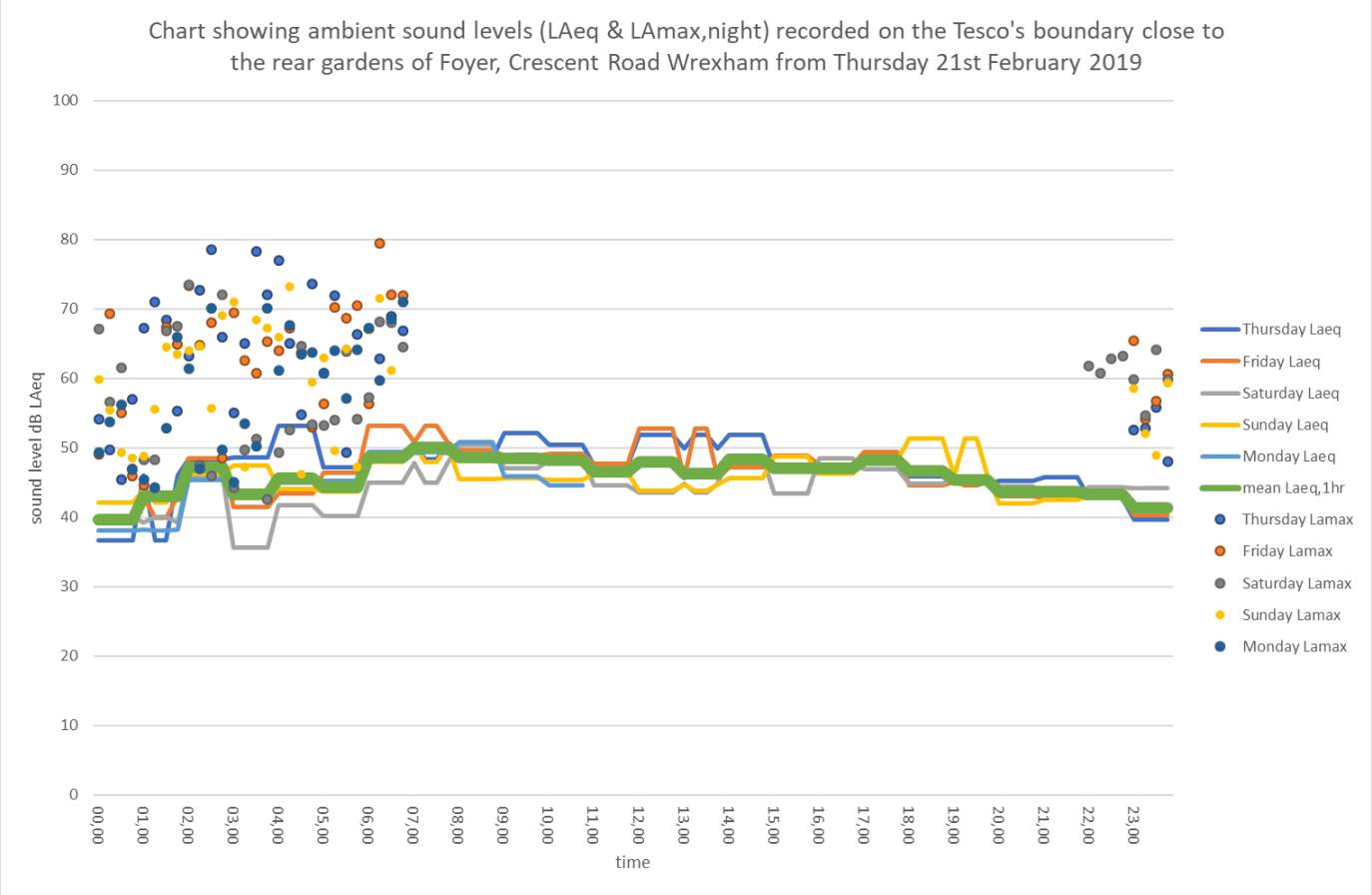


Figure 4 showing recorded L_{Aeq} & L_{Amax} levels

These levels will be used to assess the impact of customer vehicle noise later in this report.

[5] https://www.wunderground.com/history/weekly/gb/chester/EGGP/date/2019-2-20

6.2 Background sound levels

The chart below shows the background sound levels recorded;

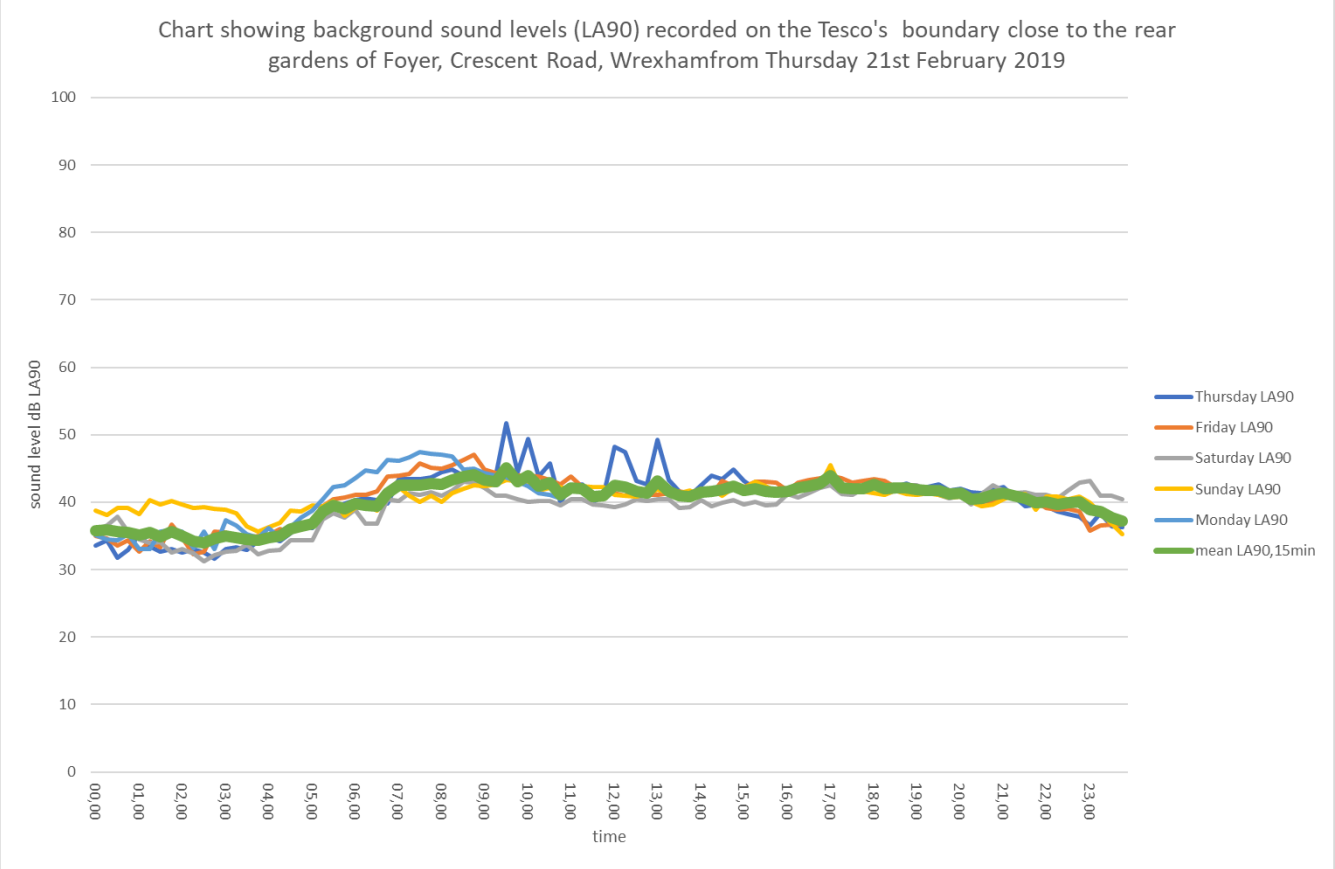


Figure 5 showing recorded background L_{A90} levels

This shows levels at night hovering around 35 dB $L_{A90,T}$ (due to Tesco's plant noise) rising to around 40-45 dB $L_{A,90,T}$ during the day.

