

## Environmental Noise Assessment

McDonald's  
Molesworth Street  
Rochdale



On Behalf of



Project Ref: 8042 | Rev: 1 | Date: 18<sup>th</sup> February 2025

## Document Control Sheet

Project Name: McDonald's, Molesworth Street, Rochdale

Project Ref: 8042

Report Title: Noise Impact Assessment

Date: 5<sup>th</sup> August 2024 (original report date)

|             | Name                          | Position             | Signature                                                                          |
|-------------|-------------------------------|----------------------|------------------------------------------------------------------------------------|
| Prepared by | Peter Ashford BSc<br>MloA ANC | Managing<br>Director |  |
| Reviewed by | John Hammond<br>TechIOA       | Senior Acoustician   |  |

| Revision | Date    | Description                                                                                              |
|----------|---------|----------------------------------------------------------------------------------------------------------|
| 1        | 18-2-25 | Reference to NPPF now includes Dec 2024 revisions<br>Site layout plan updated to drg No. 2285-1004 rev A |
|          |         |                                                                                                          |
|          |         |                                                                                                          |

This report has been prepared by Acoustic Associates South West Ltd with all reasonable skill, care and diligence, and taking account of the Services and the Terms agreed between Acoustic Associates South West Ltd and the Client. This report is confidential to the client, and Acoustic Associates South West Ltd accepts no responsibility whatsoever to third parties to whom this report, or any part thereof, is made known, unless formally agreed by Acoustic Associates South West Ltd beforehand. Any such party relies upon the report at their own risk.

Acoustic Associates South West Ltd disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the Services

© Acoustic Associates SW Ltd

## Contents

|     |                                                                 |    |
|-----|-----------------------------------------------------------------|----|
| 1   | Executive Summary .....                                         | 4  |
| 2   | Introduction.....                                               | 5  |
| 2.1 | Overview .....                                                  | 5  |
| 2.2 | Objectives.....                                                 | 5  |
| 3   | Planning Policy.....                                            | 5  |
| 3.1 | National Planning Policy.....                                   | 5  |
| 3.2 | Local Planning Policy .....                                     | 9  |
| 3.3 | British Standards & Guidance .....                              | 10 |
| 3.4 | BS4142 assessment of McDonald's fixed plant.....                | 11 |
| 4   | Neighbourhood & proposed development .....                      | 12 |
| 5   | Sound Measurements .....                                        | 14 |
| 5.1 | Sound measurements $L_{Aeq}$ .....                              | 14 |
| 5.2 | Sound measurements $L_{A90}$ .....                              | 15 |
| 5.3 | Sound Measurements $L_{Amax}$ .....                             | 16 |
| 5.4 | Existing sound levels at the neighbours.....                    | 16 |
| 6   | Fixed Plant Noise .....                                         | 17 |
| 6.1 | Plant location and prediction of noise levels .....             | 17 |
| 7   | McDonald's customer vehicle noise.....                          | 19 |
| 7.1 | Car Parking & drive thru noise .....                            | 19 |
| 7.2 | Noise predictions .....                                         | 20 |
| 7.3 | Car door slams.....                                             | 22 |
| 7.4 | Delivery noise .....                                            | 24 |
| 8   | Assessment of impacts .....                                     | 26 |
| 8.1 | BS4142 assessment of impact of plant noise.....                 | 26 |
| 8.2 | BS4142 assessment of impact of delivery noise .....             | 27 |
| 8.3 | Assessment of car door slam noise .....                         | 27 |
| 9   | Uncertainty effects on assessment conclusions .....             | 28 |
| 9.1 | Residential neighbours existing sound climate.....              | 28 |
| 9.2 | Assessment of plant noise.....                                  | 28 |
| 9.3 | Assessment of customer vehicle noise .....                      | 28 |
|     | Proposed Site Plan drawing No. 13484-2285-004.....              | 29 |
|     | Roof Plant Layout Caswell's indicative drawing No. 8774-3 ..... | 30 |
|     | Appendix 1 – schedule of plant noise data.....                  | 31 |
|     | Appendix 2 details of night time plant operation.....           | 32 |

## 1 Executive Summary

It is proposed to construct a new two storey McDonald's restaurant (DO100S) on site of the former car park at the junction of Molesworth and Water Streets, Rochdale. The new restaurant will have a drive thru lane with side-by-side Customer Order Displays (COD).

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 as well as from the roof plant, against existing sound levels.

A week long on-site survey has been carried out on-site where day-time sound levels were found to be 56 dB  $L_{Aeq}$ , dropping back to 51 dB  $L_{Aeq}$  overnight and were controlled predominately by traffic noise from the Molesworth Street. Background sound levels were just under 50 dB  $L_{A90}$  during the day but dropped back to 32 dB  $L_{A90}$  overnight.

Although there are no residential neighbours within the near vicinity of the site, planning permission has recently been granted for the change of use of the former Printing Shop site at 80-82 Molesworth Street for hotel use. This site will have partial view of the McDonald's site from its upper floors at a distance of approximately 150m. the next nearest, but not yet existing property with permitted residential use is Waterside House, Water Street, some 190m to the west and again with only a partial view of the site.

Sound recorded on the site will provide a fair representation of the sound levels of nearest sensitive receiver (NSR).

The table below sets out what mitigation is required for this site;

| Mitigation Item                                                | Required |
|----------------------------------------------------------------|----------|
| Limit trading hours                                            | ×        |
| Acoustic boundary fence required on northern boundary          | ✓        |
| Plant attenuation –                                            |          |
| kitchen extract fan discharge silencer 900 x 900 x 2100mm long | ✓        |
| FAI silencers on AHU's S1 & S2 1200mm long                     | ✓        |
| Danfoss chiller & freezer condensers can to be used            | ✓        |
| ABS drinks cooler condenser can be installed                   | ✓        |
| Customer Order Displays fitted with ambient level control      | ✓        |
| 24hr deliveries suitable noise-wise for this site              | ✓        |

*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 *loss of amenity for the neighbours and demonstrates compliance with Rochdale Borough Councils Development Plan Policy DM1 & G9.*

## 2 Introduction

### 2.1 Overview

It is proposed to construct a new two storey McDonald's restaurant (DO100S) on the site of the car park at the junction of Molesworth and Water Streets, Rochdale. The new restaurant will have a drive thru lane with side-by-side Customer Order Displays (COD).

This Noise Impact Assessment 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 as well as from the roof plant 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 35 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 National Planning Policy

National Planning Policy Framework (NPPF<sup>1</sup>) provides noise policy aims within Section 15 "Conserving and enhancing the natural environment" and paragraph 187 states;

*187. Planning policies and decisions should contribute to and enhance the natural and local environment by:*

*a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);*

*b) recognising the intrinsic character and beauty of the countryside, and the wider*

---

<sup>1</sup> Revised December 2024

*benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;*

*c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate;*

*d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures and incorporating features which support priority or threatened species such as swifts, bats and hedgehogs;*

*e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and*

*f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.*

Paragraph 198 also refers to noise and states;

*Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*

*a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life<sup>72</sup>;*

*b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*

*c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

The Framework states that the planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution. It does not, however, provide any specific formal guidelines.

Further guidance was published by Department for Communities & Local Government in March 2014 relating to Noise and is known as Planning Practice Guidance, this states.

*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.

*In line with the Explanatory Note of the Noise Policy Statement for England, this would include identifying whether the overall effect of the noise exposure (including the impact during the construction phase wherever applicable) is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation. As noise is a complex technical issue, it may be appropriate to seek experienced specialist assistance when applying this policy.*

Significant Observed Adverse Effect Level (SOAEL) occurs above the perception of “noticeable and intrusive” and examples of this are given in the table below, which has been taken directly from Paragraph 006 of PPG;

| Perception                       | Examples of Outcomes                                                                                                                                                                                                                                                                                                                                                                                                                          | Increasing Effect Level                          | Action                           |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|----------------------------------|
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Lowest Observed Adverse Effect Level</b>      |                                  |
| <b>Noticeable and intrusive</b>  | 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 |
|                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                               | <b>Significant Observed Adverse Effect Level</b> |                                  |
| <b>Noticeable and disruptive</b> | 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                            |

NPSE states;

***“Promote good health and good quality of life”***

2.15 This statement expresses the long term desired policy outcome, but in the use of “promote” and “good” recognizes that it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations.

***“Effective management of noise”***

2.16 This concept confirms that the policy applies to all types of “noise” (environmental, neighbour and neighbourhood) and that the solution could be more than simply minimising the noise.

