Development Control
Gloucester City Council
PO Box 3252, Gloucester, GL1 9FW
01452 396396
development.control@gloucester.gov.uk
www.gloucester.gov.uk/planning

Application for removal or variation of a condition following grant of planning permission. Town and Country Planning Act 1990. Planning (Listed Buildings and Conservation Areas) Act 1990

Publication of applications on planning authority websites.

Please note that the information provided on this application form and in supporting documents may be published on the Authority's website. If you require any further clarification, please contact the Authority's planning department.

1. Site Address

Number	
Suffix	
Property name	Aldi
Address line 1	Hucclecote Road
Address line 2	
Address line 3	
Town/city	Gloucester
Postcode	GL3 3TQ

Description of site location must be completed if postcode is not known:

Easting (x)	386583
Northing (y)	217883

Description

2. Applicant Details

Title	
First name	
Surname	Aldi Stores Limited
Company name	
Address line 1	C/O Agent
Address line 2	13-14 Orchard Street
Address line 3	
Town/city	Bristol

2. Applicant Details

Country	
Postcode	BS15EH

Are you an agent acting on behalf of the applicant? (●) Yes ( ) No

Primary number	
Secondary number	
Fax number	
Email address	

3. Agent Details

Title	Mr
First name	Lloyd
Surname	Collins
Company name	Planning Potential Ltd.
Address line 1	13-14
Address line 2	Orchard Street
Address line 3	
Town/city	BRISTOL
Country	
Postcode	BS1 5EH
Primary number	
Secondary number	
Fax number	
Email	

4. Description of the Proposal

Please provide a description of the approved development as shown on the decision letter

Variation of condition 24 of Planning permission 16/00753/FUL to allow for an earlier start for the loading and unloading of service and delivery vehicles from 06.00hrs to 21.00hrs Monday to Saturday and 07.00 hrs to 18.00 hrs on Sundays and Bank Holidays. The condition currently allows for the loading and unloading of service and delivery vehicles from 07.00hrs to 21.00hrs Monday to Saturday and 09.00 hrs to 18.00 hrs on Sundays and Bank Holidays

Reference number

20/01306/FUL

Date of decision (date must be pre-application submission)	07/04/2021

Please state the condition number(s) to which this application relates

Condition number(s)

Condition 2

4. Description of the Proposal

Has the development already started? ○ Yes ◉ No

5. Condition(s) - Removal/Variation

Please state why you wish the condition(s) to be removed or changed

This application seeks make the permanent the temporary delivery hours that were approved via planning permission 20/01306/FUL. In response to demand for greater operational flexibility in the delivery hours at the store to meet the needs expectations of customers, to provide a safe environment to customers, and to allow deliveries at quieter times to avoid congestion.

If you wish the existing condition to be changed, please state how you wish the condition to be varied

"The loading and unloading of service and delivery vehicles together with their arrival and departure from the site shall not take place outside the following times: Monday to Saturday 06.00hrs-21.00hrs, Sunday and Bank Holidays 07.00hrs- 18.00hrs.
Reason

To protect the amenity of local residents."

6. Site Visit

Can the site be seen from a public road, public footpath, bridleway or other public land? ◉ Yes ○ No

If the planning authority needs to make an appointment to carry out a site visit, whom should they contact?

- ◉ The agent
- ○ The applicant
- ○ Other person

7. Pre-application Advice

Has assistance or prior advice been sought from the local authority about this application? ○ Yes ◉ No

8. Ownership Certificates and Agricultural Land Declaration

CERTIFICATE OF OWNERSHIP - CERTIFICATE B - Town and Country Planning (Development Management Procedure) (England) Order 2015 Certificate under Article 14

I certify/The applicant certifies that:

- ◉ I have/The applicant has given the requisite notice to everyone else (as listed below) who, on the day 21 days before the date of this application, was the owner* and/or agricultural tenant** of any part of the land or building to which this application relates; or
- ○ The applicant is the sole owner of all the land or buildings to which this application relates and there are no other owners* and/or agricultural tenants**.

*** 'owner' is a person with a freehold interest or leasehold interest with at least 7 years to run. ** 'agricultural tenant' has the meaning given in section 65(8) of the Town and Country Planning Act 1990.**

Owner/Agricultural Tenant

Name of Owner/Agricultural Tenant	
Number	
Suffix	
House Name	c/o Chalfont Court
Address line 1	Hill Avenue
Address line 2	Amersham
Town/city	Buckinghamshire
Postcode	HP6 5BB
Date notice served (DD/MM/YYYY)	24/12/2021

8. Ownership Certificates and Agricultural Land Declaration

Name of Owner/Agricultural Tenant	
Number	
Suffix	
House Name	c/o Chalfont Court
Address line 1	Hill Avenue
Address line 2	Amersham
Town/city	Buckinghamshire
Postcode	HP6 5BB
Date notice served (DD/MM/YYYY)	24/12/2021