I also took sample sound measurements on Crescent Avenue, when I set the meter up during Wednesday afternoon 20th and then again when I returned to site on Monday 25th February 2019. On both occasions the $L_{Aeq,15minute}$ was around 50 dB and 42 dB $L_{A90,15minute}$, were recorded. These levels are similar to those recorded at the fixed meter location.

7 Fixed Plant Noise

7.1 Plant location and prediction of noise levels

The plant will be located on the roof of the restaurant building (NG100 model type) and the mansard roof elements will fully screen the view of the plant from the ground. The typical layout of the plant is shown on Caswell's drawings No. NG100 ECO-02, a copy of which is provided at the rear of this report.

The plant will consist of the kitchen extract fan E1, the kitchen supply air handling unit S1 (with three associated condenser units), the restaurant air handling units S2 (with its two associated condenser units), an ABS drinks machine cooler, a further three condenser units serving the manager's office, crew room and the door air curtain, plus a Chiller and a Freezer Condenser. There is also a small ASHP on the side of the Hot Water System (HWS) as well as Back of House (BOH) extract fan.

The kitchen extract fan and air handling units & condensers will run continuously, although each item of plant is inverter (or speed) controlled and will only work as hard as required. Speed of each will be controlled by the thermal load, the condensers will cycle on and off as required.

The level of sound created by all the plant running at full duty simultaneously as well as for typical night time operation[6] has been calculated using iNoise implementing the requirements of ISO9613 Part 2[7] and assuming the following noise control measures are fitted;

Noise Control Item	Dynamic insertion loss required					
	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
kit ext discharge silencer 900 x 900 x 2400mm long dB DIL	25	37	50	50	50	50
Kitchen extract fan acoustic enclosure dB R'_w	22	32	38	45	43	40
AHU S1 & S2 FAI silencers 1800mm long	15	22	45	45	33	25

Table 10 showing noise reduction requirements

The image below shows the restaurant building with the roof plant identified by pink dots;



Table 11 plan showing roof plant location

[6] Details of typical time night plant operation are shown in Appendix 1

[7] ISO 9613-2:1996 (Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation) including ISO/TR 17534-3:2015 (Acoustics - Software for the calculation of sound outdoors - Part 3: Recommendations for quality assured implementation of ISO 9613-2 in software according to ISO 17534-1).

The table below shows the predicted plant sound levels at the neighbours[8];

Location	Plant noise level	
	Day time dB $L_{Aeq,T}$ at 1.5m AGL	Night time dB $L_{Aeq,T}$ at 4.5m AGL
11 Portal Avenue	28	29
5 Portal Avenue	30	31
7 Portal Avenue	30	32
9 Portal Avenue	28	29
Crescent Close	31	33
Field View	27	27
Foyer	37	34

Table 12 showing predicted mitigated plant noise

The aerial view shows the location of the neighbours;



Figure 6 NSR locations

This shows that the highest predicted day time plant noise levels will be outside the ground floor windows of Foyer, but will be no higher than 37 dB $L_{Aeq.T}$ and 34 dB $L_{Aeq,T}$ at night, both less than the background sound level.

A BS4142 assessment of these levels are provided later in this report.

8 McDonald's customer vehicle noise

8.1 Car Parking & drive thru noise

[8] Details of full calculations can be made available upon request

To assess whether the new customer activity will have an impact on the adjacent residents a comparison should be made between the noise generated by new McDonald's customers and the existing noise climate.

To make this assessment, a noise survey was carried out to identify the noise created by cars and vans using a drive thru lane of a McDonald's as well as parking up and using the restaurant itself (eating in).

The table below shows the mean loudest recorded sound levels, activity duration, the calculated Single Exposure Level (L_{AE}) levels and derived sound power levels ($L_{AE'w}$) which will be subsequently used in the noise predictions;

Element	Duration seconds	Sound Level at (m) dB $L_{Aeq,T}$	measurement distance measurement	L_{AE} dB	Derived $L_{AE'w}$ dB
Drive Thru					
drive off street and stop at COD[9]	10	65	5	75	97
make order with engine at idle	63	75	1	93	101
drive to Pay Point	6	67	5	75	97
pay at Pay Point with engine at idle	20	63	5	76	98
drive to Collection Point	8	67	5	76	98
collect food engine at idle	20	63	5	76	98
drive out and off down street	9	71	5	81	103
Parking drive in, back up, park, get out and shut 2 car doors get in car, shut 2 x doors & drive off	64	61	5	79	101
Vehicle Door Slam at 1m	1	88	1	88	96

Table 13 showing vehicle noise levels

ADL Traffic & Highways[10] have estimated the number of customers, using the drive thru lane or customer vehicles parking up that can be expected to visit this new restaurant, through the week as well as on Saturdays.

The table over page shows the predicted vehicle numbers on the site;

[9] Latest Customer Order Display operates on an automatic ambient level control so it is no louder than is required to be heard, when ambient levels are quieter it the evenings the play back volume of the member of staff will be reduced accordingly.
[10] ADL Traffic & Highways Transport Assessment September 2024 Traffic Profile table Appendix 9

	Friday				Saturday			
	Total In	DT	Car Park	McDelivery	Total In	DT	Car Park	McDelivery
00:00	16	10	4	2	21	18	6	0
01:00	6	3	2	1	10	8	5	0
02:00	4	2	2	0	8	3	3	0
03:00	5	3	2	0	5	2	1	0
04:00	3	3	0	0	3	5	1	0
05:00	9	8	1	0	9	4	3	1
06:00	23	14	8	1	19	9	4	3
07:00	42	29	9	4	34	19	11	4
08:00	75	45	14	16	58	31	11	12
09:00	79	46	18	15	68	42	17	18
10:00	70	39	22	9	77	42	25	11
11:00	61	34	15	12	80	49	27	12
12:00	108	54	41	13	127	56	27	19
13:00	90	49	32	9	119	55	36	13
14:00	62	34	14	14	116	51	30	14
15:00	90	52	24	14	90	51	25	12
16:00	92	51	28	13	96	44	24	13
17:00	104	60	27	17	87	58	25	15
18:00	89	44	35	10	87	46	23	14
19:00	93	50	29	14	60	39	24	5
20:00	69	42	10	17	48	20	29	4
21:00	59	33	15	11	40	16	23	5
22:00	42	22	12	8	40	15	18	7
23:00	32	18	10	4	11	17	15	0
Total	1323	745	374	204	1313	700	413	182

Table 14 showing estimated customer vehicle numbers

This table shows that the busiest day of trading will be on a Friday, when at tea time from 5pm 60 customers can be expected to use the drive thru, 37 to park up and 17 McDeliveries to be made.

8.2 Noise predictions

The noise levels generated by the customer vehicle movements at the proposed development have been predicted in accordance with the noise prediction framework set out in ISO 9613-2 Acoustics - Attenuation of sound during propagation outdoors - Part 2 General method of calculation, using iNoise noise modeling software. Sound levels have been calculated for each of the nearest sensitive residential neighbours.