***"Within the context of Government policy on sustainable development"***

2.17 Sustainable development is a core principle underpinning all government policy. For the UK Government the goal of sustainable development is being pursued in an integrated way through a sustainable, innovative and productive economy that delivers high levels of employment and a just society that promotes social inclusion, sustainable communities and personal wellbeing. The goal is pursued in ways that protect and enhance the physical and natural environment, and that use resources and energy as efficiently as possible.

2.18 There is a need to integrate consideration of the economic and social benefit of the activity or policy under examination with proper consideration of the adverse environmental effects, including the impact of noise on health and quality of life. This should avoid noise being treated in isolation in any particular situation, i.e. not focusing solely on the noise impact without taking into account other related factors.

The document "Noise Policy Statement for England" referenced within the NPPF sets out the following vision for on-going noise policy:

*"Promote good health and quality of life through the effective management of noise within the context of Government policy on sustainable development."*

*This vision should be achieved through the following Noise Policy Aims:*

*"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development: avoid significant adverse impacts on health and quality of life; mitigate and minimise adverse impacts on health and quality of life; and where possible, contribute to the improvement of health and quality of life".*

To achieve these objectives, the Noise Policy Statement sets out three noise levels to be defined by the assessor:

**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.

### 3.2 Local Planning Policy

Rochdale Adopted Core Strategy (October 2016) policy DM1 – General development requirements that;

*All development proposals, including changes of use of land and buildings, extensions and alterations, will be expected to demonstrate that they:*

....

*d. Mitigate against any impacts due to noise, air, dust, light and odour pollution, traffic generation or inadequate access, where such mitigation is identified as being necessary;*

The Council has also published *Guidelines & Standards for Hot Food Takeaway Uses Supplementary Planning Document (Adopted April 2015 Updated February 2017)* which addresses noise at;

#### 5. Extraction of odours and noise abatement (HF2)

*5.1 A balance is needed between the provision of hot food takeaways and the need to protect the amenity of residents living adjacent or near to such establishments. Compared to other uses, hot food takeaways can generate unacceptable levels of noise, vibrations and odours and it is therefore important that such uses are controlled.*

*5.2 The design of the fume extraction/ventilation equipment should ensure that odours, fumes, or noise cause no significant nuisance or disturbance to nearby properties. Odours should normally be extracted directly upwards at a speed and height that will ensure adequate dispersion past adjacent buildings. Regular cleaning and maintenance will be necessary for any equipment, including the flue stack, to prevent odour and the possibility of fires due to grease build up and also to prevent the generation of smoke from the flue.*

### 3.3 British Standards & Guidance

Guidance as to a numerical definition of significant adverse impacts may be inferred from the following Standards.

BS8233:2014 (Guidance on sound insulation and noise reduction for buildings) provides guidance on suitable internal sound levels in Table 4, which is reproduced below;

Table 4 Indoor ambient noise levels for dwellings

| Activity                   | Location         | 07:00 to 23:00         | 23:00 to 07:00        |
|----------------------------|------------------|------------------------|-----------------------|
| Resting                    | Living room      | 35 dB $L_{Aeq,16hour}$ | —                     |
| Dining                     | Dining room/area | 40 dB $L_{Aeq,16hour}$ | —                     |
| Sleeping (daytime resting) | Bedroom          | 35 dB $L_{Aeq,16hour}$ | 30 dB $L_{Aeq,8hour}$ |

Table 2 copy of Table from BS8233:2014

This shows a “desirable” standard for internal noise levels within bedrooms, during the night, is 30 dB  $L_{Aeq,8 hour}$ . Allowing 10 to 15 dBA loss through an open window this translates to a “desirable” standard being achieved if the level of external noise does not exceed 40 to 45 dB  $L_{Aeq,day}$ .

The institute of Environmental Management & Assessment has published Guideline for environmental Noise Impact Assessment<sup>2</sup>, although not ratified by the Institute of Acoustics, does provide some numerical guidance for the onset of adverse and significant adverse effect levels as shown in the table below;

| Day       | Time (hours)  | Lowest Observed Adverse Effect Level (dB) | Significant Observed Adverse Effect Level (dB) |
|-----------|---------------|-------------------------------------------|------------------------------------------------|
| Any day   | 07:00 - 23:00 | 50 $L_{pAeq}$                             | 65 $L_{pAeq}$                                  |
| Any night | 23:00 - 07:00 | 40 $L_{pAeq}$                             | 55 $L_{pAeq}$                                  |

Table 3 showing LOAEL & SOAEL onset criteria

Consequently, 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, then this can be considered of No Observable Effect.

<sup>2</sup> Iema Guideline for Environmental Noise Impact Assessment version 1.2 (November 2014)

Also provided in this guidance is a table considering the impact of change in sound levels<sup>3</sup>, as shown below;

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

Table 4 showing relative significance in change of sound levels

From this it can be seen that in the long term, an increase in sound levels of less than 3 dB can be considered to have a negligible impact.

The impact of impulsive noise, typically the shutting of car doors, that generate short term, peak levels quantified by the term  $L_{Amax}$  also need to be considered at night against the standards for sleep disturbance.

BS8233<sup>4</sup> & WHO<sup>5</sup> 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”.

Making a 10 to 15 dBA allowance for the attenuation through a façade with a window open<sup>6</sup> for ventilation purposes this would translate to a limited external level of 55 to 60 dB  $L_{Amax}$ .

### 3.4 BS4142 assessment of McDonalds fixed plant

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 of 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 5 BS4142 impacts

<sup>3</sup> Source HS2 Phase 1 Environmental Statement

<sup>4</sup> BS8233:2014 Guidance on sound insulation and noise reduction for buildings

<sup>5</sup> World Health Organization Guidelines for Community Noise (1999)

<sup>6</sup> PPG24: 1994 Annex 2 paragraph 6

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;

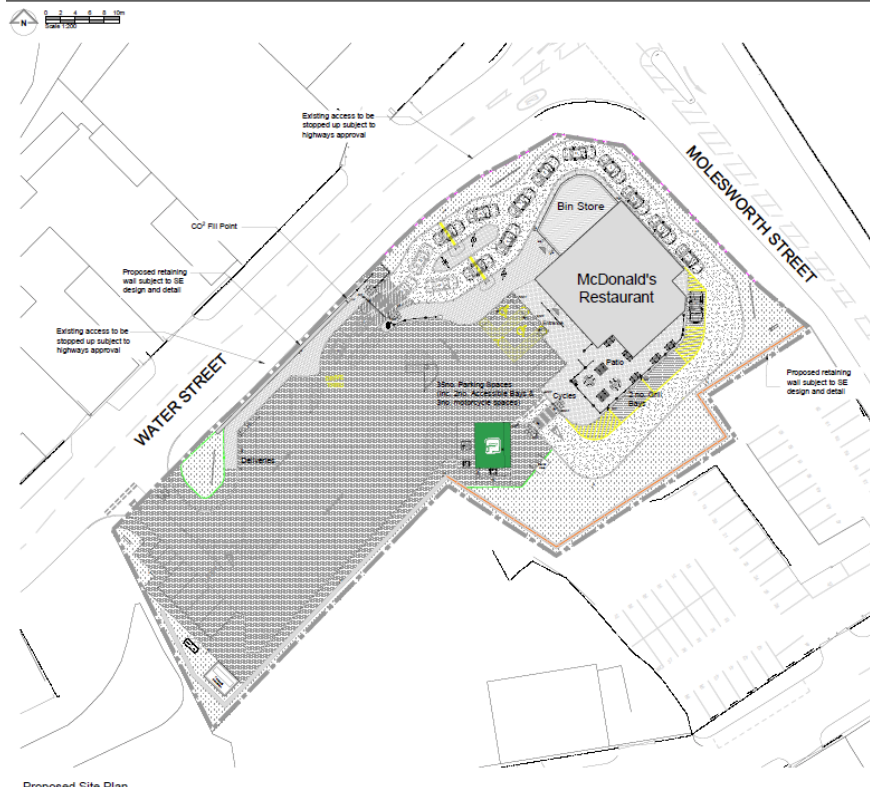
| Acoustic Feature      | Correction dB    |                     |                    |
|-----------------------|------------------|---------------------|--------------------|
|                       | Just perceptible | Clearly perceptible | Highly perceptible |
| Tonality              | 2         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

*Table 6 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, in this case McDonald's fans and condensers, is no louder than the background and has no readily perceptible features the Rating Level is often equal to the  $L_{Aeq,T}$  level.

## 4 Neighbourhood & proposed development

The proposed layout of the site is shown on AEW Architect's Proposed Site Plan drawing No. 13484-2285-004 rev A AEW (a copy can be found at the rear of this report) and an extract is shown below;



*Figure 1 showing proposed site layout*

Mr Peter Ashford BSc MIOA ANC of Acoustic Associates SW Ltd attended site on 19<sup>th</sup> June 2024 to set up a logging sound level meter to run for a full week.