The model takes into account the distance between the sources and the receptors, reflections from building facades, attenuation from screens as well as atmospheric attenuation. The following modelling assumptions have been relied upon;

- G = 0 (hard ground)
- Air temperature 10 °C,
- Humidity 70%,
- Downwind propagation,
- acoustic screens[11] on south & east boundaries 3.5m high and 2.4m high to western as shown below;

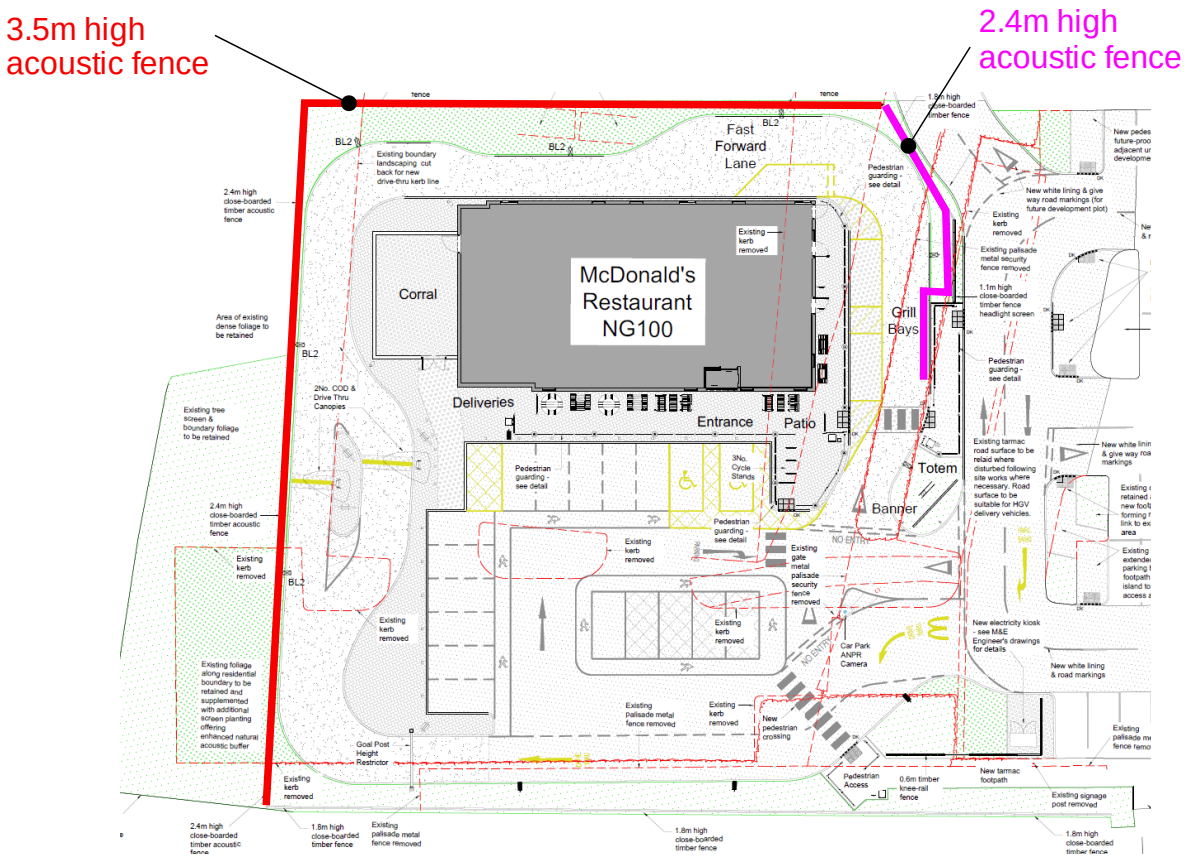


Figure 7 showing acoustic fence requirements

The image over page shows the acoustic model for the calculation of car drive thru noise, the pink dots represent the various elements of the drive thru activity (Table 13 showing vehicle noise levels). The overall sound level created by a single vehicle, which will take approximately 2 minutes to arrive, order, collect and leave the drive thru lane, before being multiplied up for the number of vehicles predicted to pass through the drive thru lane in each hour.

[11] Solid timber screen 24 kg/m^2 as per https://www.jacksons-security.co.uk/acoustic-security-barriers?sc_camp=B0F7CA3E28E34B44941CB67810D82B17&msclkid=add9c5c41a131e282ec6ada7ad0102fc&utm_source=bing&utm_medium=cpc&utm_campaign or similar



Figure 8 showing DT sources

The highest drive thru activity noise levels will be at the upper floor windows of houses across Crescent Close.

The chart below shows the mean existing measured ambient sound levels recorded, across 24-hours (orange line) with the dotted blue solid line representing the level of vehicle activity noise at Crescent Close. The dotted brown line represents increase in overall levels, with McDonald's trading, over the existing levels, assuming a 3.5m high acoustic screen in employed on the southern and western boundaries.

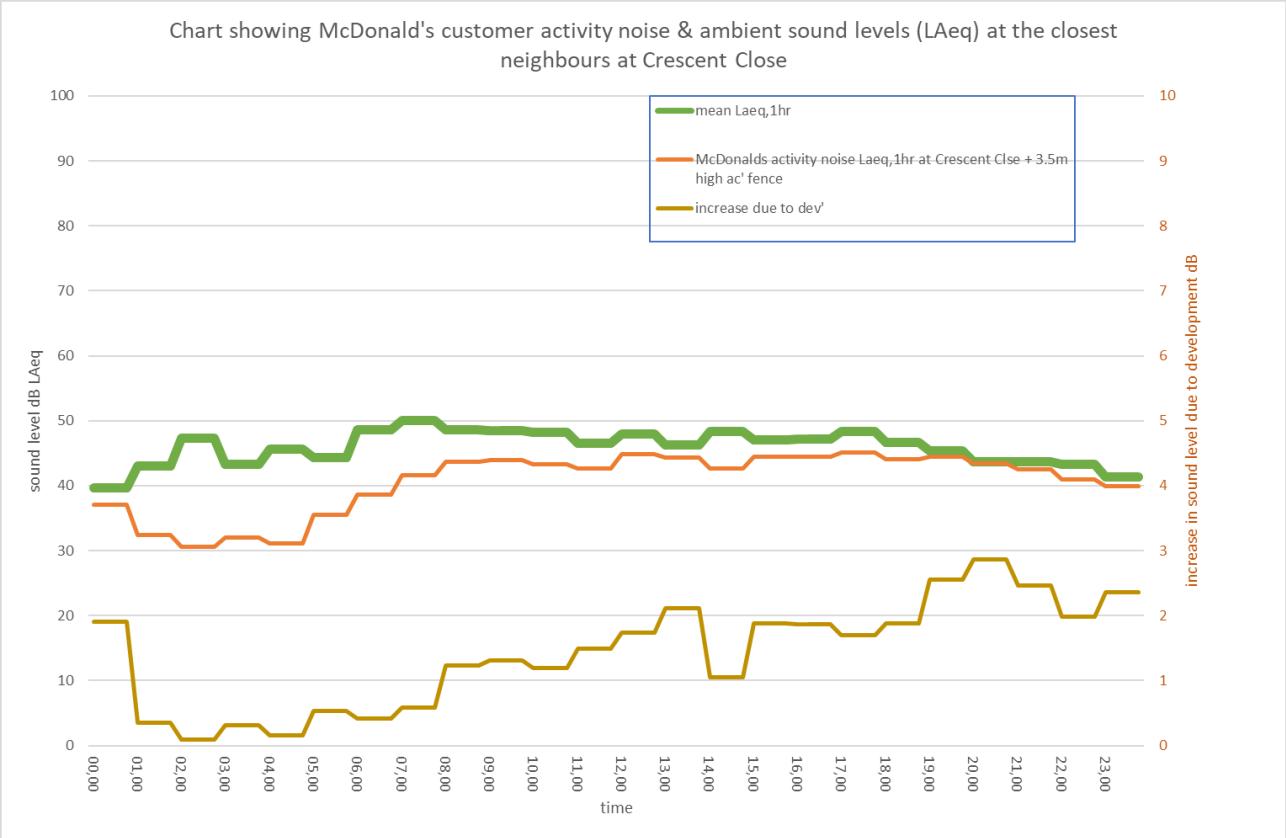


Figure 9 showing existing, proposed & increased sound levels at Crescent Close

This shows the greatest increase will be less than 3 dB (reading from the right hand side Y axis). Increases of 3 dB or less can be considered to have a *negligible impact according to IEMA Guidelines*.

The chart below shows a similar assessment for the Foyer to the west, provided a 2.4m high acoustic screen is employed on part of the western boundary;

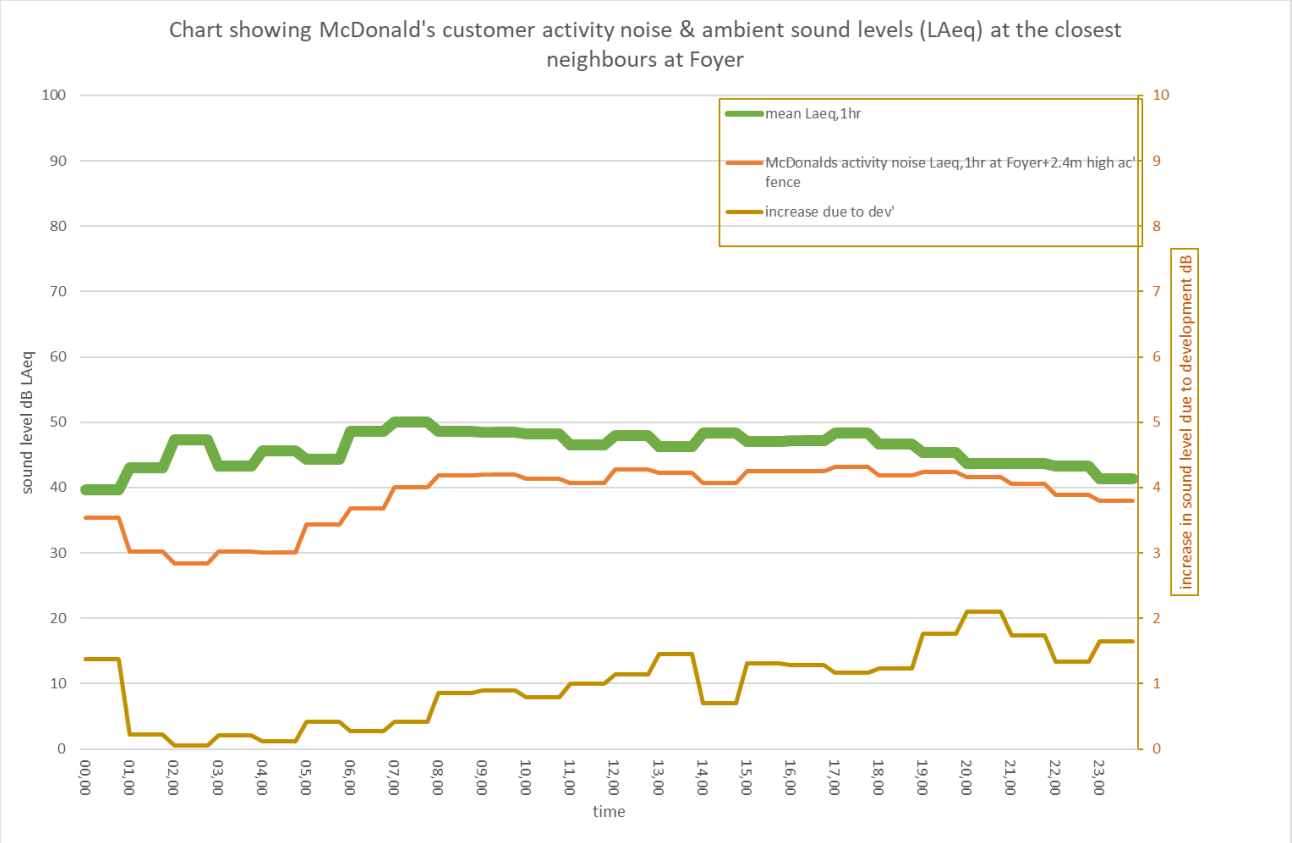


Figure 10 showing existing, proposed & increases in sound levels at Foyer

This chart shows that levels at the upper windows of Foyer will be increased by less than 2 dB.

8.3 Car door slams

With the proposed opening hours being 24 hours per day, the restaurant will be trading through the night (11pm to 7am) when sleep disturbance should be considered.

Although the customers using the new restaurant car park will not be inherently noisy, the closing of car doors is an impulsive activity which could draw attention.

A range of car and van doors being firmly swung closed were checked and it was found that an event sound level of 88 dB L_{Amax} at 1m represented the upper end of the vehicles tested with a slamming action. An assumed sound power level of 96 dB L_{wA} was inputted into the noise model, with a car parking in the middle of the parking spaces[12] to houses opposite, as indicated by the pink dot on the aerial view over page;

[12] the parking spaces outside the entrance to the restaurant are most likely to be most used, particularly during the quieter trading hours of the night



Figure 11 showing location of modelled door slam

The chart below shows the L_{Amax} events recorded along with the mean loudest door slam (orange line) from the McDonald's site at the houses on Crescent Close.