The site is currently used as part secure storage for two car dealerships and part a public carpark, the logging sound level meter was set up out of harm's way as shown on the aerial view below;



*Figure 2 showing location of sound level meter and NSRs*

The photograph below shows the view of the microphone on a tripod looking down across Water Street;



*Figure 3 showing view of the microphone across the site and Water St*

## 5 Sound Measurements

The sound meter/pre-amp/microphone was calibrated using a hand held calibrator before and after the survey which ran from 13,00 hours on Wednesday 19<sup>th</sup> June 2024 through to the following Tuesday. Details of the equipment used are given in the table below.

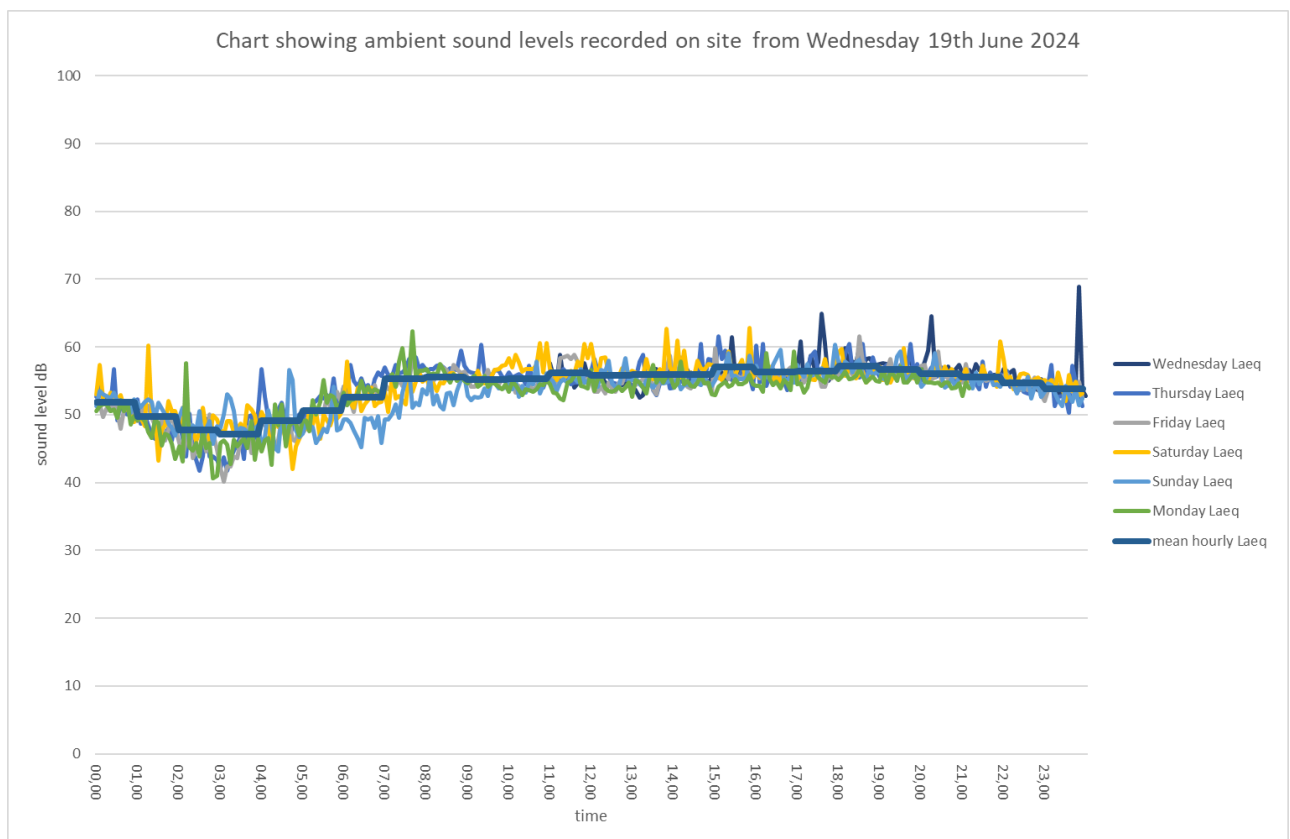
| Meter Make | Model | Serial No. | Calibration Date | Calibration Certificate No. | Calibration due date |
|------------|-------|------------|------------------|-----------------------------|----------------------|
| Rion       | NL52  | 00253718   | 5-7-23           | 1129645                     | 5-7-24               |
| Rion       | NC74  | 34794316   | 6-6-24           | 1163294                     | 6-6-25               |

*Table 7 showing measurement equipment details*

The weather during the survey was fine and hot, with high pressure lying across the country, light westerly wind and generally suitable for repeatable environmental sound measurement<sup>7</sup>.

### 5.1 Sound measurements $L_{Aeq}$

The chart below shows the  $L_{Aeq}$  values recorded, across the week in June;



*Figure 4 showing recorded  $L_{Aeq}$  levels*

The mean hourly levels across the week are indicated by the thicker blue line.

<sup>7</sup> <https://www.timeanddate.com/weather/@3333188/historic?month=6&year=2024>

## 5.2 Sound measurements $L_{A90}$

The chart below shows the  $L_{A90}$  values recorded, across the week in June;

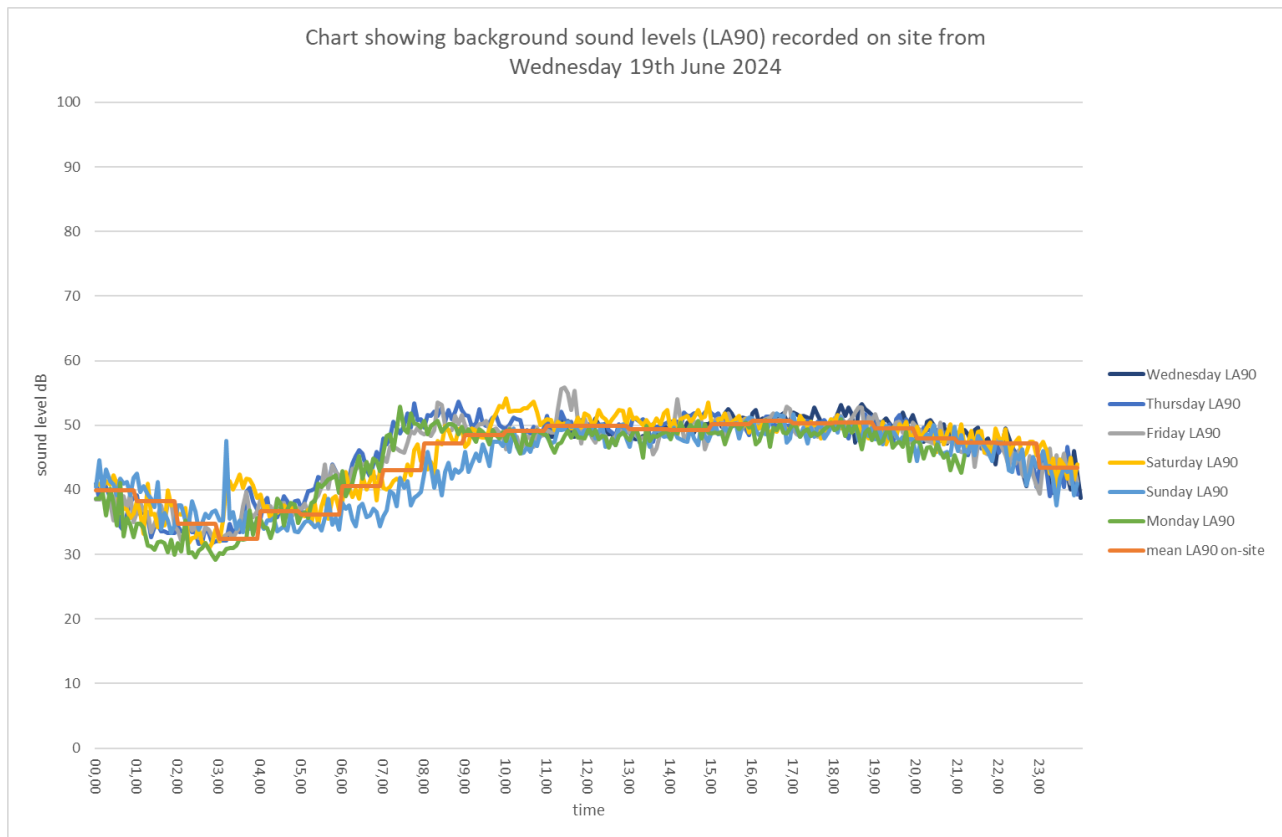


Figure 5 chart showing recorded background  $L_{A90}$  levels

This shows that the mean hourly background during the working day hovering around 50 dB  $L_{A90}$  but overnight dropped to low of 32 dB  $L_{A90}$  between 3 and 4am in the morning.