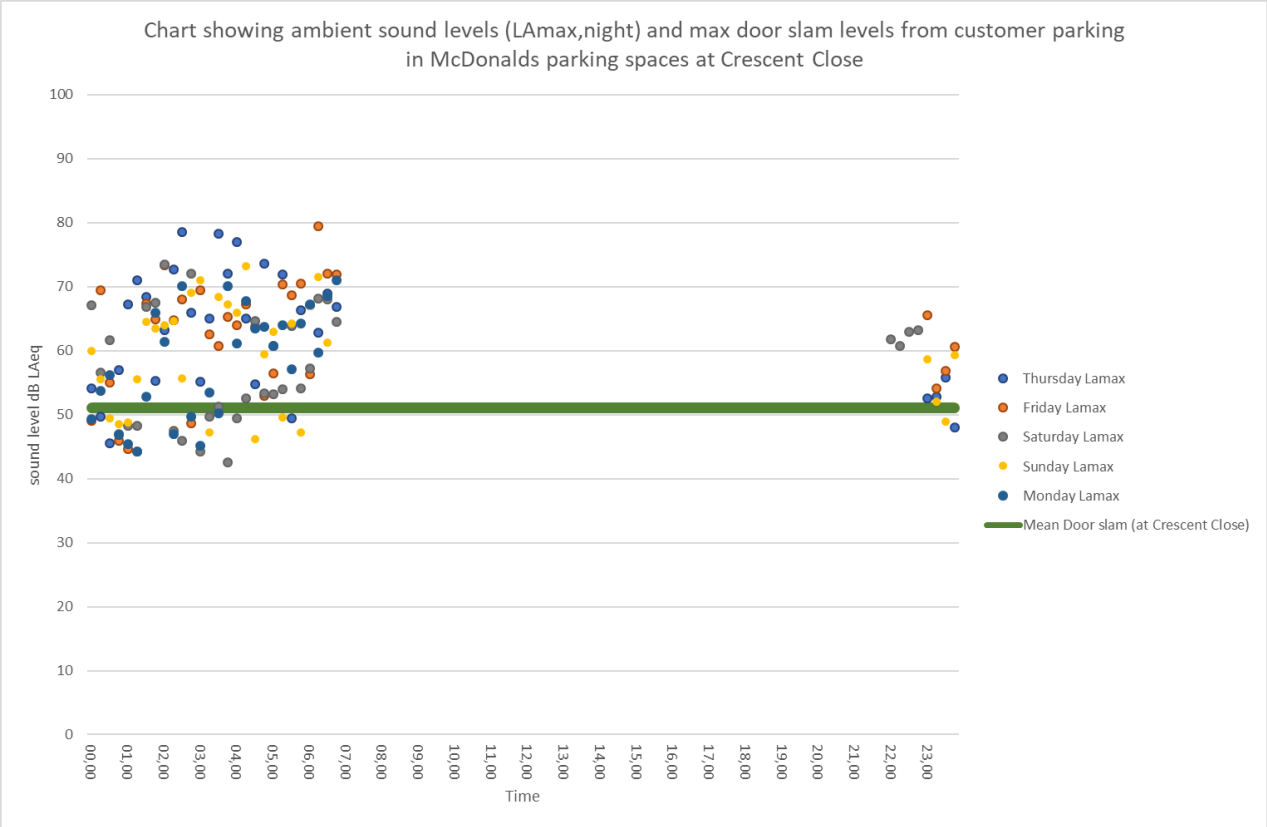


Figure 12 showing comparison between existing event levels & those from door slams

This shows that the maximum predicted door slam event level (51dB L_{Amax}), is significantly less than the 60 dBA WHO derived criteria for the onset of internal sleep disturbance and less than current levels through majority of both the day and night. Their impact can therefore be considered to be *negligible* according to IEMA Guidelines.

8.4 Delivery noise

The restaurant is likely to require 3 deliveries per week; these deliveries being carried out by Martin Brower UK.

Martin Brower is a McDonald's partner logistics company and supply all their restaurants nationally. They have recently won a Highly Commended award from the Noise Abatement Society *"for its understanding of the holistic spirit of Soundscape principles through a variety of sustained best practices to enable efficient servicing without causing noise disturbance."*

Martin Brower's delivery activities, the most recent being at Sheen Road, Bristol, have been surveyed, where a delivery activity sound level of 67 dB $L_{Aeq,5minutes}$ (92 dB L_{AE}) at 5m was recorded.

Here delivery lorries will arrive at the McDonald's turning off roundabout on A5152, passing along the access road and across Tesco car park before pulling up across the most eastern line of parking bays by the restaurant. Once the delivery has been completed the vehicle will pull forward before turning back through car park and on to the road network. The position of the parked delivery vehicle is indicated by a pink dot on the plan below;



Figure 13 showing location of delivery vehicle

The table below shows the noise contribution for the delivery activity (as a Rating Level according to BS4142)[13];

Location	Delivery noise level	
	Day time dB $L_{Ar,Tr}$ at 1.5m AGL	Night time dB $L_{Ar,Tr}$ at 4.5m AGL
Crescent Close	24	33
Foyer	18	27

Table 15 showing predicted delivery noise levels

The night time level is 9 dB higher than the day time one as the duration over which the activity is considered is only 15 minutes, whereas during the day (7am to 11pm) it's 1 hour

[13] Full details of these calculations can be made available upon request, a 3 dB "other penalty" has been added to the predicted $L_{Aeq,T}$ to give a Rating Levels $L_{A,r,Tr}$ (BS4142:2014) for night time deliveries only

and a 3dB *intermittency character penalty* (BS4142) has been added to the night time delivery levels to give the *Rating Level*.

The chart below shows the $L_{A90,T}$ levels recorded on site along with the predicted delivery noise *Rated Levels* at the houses opposite on Crescent Close.

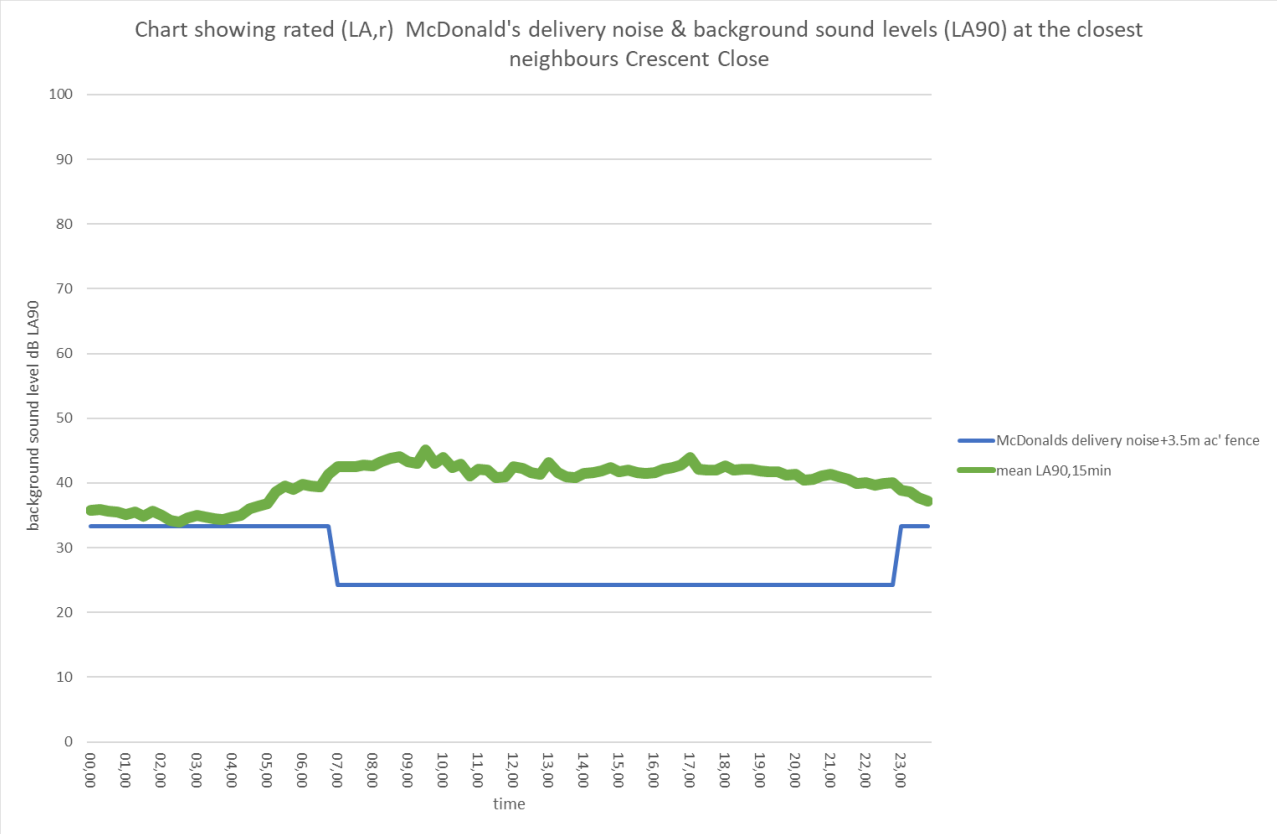


Figure 14 showing Rated delivery noise & background sound levels

This shows that *Rated delivery noise* will not be higher than the existing background sound level during the day or night. Therefore, there is no noise requirement to limit delivery hours.