### 5.3 Sound Measurements $L_{Amax}$

The chart below shows the  $L_{Amax}$  values recorded, across the week in June;

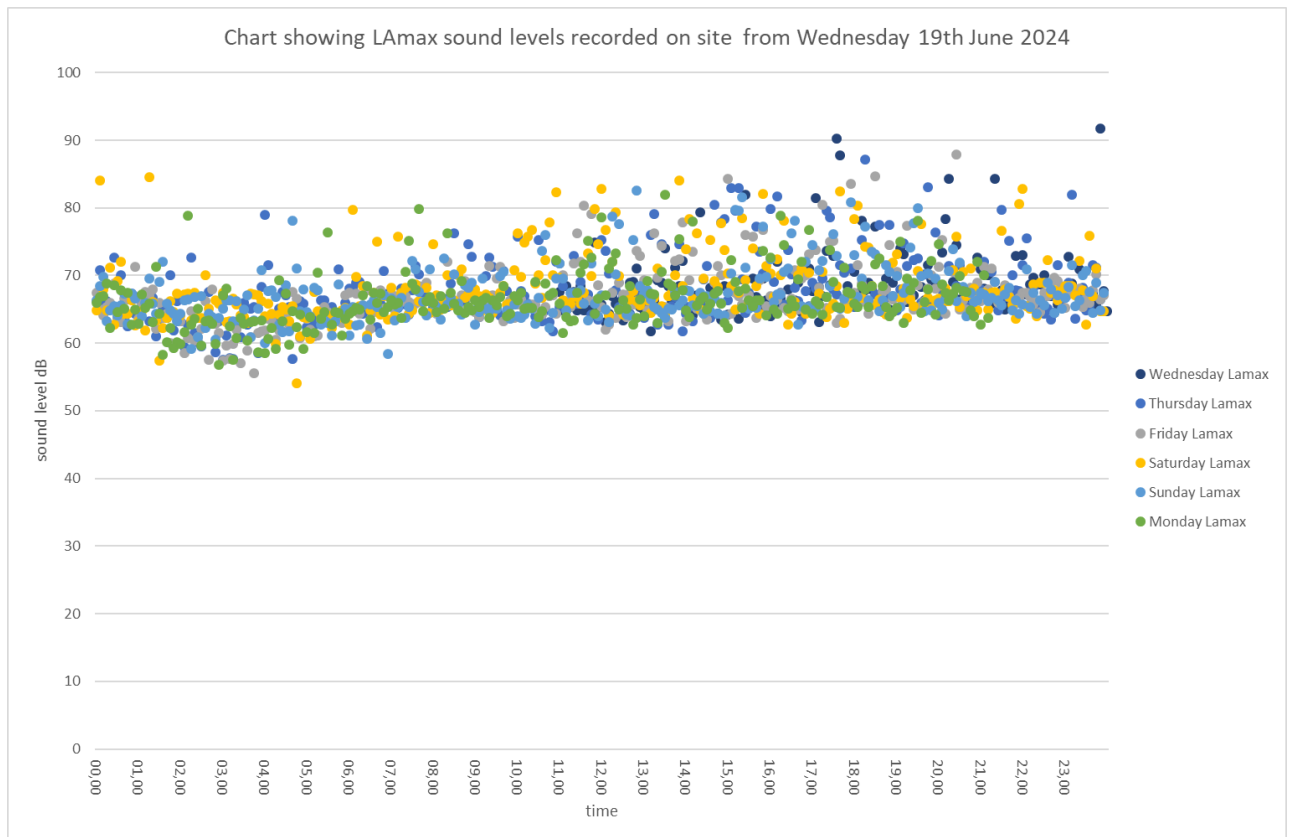


Figure 6 showing recorded  $L_{Amax}$  levels

This chart shows that during the proposed trading hours the current  $L_{Amax}$  levels were no lower than 54dB  $L_{Amax}$ .

### 5.4 Existing sound levels at the neighbours

For the purposes of this assessment it can be assumed that existing sound levels at the criterial facades of 80 -82 Molesworth Street, which has consent to for use as a hotel<sup>8</sup>, will be no lower, by virtue of closer proximity to Molesworth Street, than those recorded on-site monitoring position 40m from the road.

Similarly for Water House<sup>9</sup> at 9 Water Street to the west of the site which has consent for residential conversion, which fronts right on to Water Street.

The use of the existing ambient sound levels recorded on site to assess the impacts at the distant neighbours can therefore be considered as robust.

<sup>8</sup> App ref 22/00768/FUL

<sup>9</sup> App Ref 23/00972/VRCON

## 6 Fixed Plant Noise

### 6.1 Plant location and prediction of noise levels

The plant will be located on the roof of the restaurant building (DO100s model type) and the mansard roof elements will fully screen the view of the plant from the ground. The layout of the plant is shown on Caswell's indicative drawing No. 8774-3 an extract of which is shown below with the items of plant highlighted and full version at the end of this report;

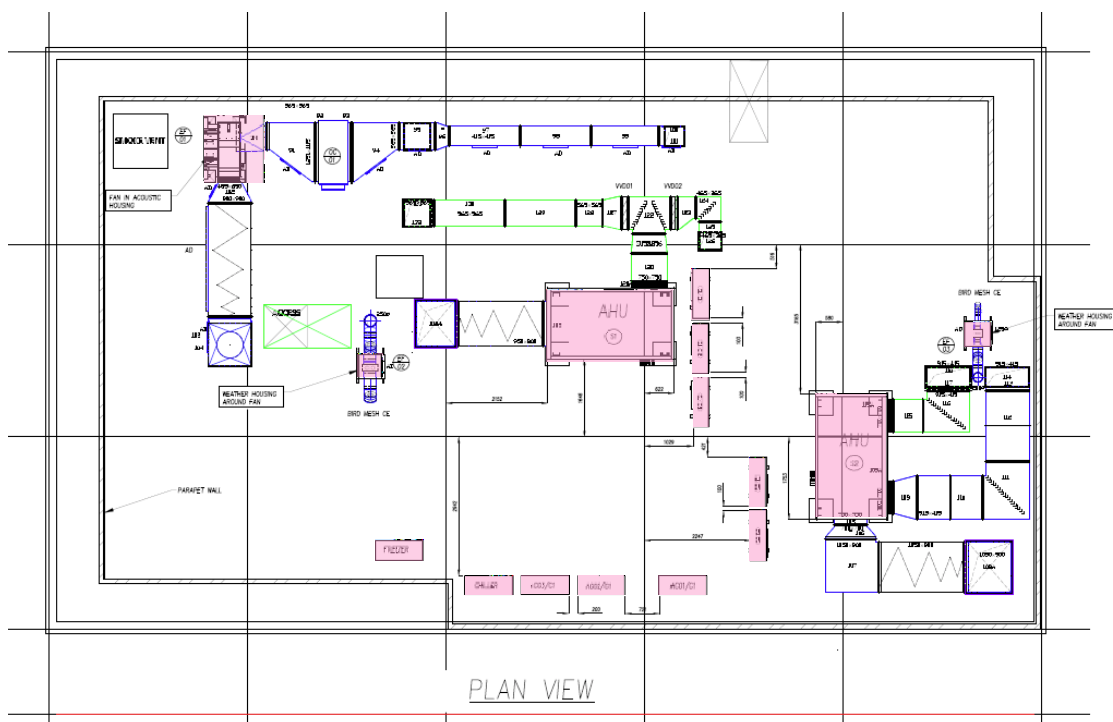


Figure 7 showing noise emitting roof plant

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<sup>10</sup> has been calculated using Wolfe IMMI implementing the

<sup>10</sup> Details of typical time night plant operation are shown in Appendix 1

requirements of ISO9613 Part 2<sup>11</sup> and assuming the following noise control measures are fitted;

| Noise Control Item                                    | octave band centre frequency Hz |        |        |         |         |         |
|-------------------------------------------------------|---------------------------------|--------|--------|---------|---------|---------|
|                                                       | 125 Hz                          | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz |
| kit ext discharge silencer<br>900 x 900 x 2100mm long | 17                              | 26     | 49     | 49      | 35      | 30      |
| S1 & S2 AHU FAI 1200mm<br>long                        | 11                              | 20     | 36     | 39      | 31      | 21      |

Table 5 showing noise reduction requirements

The image below shows the restaurant building with the roof plant identified by red crosses;



Table 6 plan showing roof plant location

The table below shows the predicted plant sound levels at the neighbours<sup>12</sup>;

| Location                | Height<br>m | Plant noise level              |                                                   |
|-------------------------|-------------|--------------------------------|---------------------------------------------------|
|                         |             | Day time dB L <sub>Aeq,T</sub> | Night time <sup>13</sup> dB<br>L <sub>Aeq,T</sub> |
| 39 Nile Street          | 4.5         | 20                             | 16                                                |
| 80-82 Molesworth Street | 4.5         | 27                             | 23                                                |
| 9 Water Street          | 4.5         | 24                             | 19                                                |

Table 7 showing predicted mitigated plant noise

This shows that the highest predicted plant noise levels will be outside the upper floor windows of 80-82 Molesworth Street to the south east but will be no higher than 27 dB L<sub>Aeq,T</sub> 5 dB less than the minimum overnight background sound level. A BS4142 assessment of these levels are provided later in this report.