9 Assessment of impacts

9.1 BS4142 assessment of impact of plant noise

BS4142:2015+A:2019 provides a method for assessing the likely impact industrial and commercial noise will have on residential neighbours. This Standard requires that *character penalties*, if any tonality, intermittency, impulsivity or "other characteristics" are present in the noise are added to the assessed $L_{Aeq,T}$ level of plant noise to provide a Rating Level.

Here the McDonald's plant will run without any tonality or discernable intermittency or impulsivity and at a level more than 10 dB below the day time background sound level and therefore will not attract any characteristic penalties.

The table below shows the BS4142 assessment of plant noise:

BS4142 assessment of plant noise			
Location		Foyer	
		Day time	night time
Predicted plant noise level dB L_{Aeq}		37	34
character penalties			
	tonality	0	0
	impulsivity	0	0
	intermittency	0	3
	other characteristics	0	0
Plant Rating Level dB $L_{Ar,Tr}$		37	0
Background sound level (during day/night) dB L_{A90}		40	35
Excess over background dB		**-3**	**-1**
Likely impact		very low	low

Table 10 BS4142 assessment of plant noise

This shows that plant noise will have a "*very low*" impact during the day and a "*low*" impact overnight and complies with Wrexham County Borough Council's aims set out in Policy GDP 1.

9.2 BS4142 assessment of impact of delivery noise

The impact of the noise created by deliveries to the restaurant can also be assessed using BS4142, the nearest sensitive dwellings, as shown in the table below;

BS4142 assessment of delivery noise			
Location		Crescent Close	
		Day time	night time
Predicted delivery noise level dB $L_{Aeq,T}$		24	30
character penalties			
	tonality	0	0
	impulsivity	0	0
	intermittency	0	3
	other characteristics	0	0
Delivery Rating Level dB $L_{Ar,Tr}$		**30**	**33**
Background sound level dB L_{A90}		40	34
Excess over background dB		**-10**	**-1**
Likely impact		very low	Low

Table 11 BS4142 assessment of delivery noise

This shows that the noise created by deliveries during the day have a "*very low*" and a "low" impact at night, therefore, deliveries do not need to be confined to day time hours only.

9.3 W.H.O. assessment of car door slam noise

The impact or otherwise of the sound generated by the slamming of car doors is not within the scope of BS4142, but the World Health Organization (W.H.O.) in their guidelines for Community Noise (1999) states "For a good night's sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times per night". This being an inside sound level and if 15 dB is assumed to be the loss from a façade with an open window translates to an external level of 60 dB $L_{Amax.regular}$. The table over page compares the predicted loudest door slam level at the closest neighbour;

W.H.O. assessment of door slams

Location	Crescent Close	
	Day time	night time
predicted max slam level dB $L_{Amax,f}$	51	51
W.H.O. internal criteria dB $L_{Amax,f(regular)}$		45
derived external criteria windows open dB $L_{Amax,f(regular)}$		60
exceedance		**NO**

Table 12 WHO assessment of slam levels

This shows that the highest door slam event levels are below the W.H.O. criteria, for the onset of sleep disturbance and significantly less than existing event levels, at the closest neighbours and therefore do not represent an *adverse impacts* and Wrexham County Borough Council's aims set out in Policy GDP 1.

9.4 Assessment of customer vehicle movement noise

The assessment of the sound generated by the movement of customer vehicles is not within the scope of BS4142[14], although it does cover "*loading and unloading of goods and materials at industrial and/or commercial premises*" and from "*sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from fork-lift trucks, or that from train or ship movements on or around an industrial and/or commercial site*."

The institute of Environmental Management & Assessment provides Guidelines for Environmental Noise Impact Assessment both in absolute and relative terms, namely;

- If noise generated by customer vehicles using the restaurant is below 50 L_{pAeq} across the day (7am to 11pm) and 40 dB L_{pAeq} overnight, at the nearest residential dwelling, this can be considered to have No Observable Effect.
- An increase in noise level of 3 dB or less can be considered to be "*negligible*"

The table below shows the comparison of these criteria with the predicted customer vehicle noise levels;

BS4142 assessment of customer vehicle activity noise

Location	Crescent Close	
	Day time	night time
Predicted customer vehicle activity noise (busiest hr day/quietest hr night) dB $L_{Aeq,T}$	45	32
IEMA absolute criteria for onset of LOAEL dB $L_{Aeq,T}$	50	40
meets absolute criteria	✓	✓
existing ambient $L_{Aeq,T}$ 12:00 & 03:00 hrs	**48**	**43**
relative change in noise level	< 3 dB	< 3 dB
Iema relative classification	**Minor**	**Minor**

Table 13 absolute and relative assessment of customer vehicle noise

This table shows that the absolute level of noise created by the drive thru lane and vehicles parking up will fall below the IEMA criteria for the onset of *adverse impacts*, across the entire

[14] BS4142:2014 + A1;2019 Scope 1.1

day and night and, therefore, do not represent an *adverse impact* and better Wrexham County Borough Council's aims set out in Policy GDP 1.

9.5 Summary of Impact Assessment

The table below summarises these noise criteria for each element of the assessment;

Noise Element	Requirement		Sound levels	Complies
	Criteria	Comment		
Fixed plant	No greater than background		Existing background 40 dB $L_{A90,Day}$ & 35 dB $L_{A90,Night}$ Predicted plant levels 37 dB $L_{Ar,Tr(Day)}$ & 33 dB $L_{Ar,Tr(Night)}$ with HVAC mitigation	✓ With HVAC mitigation
HGV deliveries	No greater than background		Predicted HGV levels 24 dB $L_{Ar,Tr(Day)}$ and 33 dB $L_{Ar,Tr(Night)}$ and therefore no requirement to exclude night time deliveries	✓ 24 hr deliveries
Customer cars on site	50 & 40 dB L_{Aeq} externally sensitive facades, day and night respectively		45 dB L_{AeqDay} and 32 dB $L_{Aeq,night}$ at external facades	✓ 3.5m high acoustic screens required
	Less than 60 dB L_{AFmax}		Predicted door slam 51 dB L_{Afamx}	✓
	L_{Aeq} increase with development < 3 dB	IEMA criteria for minor impact	Increase with development <3 dB	✓

Table 14 summary of criteria & predicted sound levels

This shows that Wrexham County Borough Council's aims set out in Policy GDP 1., are met by this application.

10 Uncertainty effects on assessment conclusions

There is a degree of uncertainty at each stage of these assessments, most will be small and not all additive, but if the uncertainty was large and the assessment conclusion was on the threshold of acceptability, then it might change the assessment outcome.

10.1 Residential neighbours existing sound climate

The magnitude of the impact of fixed plant and customer vehicle noise on the neighbours has been based on the results of an on-site ambient noise survey, where levels were monitored in a location representative of that experienced by the neighbours.

Any on-site sound survey will only provide a snap shot of historical levels. For these levels to provide the basis upon which future impacts can be assessed, then the snap shot should, at the very least, cover the hours under assessment and during normal circumstances. Measuring next to a road which has temporary traffic lights in place may well understate sound levels when the traffic is passing freely, for example, should be avoided.

Here the survey was conducted over four days, including a weekend, during clement weather conditions. The background sound levels did drop as low as 35 dB $L_{A90,T}$ in the small hours, a level which is comparatively low given the site's close proximity to the town centre.

10.2 Assessment of plant noise

The plant to be used on the roof of the proposed McDonald's restaurant has been tried and tested on countless other McDonald's around the country and the noise levels used in this assessment for the plant can be relied upon.

The maximum noise that all the plant running at 100% duty will create here has been compared with the minimum representative day time background sound levels, and a sensible degree of diversity has been included for the operation of the plant at night. Practically at 3am in the morning, when the background is at its quietest, all the plant will not be running flat out. The air-conditioning, fans and condensers will be ticking over and even the main kitchen extract fan will automatically reduce in speed when there will be just a few orders being cooked.

The mitigation requirements set out in this report are therefore robust and will not be adversely effected by uncertainty.

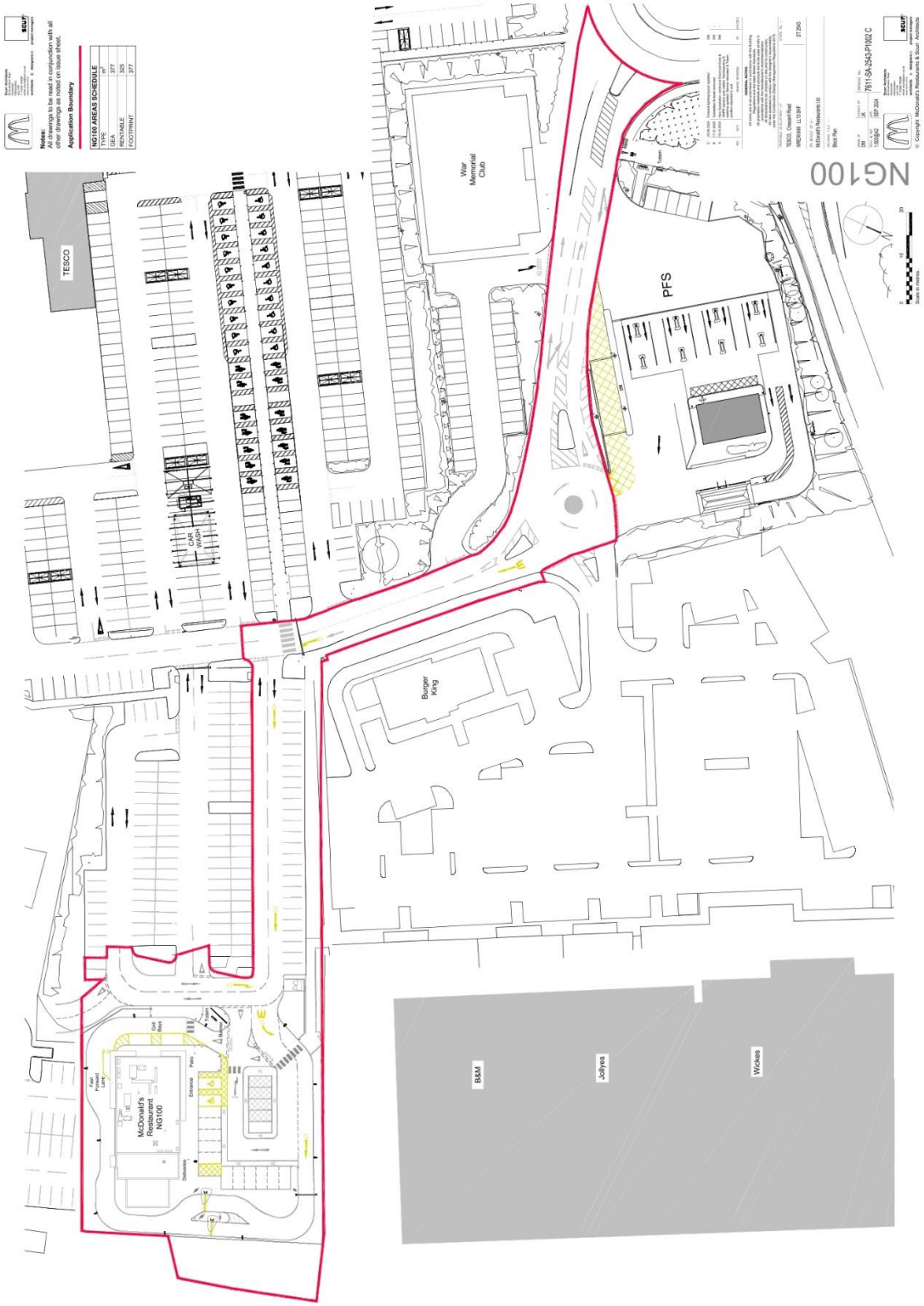
10.3 Assessment of customer vehicle noise

The noise data for customer vehicle movement noise has been developed and tested over many years and has been shown to provide a reliable prediction. The ambient sound levels recorded by the on-site survey are higher than the noise that customers will create as they move slowly around the drive thru lane and car park of the restaurant. So that even with the small natural variations in ambient levels, that will occur day to day, summer to winter, ambient sound levels can still be expected to be far higher than the predicted McDonald's' noise levels.

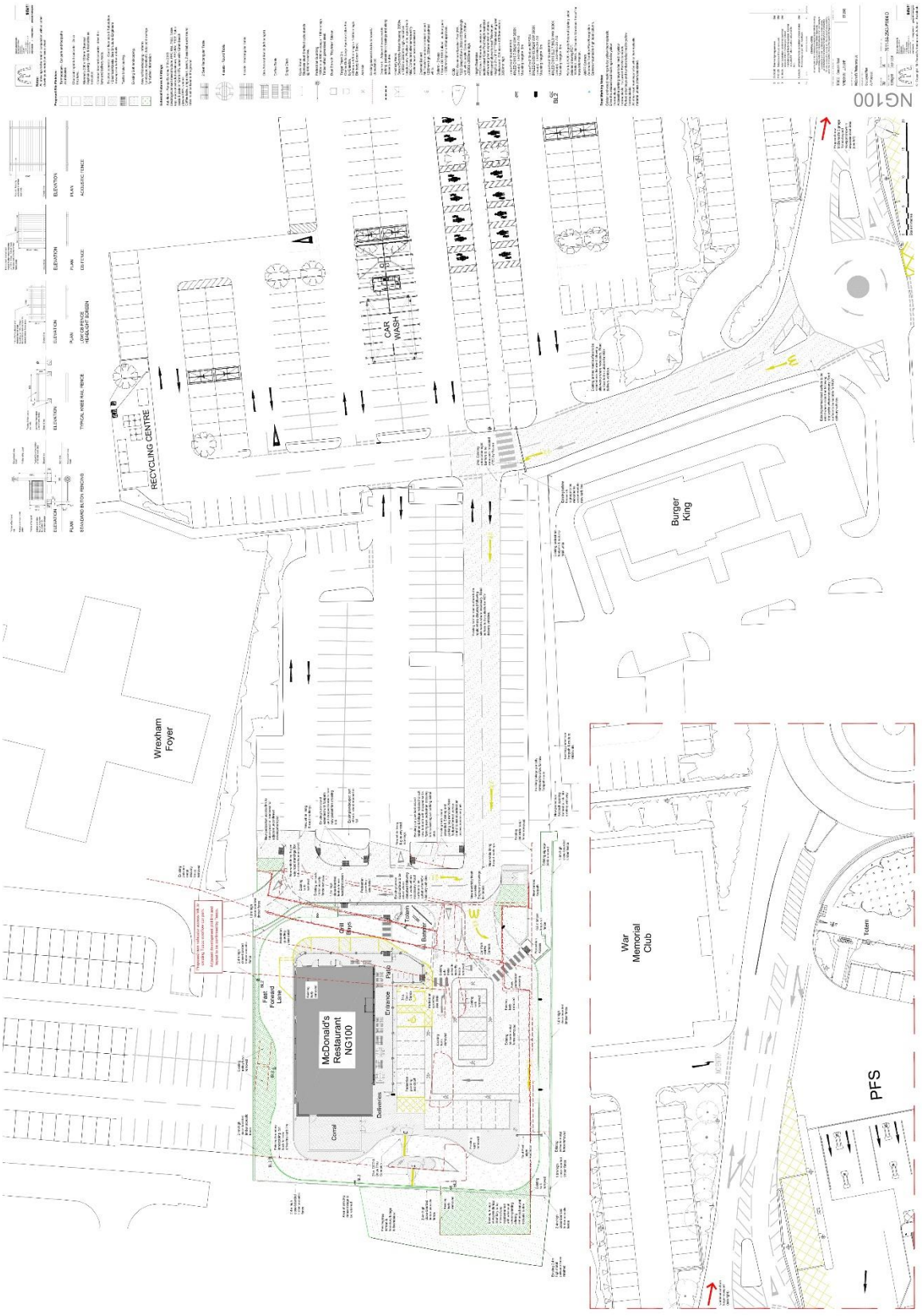
Whilst the estimates for likely peak customer numbers provided by McDonald's' traffic engineers ADL Traffic & Transport are just that, estimates, they have been arrived at having studied hundreds of other restaurants and are unlikely to underestimate them sufficiently to make any acoustic difference. It should be noted that if 25% more customers were to use the drive thru lane in any one hour than those estimated, it will only increase levels by 1 dB.