<sup>11</sup> 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).

<sup>12</sup> Details of full calculations can be made available upon request

<sup>13</sup> Appendix 2 sets out details of night running plant

## 7 McDonald's customer vehicle noise

### 7.1 Car Parking & drive thru noise

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, using the Customer Order Displays 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 SEL levels and derived sound power levels ( $L_w$ ) which will be subsequently used in the noise predictions;

| Element                                                                                      | Duration<br>seconds | Sound<br>Level at (m)<br>dB LAeq,T | measurement<br>distance<br>measurement | SEL<br>dB | Derived<br>Lw SEL<br>dB |
|----------------------------------------------------------------------------------------------|---------------------|------------------------------------|----------------------------------------|-----------|-------------------------|
| <b>Drive Thru</b>                                                                            |                     |                                    |                                        |           |                         |
| drive off street and stop at COD <sup>14</sup>                                               | 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                     |
| <b>Parking</b>                                                                               |                     |                                    |                                        |           |                         |
| 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                   | 88.0                               | 1                                      | 88        | 96                      |

Table 11 showing vehicle noise levels

AMATP<sup>15</sup> have estimated the number of customers, using the drive thru lane or parking up and eating in that can be expected to visit this new restaurant, through the week as well as on Saturdays, the busiest trading day of the week.

<sup>14</sup> 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.

<sup>15</sup> AMATP email dated 29<sup>th</sup> July 2024

The table below shows the predicted vehicle numbers on the site;

| Hour<br>Beginning | Friday   |     |          | Saturday |     |          |
|-------------------|----------|-----|----------|----------|-----|----------|
|                   | Total In | DT  | Car Park | Total In | DT  | Car Park |
| 00:00             | 13       | 4   | 9        | 29       | 12  | 17       |
| 01:00             | 4        | 2   | 2        | 19       | 9   | 10       |
| 02:00             | 4        | 3   | 1        | 11       | 6   | 5        |
| 03:00             | 5        | 3   | 2        | 6        | 3   | 3        |
| 04:00             | 3        | 2   | 1        | 8        | 4   | 4        |
| 05:00             | 16       | 10  | 6        | 11       | 6   | 5        |
| 06:00             | 27       | 17  | 10       | 22       | 15  | 7        |
| 07:00             | 46       | 30  | 16       | 31       | 21  | 10       |
| 08:00             | 48       | 29  | 19       | 55       | 38  | 17       |
| 09:00             | 53       | 29  | 24       | 69       | 39  | 30       |
| 10:00             | 43       | 23  | 20       | 61       | 35  | 26       |
| 11:00             | 43       | 19  | 24       | 58       | 42  | 16       |
| 12:00             | 74       | 36  | 38       | 87       | 65  | 22       |
| 13:00             | 74       | 36  | 38       | 91       | 60  | 31       |
| 14:00             | 55       | 26  | 29       | 90       | 59  | 31       |
| 15:00             | 71       | 36  | 35       | 78       | 43  | 35       |
| 16:00             | 75       | 47  | 28       | 68       | 35  | 33       |
| 17:00             | 80       | 57  | 23       | 77       | 42  | 35       |
| 18:00             | 80       | 56  | 24       | 65       | 40  | 25       |
| 19:00             | 67       | 40  | 27       | 58       | 37  | 21       |
| 20:00             | 54       | 32  | 22       | 44       | 29  | 15       |
| 21:00             | 42       | 25  | 17       | 33       | 22  | 11       |
| 22:00             | 39       | 22  | 17       | 31       | 21  | 10       |
| 23:00             | 22       | 12  | 10       | 26       | 16  | 10       |
| Total             | 1038     | 596 | 442      | 1128     | 699 | 429      |

Table 12 showing estimated customer vehicle numbers

This table shows that the busiest hour of trading will be on a Saturday lunch time from 1pm when 60 customers can be expected to use the drive thru, 31 to park.

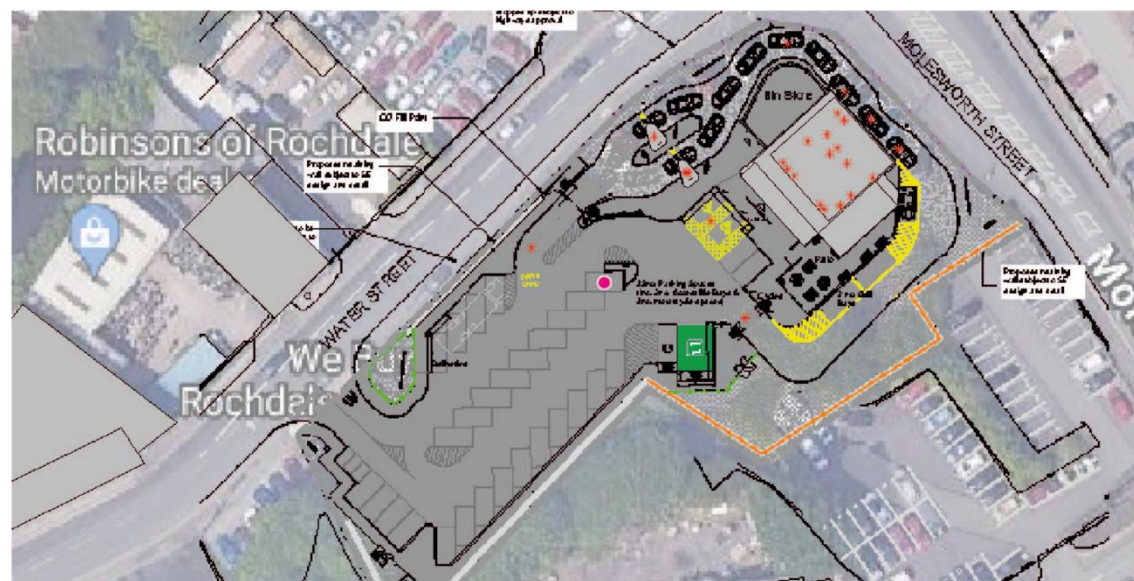
## 7.2 Noise predictions

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 IMMI 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,

The image below shows the location of three parking activities, in the middle of the bay immediately outside the restaurant, in the middle of the middle bay as this will provide some degree of spacial averaging;



The chart over page shows the mean existing measured ambient sound levels recorded, across 24-hours (**orange line**) with the **blue** line representing the level of vehicle activity noise outside the 1<sup>st</sup> floor windows of 80-82 Molesworth Street. The **brown line** represents increase in overall levels, with McDonald's trading, over the existing levels.

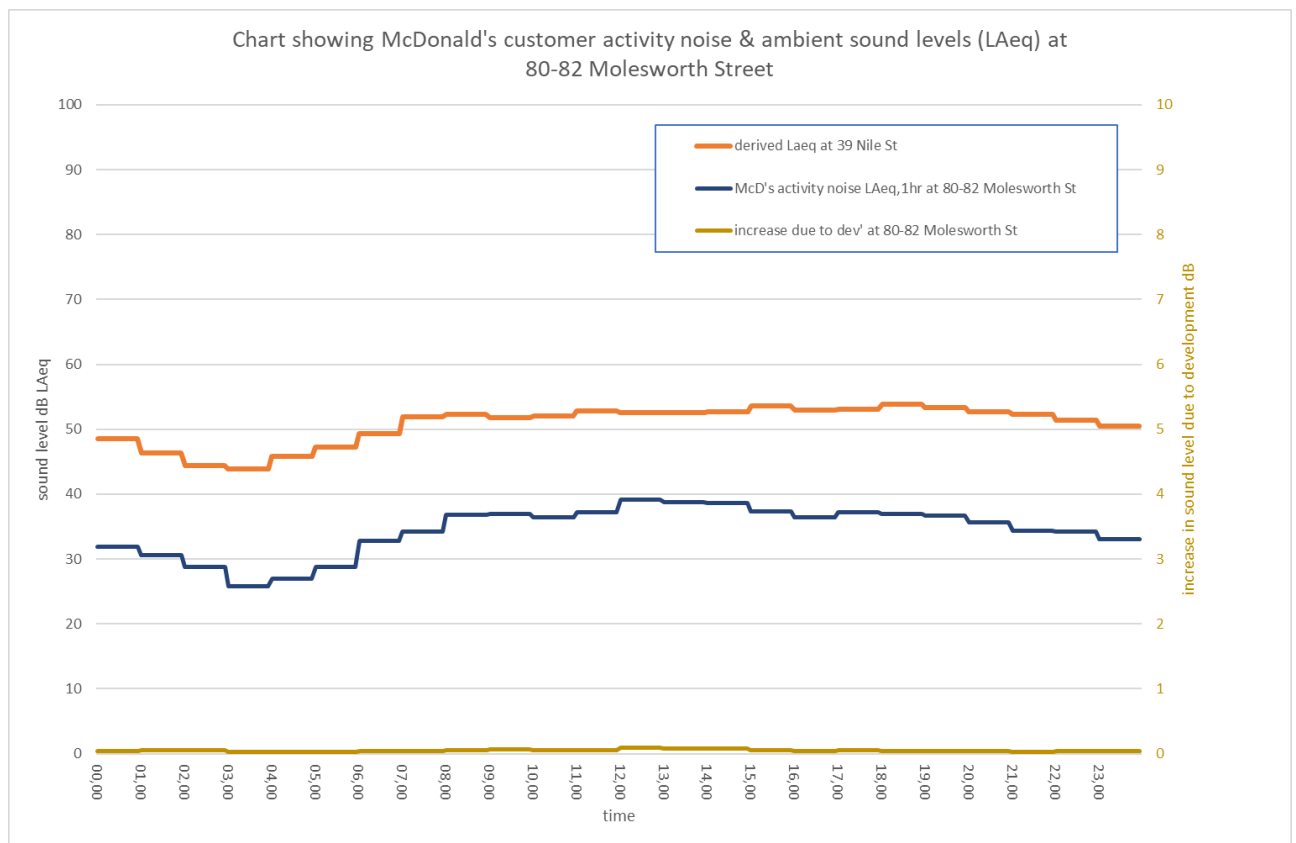


Figure 10 showing comparison between existing & dev' sound levels

This shows the greatest increase will be less than 1 dB (reading from the right hand side Y axis). Increases of 1 dB or less can be considered to have a *negligible impact*.

### 7.3 Car door slams

Although the customers using the new restaurant car park will not be inherently noisy or any noisier than those previously using the public car park, the closing of car doors is an impulsive activity which could draw attention.

World Health Organization provides guidance values<sup>16</sup> for individual event levels, denoted by  $L_{Amax}$ , to maintain the restorative powers of sleep. This criterion being to limit the magnitude and frequency of loud events to no more than 10 to 15 events louder than 45 dB  $L_{Amax}$  across an eight-hour night from 11pm to 7am. Allowing a nominal loss outside to inside, for a residential façade with an open window of 15 dBA. This provides a derived external criterion of 60 dB  $L_{Amax,regular}$ .

Here with the proposed trading hours being 24 hours per day, potential night time disturbance should be considered.

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

<sup>16</sup> WHO Guidelines for Community Noise

model, with a car parking in the middle of the parking spaces<sup>17</sup> to upper floor windows at 80-82 Molesworth Street, as indicated by the pink dot on the aerial view below;

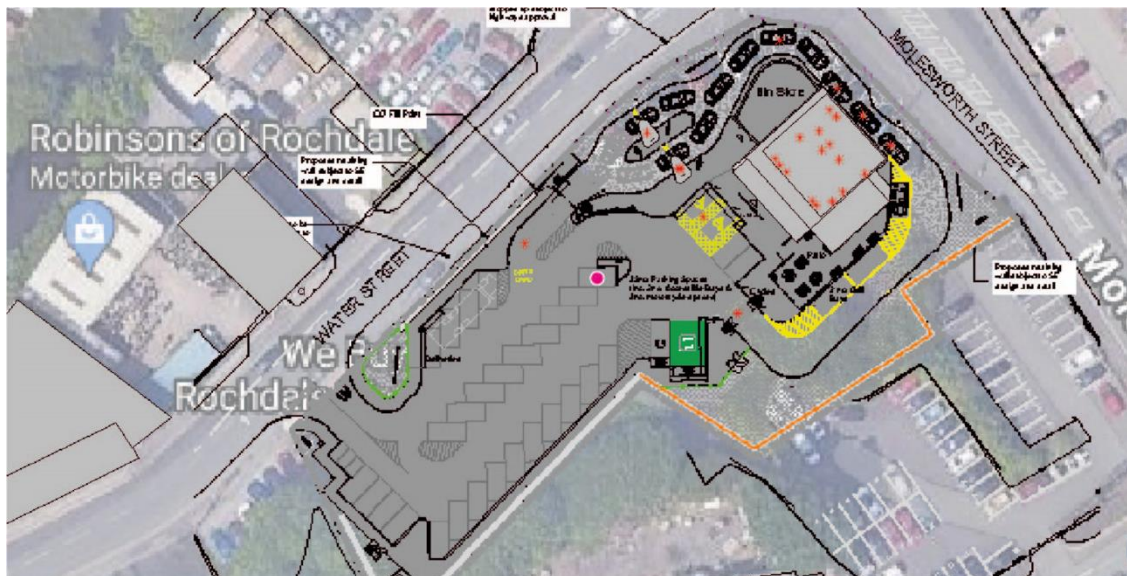


Figure 11 showing location of car door slam

The chart below shows the  $L_{Amax}$  events recorded, along with the mean loudest door slam (orange line) from the McDonald's site outside the upper windows of 80-82 Molesworth Street.

<sup>17</sup> 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

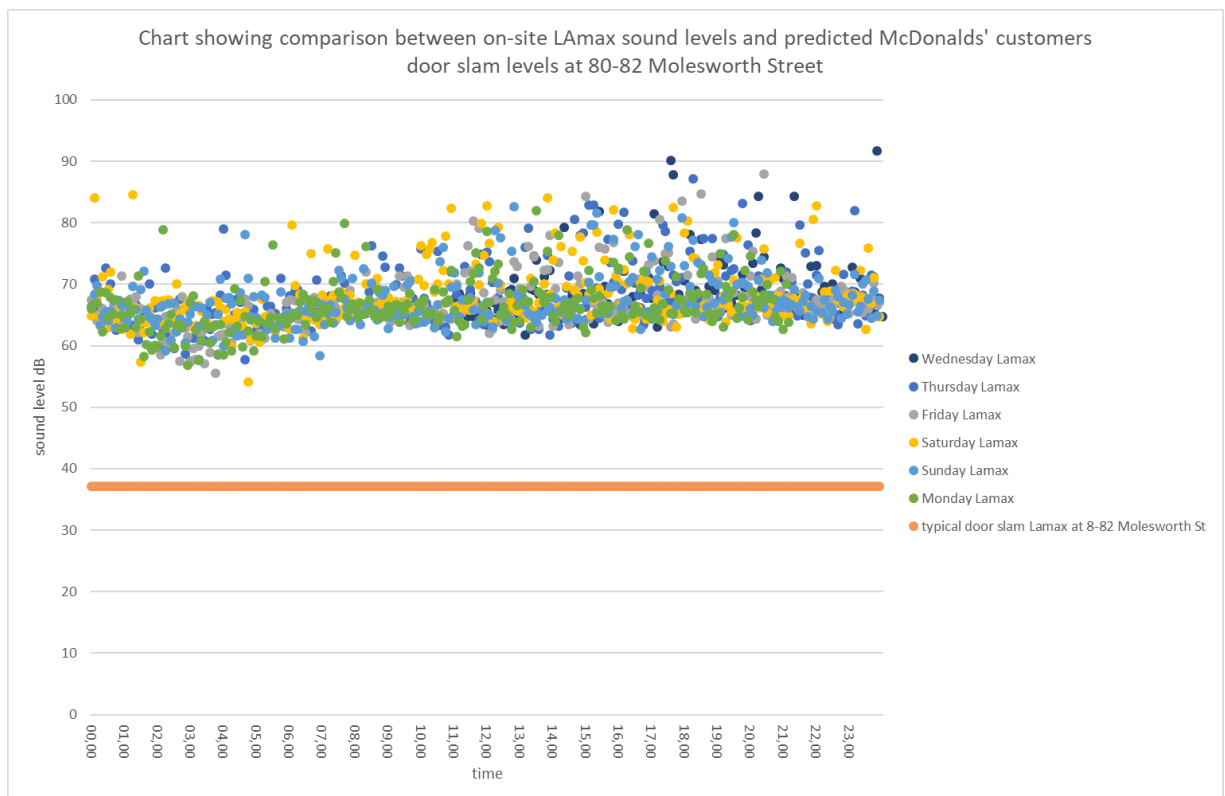


Figure 12 showing comparison between existing event levels and those from door slams

This shows that the maximum predicted door slam event level will be only 37 dB L<sub>Amax</sub>, significantly less than the 60 dB L<sub>Amax</sub> external, WHO derived criteria, for the onset of internal sleep disturbance and also significantly less than current levels for the entirety of the day and night.