The assessment conclusion is for a *minor impact*, from customer vehicle noise, and uncertainty is unlikely to change this.

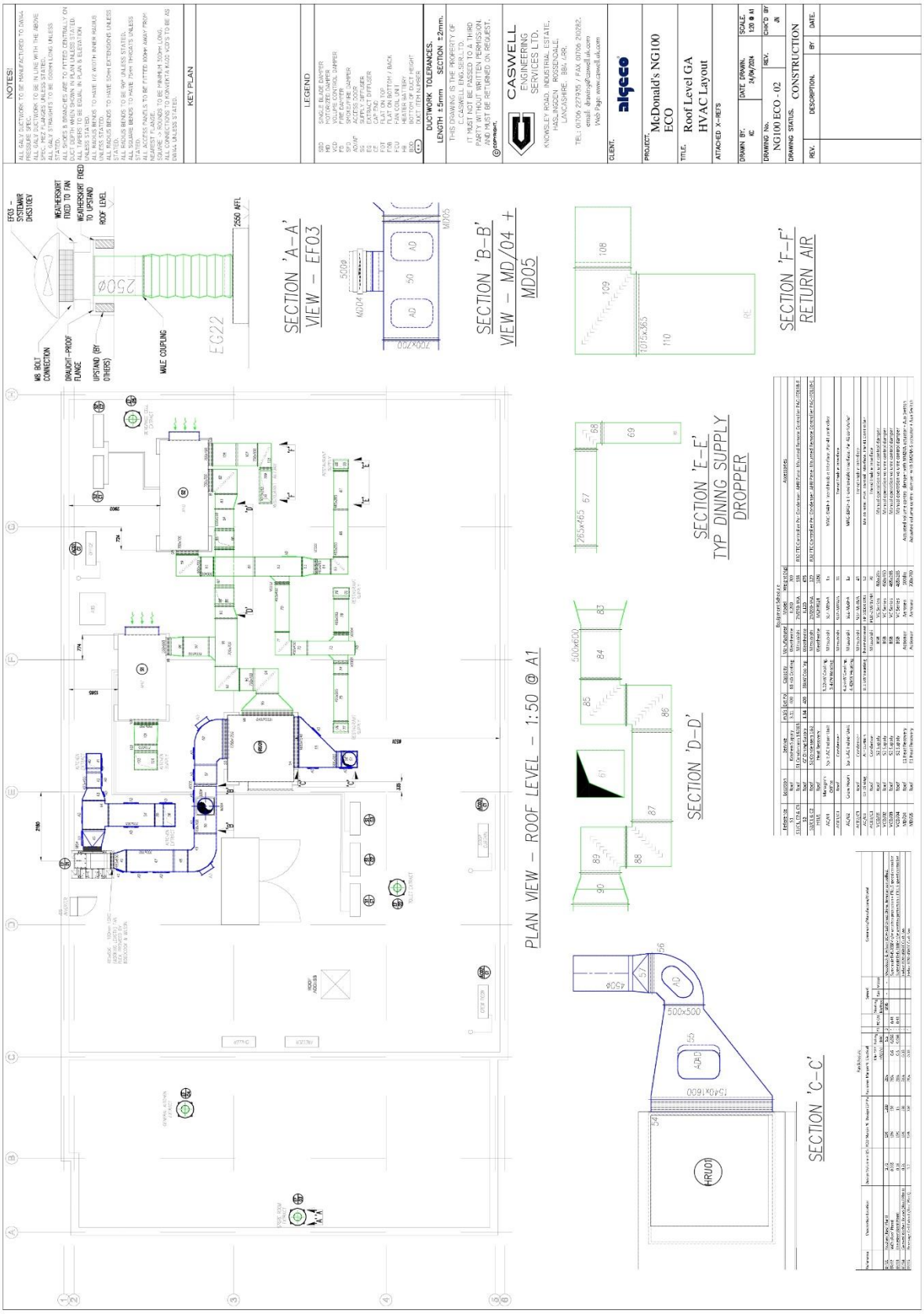
Block Plan 7611-2543-P1004D



Site Layout Plan drg No. 7611-SA-2543 P1004D



Proposed floor layout



Proposed building elevations 8612-SA-2723-P005 (typical)



Appendix 1 – schedule of plant noise data

System	Make/model	Units	Sound levels									
				63Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz
			dBA	dB	dB	dB	dB	dB	dB	dB	dB
S1 kitchen AHU	Weatherite IL200	Lw	80	73	80	81	78	72	70	69	66
S1/C1 condenser	PUZ-ZM250YKA	Lw	77	87	78	76	75	71	69	64	58
S1/C2 condenser	PUZ-ZM250YKA	Lw	77	87	78	76	75	72	68	64	58
S1/C3 condenser	PUZ-ZM200YKA	Lw	78	83	78	76	77	72	69	64	60
ABS drinks cooler	Manitowoc CVDT1200A	Lw	74	63	72	71	70	69	66	65	62
S2 lobby AHU	Weatherite IL200	Lw	80	72	79	82	79	73	70	69	66
S2/C1 condenser	PUZ-ZM250YKA	Lw	77	87	78	76	75	72	68	64	58
S2/C2 condenser	PUZ-ZM250YKA	Lw	77	87	78	76	75	72	68	64	58
E1 kitchen extract fan	W&W BCW550	Lw 3.6m3/s	93	100	97	96	91	86	84	81	78
		Lp,1m case	67	54	60	63	64	62	61	58	51
	discharge silencer 2.4m long	DIL	56	29	41	50	50	50	50	50	39
Chiller Condenser	Danfoss OP-MPUM046	Lw	68	57	66	65	65	62	61	60	58
Freezer Condenser	Danfoss OP-LPHM136	Lw	73	72	71	70	69	68	65	65	62
Crew & Office condensers	Mitsubishi PUZ 71VHA	Lw	67	70	69	71	63	62	46	52	44
Door heater condenser	Mitsubishi SUZ M35VA	Lw	59	71	64	58	57	53	50	46	44
E2 wc extract	Helios GBW EC250	Lw exhaust	67	na	45	57	59	62	62	56	50
	disch' silencer ST2/250	DIL	20	2	2	3	13	18	11	10	10
E3 Drinks System Extract	Helios GBW EC450	Lw exhaust	80	na	61	71	75	76	75	66	61
	disch' silencer ST2/450			2	7	7	16	18	9	7	7