Their impact can therefore be considered to be *negligible*.

## 7.4 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<sub>Aeq,5minutes</sub> (92 dB SEL) at 5m was recorded.

Here delivery lorries will arrive turn into the site off Water Road onto the McDonald's' site, and parking across the parking bays in front of the restaurant. Once the delivery has been completed the vehicle will simply pull forward and exit the site back on to Water Road. 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)<sup>18</sup>;

| Location                | Delivery vehicle noise           |                                      |
|-------------------------|----------------------------------|--------------------------------------|
|                         | Day time<br>LA <sub>r</sub> ,1hr | Night time<br>LA <sub>r</sub> ,15min |
| 39 Nile Street          | 5                                | 11                                   |
| 80-82 Molesworth Street | 36                               | 42                                   |
| 9 Water Street          | 22                               | 28                                   |

Table 13 showing predicted delivery noise levels

The night time level is 6 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.

The chart below shows the L<sub>A90,T</sub> levels recorded during the on-site survey with the predicted delivery noise Rating Level, outside the first floor windows of 9 Water Street.

<sup>18</sup> Full details of these calculations can be made available upon request, a 3 dB "other penalty" has been added to the predicted L<sub>Aeq,T</sub> to give a Rating Levels L<sub>A,r</sub> (BS4142:2014)

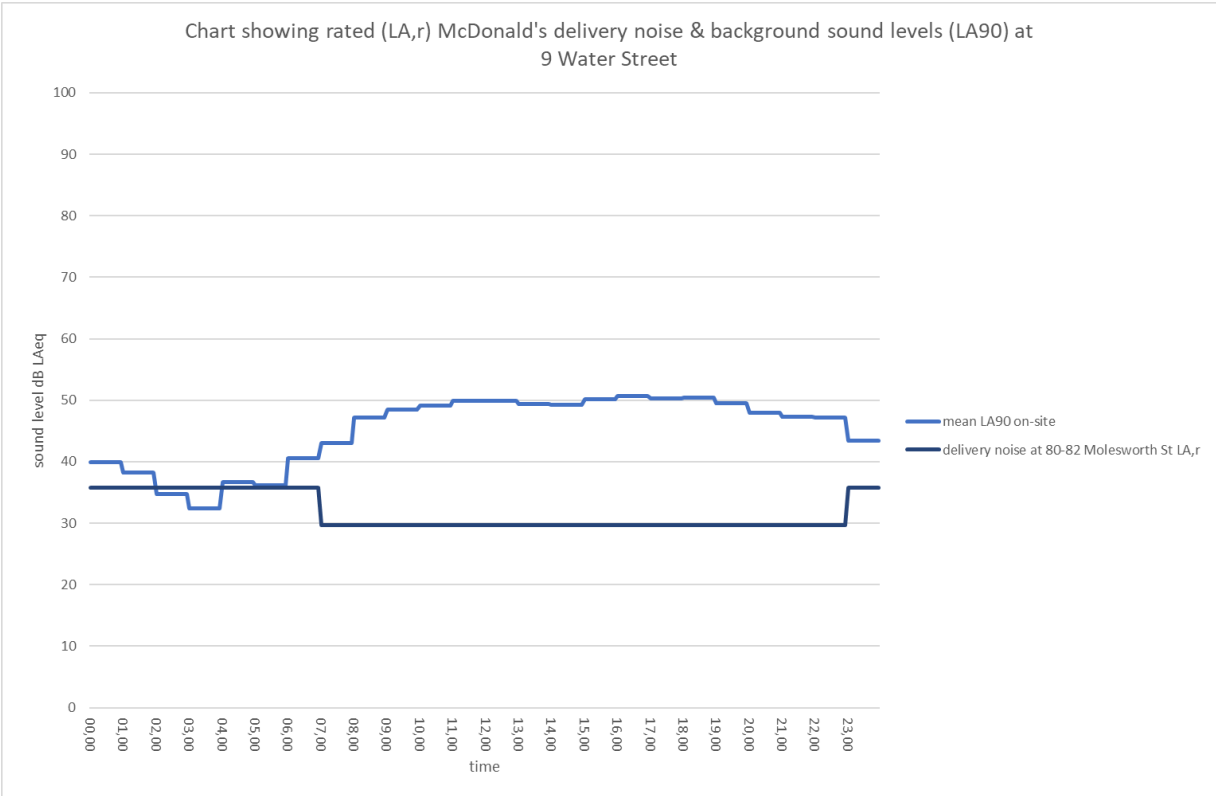


Figure 14 showing Rated delivery noise vs the background

This shows that *Rated delivery noise* will be no more than 5 dB higher than the existing background sound level and therefore delivery hours do not need to be limited for this site.

## 8 Assessment of impacts

### 8.1 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. However, at night, some of the plant will run intermittently and this might be perceivable at times when the background sound level is considerably lower. Consequently, a 3 dB penalty needs to be added to the assessed  $L_{Aeq,T}$  to give the Rating Level.

| Location                                 | 80-82 Molesworth St |            |
|------------------------------------------|---------------------|------------|
|                                          | Day time            | night time |
| Predicted plant noise level dB $L_{Aeq}$ | 27                  | 23         |
| character penalties                      |                     |            |
| tonality                                 | 0                   | 0          |
| impulsivity                              | 0                   | 0          |

|                                                   |                       |            |           |
|---------------------------------------------------|-----------------------|------------|-----------|
|                                                   | intermittency         | 0          | 3         |
|                                                   | other characteristics | 0          | 0         |
| <b>Plant Rating Level dB <math>L_{A,r}</math></b> |                       | <b>27</b>  | <b>26</b> |
| Background sound level (day/night) dB $L_{A90}$   |                       | 42         | 32        |
| <b>Excess over background dB</b>                  |                       | <b>-15</b> | <b>-6</b> |
| Likely impact                                     |                       | very low   | very low  |

Table 8 BS4142 assessment of plant noise

This shows that plant noise will have a “very low” impact day and night.

## 8.2 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;

| Location                                             | 9 Water Street        |                               |
|------------------------------------------------------|-----------------------|-------------------------------|
|                                                      | Day time              | night time                    |
| Predicted delivery noise level ( $L_{Aeq,T}$ )       | 27                    | 33                            |
| character penalties                                  |                       |                               |
|                                                      | tonality              | 0                             |
|                                                      | impulsivity           | 0                             |
|                                                      | intermittency         | 3                             |
|                                                      | other characteristics | 0                             |
| <b>Delivery Rating Level dB <math>L_{A,r}</math></b> | <b>30</b>             | <b>36</b>                     |
| Background sound level $L_{A90}$ at 10pm &           | 42                    | 32                            |
| <b>Excess over background</b>                        | <b>-10</b>            | <b>+4</b>                     |
| Likely impact                                        | Very low              | Less than significant adverse |

Table 15 BS4142 assessment of delivery noise

This shows that the noise created by the deliveries will have “very low” impact during the day but at night will create a “less than significant adverse impact” and therefore deliveries do not need limiting for noise reasons.

## 8.3 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 below compares the predicted loudest door slam level at the closest neighbour;

| Location                               | 80-82 Molesworth Street |                        |
|----------------------------------------|-------------------------|------------------------|
|                                        | Evening (7pm to 11pm)   | night time 11pm to 7am |
| predicted max slam level $L_{Amax,f}$  | 37                      | 37                     |
| W.H.O. internal criteria               | NA                      | 45                     |
| derived external criteria windows open | NA                      | 60                     |
| <b>exceedance</b>                      | <b>NA</b>               | <b>NO</b>              |

Table 16 WHO assessment of slam event levels

This shows that the highest door slam event levels are below the W.H.O. criteria, for the onset of sleep disturbance, at the closest neighbours and are substantially below those currently existing. It can therefore be concluded that there will be no loss of amenity to the neighbours from door slam events.

## 9 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.

### 9.1 Residential neighbours existing sound climate

A week long survey in June 2024 shows day time levels as the NSRs will be no less than 56 dB  $L_{Aeq,day}$  and 51 dB  $L_{Aeq,night}$ , levels that will provide a very high level of sound masking given the separation distances between the site and the distant NSR's.

Any small variations in ambient levels will therefore not be critical in the determination of the impacts.

### 9.2 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 has been compared with recorded ambient levels and shown to be at least 5 dB below than the background at all times, day and night.

Uncertainty in plant noise and its predictions are unlikely to be sufficient to cause adverse impacts.

### 9.3 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 reliable prediction.

Whilst the estimates for likely peak customer numbers provided by McDonald's' traffic engineers AMATP 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.

Cumulative uncertainties in this assessment are not expected to result in any loss of amenity of the neighbours.

**Proposed Site Plan**

The plan illustrates the layout of the proposed McDonald's Restaurant and its associated parking and service areas. Key features include:

- Water Street** and **Molesworth Street** forming the street frontage.
- McDonald's Restaurant** building footprint.
- Parking Spaces**: 3600 designated spaces, including 300 motorcycle bays and 2 m. Grill Bays.
- Delivery Zone** and **Bin Store**.
- Existing Access** to be subject to highway approval.
- Proposed Retaining Wall** design and detail.
- 60' Fill Point** along the waterfront.

**PLANNING**

This section provides technical specifications and planning information for the project.

### Technical Specifications

| Item | Description                    | Quantity | Unit    |
|------|--------------------------------|----------|---------|
| 1    | McDonald's Restaurant Building | 1        | Sq. Ft. |
| 2    | Parking Spaces                 | 3600     | Sq. Ft. |
| 3    | Motorcycle Bays                | 300      | Sq. Ft. |
| 4    | Grill Bays                     | 2        | Sq. Ft. |
| 5    | Delivery Zone                  | 1        | Sq. Ft. |
| 6    | Bin Store                      | 1        | Sq. Ft. |

### Planning Information

**Project Name:** McDonald's Restaurant Building

**Address:** 13484 AEW 2285 1004

**Owner:** McDonald's Restaurants Ltd.

**Architect:** [Firm Name]

**Date:** [Date]

**Scale:** 1" = 10'

**Notes:**

- All dimensions are approximate and subject to change.
- The plan is based on the latest available aerial photography.
- The proposed building footprint is shown in grey.
- Parking spaces are shown in yellow.
- Motorcycle bays are shown in green.
- Grill bays are shown in blue.
- Delivery zone is shown in orange.
- Bin store is shown in red.

[illegible]

## Appendix 1 – schedule of plant noise data

| Reference      | Service                | Make       | Model         | Indice     | dBa | linear octave band centre frequency Hz |        |        |        |         |         |         |        |  |  |
|----------------|------------------------|------------|---------------|------------|-----|----------------------------------------|--------|--------|--------|---------|---------|---------|--------|--|--|
|                |                        |            |               |            |     | 63 Hz                                  | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz | 8000Hz |  |  |
| S1             | kitchen supply         | Weathrite  | Y200          | Lw         | 88  | 83                                     | 89     | 85     | 85     | 81      | 80      | 76      | 77     |  |  |
| S11C1, C2 & C3 | S1 condensers 1,2&3    | Mitsubishi | ZRP250        | Lp at 1m   | 62  | 65                                     | 62     | 60     | 59     | 58      | 52      | 48      | 42     |  |  |
| S2             | GF Dining supply       | Weathrite  | Y120          | Lw         | 82  | 78                                     | 82     | 79     | 80     | 77      | 75      | 72      | 68     |  |  |
| S2/C1 & C2     | S2 condensers 1&2      | Mitsubishi | ZRP200        | Lp at 1m   | 62  | 61                                     | 61     | 60     | 59     | 58      | 52      | 46      | 42     |  |  |
| AC01/C1        | Manger Rn condenser    | Mitsubishi | SUZ M35FA     | Lp at 1m   | 48  | 51                                     | 53     | 51     | 45     | 52      | 39      | 31      | 25     |  |  |
| AC02/C1        | Crew Rm condenser      | Mitsubishi | SUZ M50FA     | Lp at 1m   | 49  | 57                                     | 57     | 56     | 54     | 52      | 48      | 41      | 45     |  |  |
| AC03/C1        | Office condenser       | Mitsubishi | PUZ-ZM71VHA   | Lp at 1m   | 49  | 53                                     | 52     | 53     | 45     | 42      | 39      | 34      | 28     |  |  |
| E1             | Door Curtain condenser | Mitsubishi | PUHX-RP125R   | Lp at 1m   | 45  | 52                                     | 45     | 45     | 40     | 39      | 35      | 27      | 13     |  |  |
|                | kitchen extract        | RHF        | BW10 500      | induct Lw  | 97  | 104                                    | 95     | 100    | 98     | 84      | 80      | 77      | 68     |  |  |
| EF/02          | WC extract             | Systemair  | DHS 310EV     | case BO Lw | 89  | 92                                     | 79     | 91     | 86     | 84      | 78      | 67      | 54     |  |  |
| EF/03          | Energizer (Store)      | Systemair  | DHS 310EV     | Lw         | 67  | 54                                     | 56     | 60     | 62     | 61      | 58      | 53      | 46     |  |  |
| HWS            | ASHP                   | Cosmic Gas | FRYO-13PI     | Lw         | 67  | 54                                     | 56     | 60     | 62     | 61      | 58      | 53      | 46     |  |  |
| ABS            | condenser              | Manitowoc  | ICVD 1195-261 | Lp         | 59  | 60                                     | 58     | 49     | 46     | 46      | 43      | 38      | 39     |  |  |
|                | Freezer condensers     | Danfoss    | OP-LPHM136    | Lw         | 66  | 55                                     | 64     | 63     | 62     | 61      | 58      | 57      | 54     |  |  |
|                | chiller condenser      | Danfoss    | OP-MPUM046    | Lw         | 73  | 72                                     | 71     | 70     | 69     | 68      | 65      | 65      | 62     |  |  |
|                |                        |            |               | Lw         | 68  | 50                                     | 59     | 58     | 57     | 56      | 53      | 53      | 50     |  |  |

## Appendix 2 details of night time plant operation

| Reference      | Service             | Indice     | at duty point<br>dBA | night running<br>duty             | night run<br>time | night time<br>L <sub>aeq,T</sub> |
|----------------|---------------------|------------|----------------------|-----------------------------------|-------------------|----------------------------------|
| S1             | kitchen supply      | Lw         | 88                   | fan speed deduces from 45 to 35Hz | 100%              | 83                               |
| S11C1, C2 & S1 | condensers 1,2&3    | Lp at 1m   | 62                   | operates only on thermal load     | 33%               | 57                               |
| S2             | GF Dining supply    | Lw         | 82                   | fan speed deduces from 45 to 35Hz | 100%              | 77                               |
| S2/C1 & C2     | S2 condensers 1&2   | Lp at 1m   | 62                   | operates only on thermal load     | 33%               | 57                               |
| AC01/C1        | Manger Rn condenser | Lp at 1m   | 48                   | operates only on thermal load     | 33%               | 43                               |
| AC02/C1        | Crew Rm condenser   | Lp at 1m   | 49                   | operates only on thermal load     | 33%               | 44                               |
| AC03/C1        | Office condenser    | Lp at 1m   | 49                   | operates only on thermal load     | 33%               | 44                               |
|                | Door curtain        | Lp at 1m   | 45                   | operates only on thermal load     | 33%               | 40                               |
| E1             | kitchen extract     | induct Lw  | 97                   | fan speed deduces from 45 to 40Hz | 100%              | 91                               |
|                |                     | case BO Lw | 89                   |                                   | 100%              | 83                               |
| EF/02          | WC extract          | Lw         | 67                   | operates only on thermal load     | 50%               | 64                               |
| EF/03          | Energizer (Store)   | Lw         | 67                   | operates only on thermal load     | 50%               | 64                               |
| HWS            | ASHP                | Lp         | 59                   | operates only on thermal load     | 25%               | 53                               |
| ABS            | condenser           | Lp         | 66                   | operates only on thermal load     | 25%               | 60                               |
|                | Freezer condensers  | Lw         | 73                   | operates only on thermal load     | 25%               | 67                               |
|                | chiller condenser   | Lw         | 68                   | operates only on thermal load     | 25%               | 62                               |