Person role

- ○ The applicant
- ◉ The agent

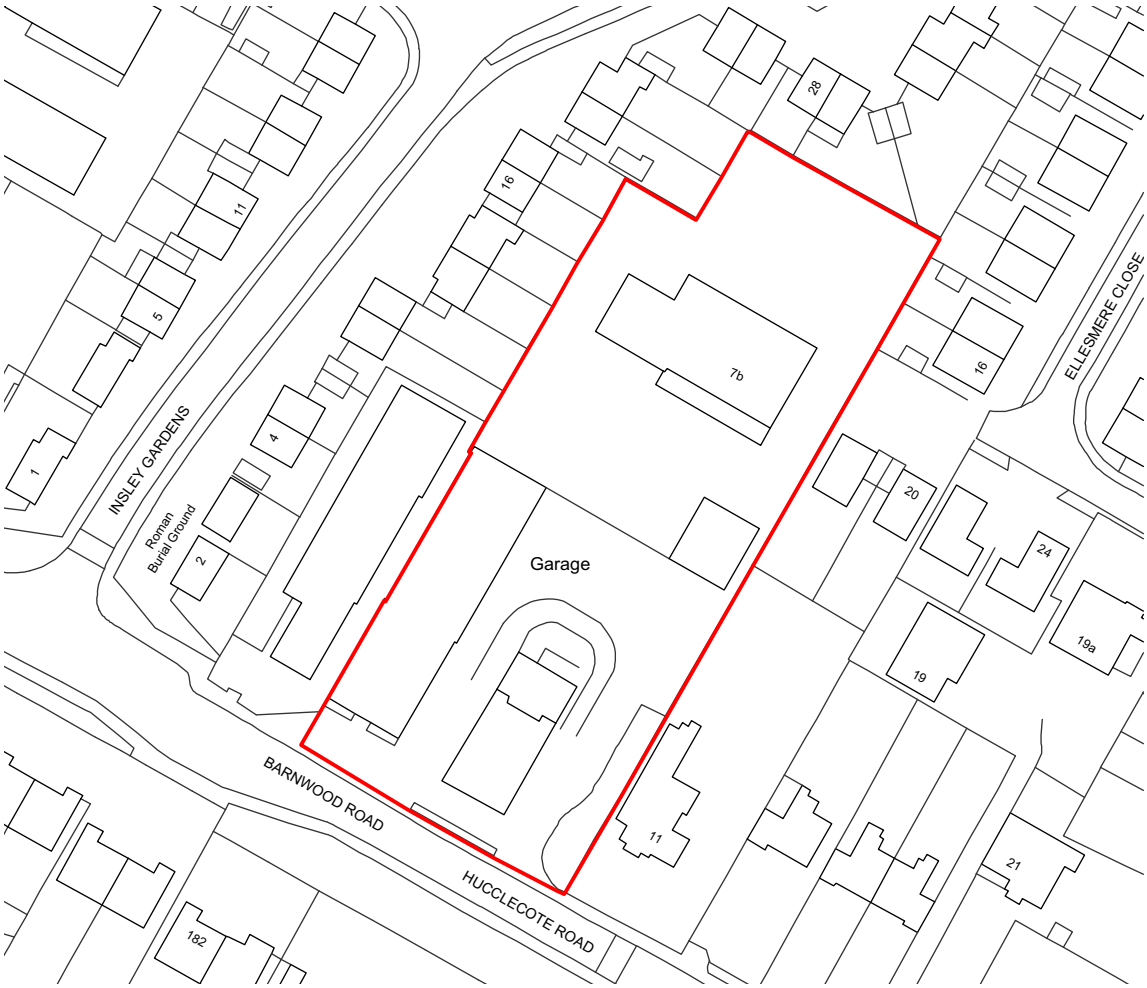
Title	Mr
First name	Lloyd
Surname	Collins
Declaration date (DD/MM/YYYY)	24/12/2021

☑ Declaration made

9. Declaration

I/we hereby apply for planning permission/consent as described in this form and the accompanying plans/drawings and additional information. I/we confirm that, to the best of my/our knowledge, any facts stated are true and accurate and any opinions given are the genuine opinions of the person(s) giving them. ☑

Date (cannot be pre-application)	24/12/2021



0 10 30 50 M

Scale = 1:1250 @ A4

Site Address:

Hucclecote Road,
Gloucester
GL3 3TQ

Kendall Kingscott

Chartered Architects
Chartered Building Surveyors
Interior Designers
CDM Co-ordinators

Glentworth Court, Lime Kiln Close
Stoke Gifford, Bristol BS34 8SR
[redacted]

Rv.	Date	By	Ap	Note

Project
ALDI Stores, Hucclecote Road, Gloucester

Client
ALDI Stores Ltd

Drawing Title
Site Location Plan

Project No. 150157 Drawing No. P(1)200 Rev.

Scale	Paper Size	Filename
1:1250	A4	As drg name

Date	Drawn	Checked	Status
9/1/18	SK	MW	Planning

London
Magdalen House
148 Tooley Street
London SE1 2TU
[redacted]

Harrogate
14-15 Regent Parade
Harrogate
HG1 5AW
[redacted]

Bristol
13-14 Orchard Street
Bristol
BS1 5EH
[redacted]

Development Control
Gloucester City Council
4th Floor Herbert Warehouse
The Docks
Gloucester
GL1 2EQ

24 December 2021

Our Ref: 21/4107DD

Dear Sir/Madam,

Aldi Stores Limited, Hucclecote Road, Gloucester, GL3 3TQ
Application under Section 73 of the Town and Country Planning Act 1990 to Extend Delivery Hours

On behalf of my Client, Aldi Stores Ltd, please find enclosed a planning application, which seeks the variation of Condition 2 of Planning Permission ref. 20/01306/FUL, to allow permanent extended delivery hours in the mornings at the existing Aldi store at Hucclecote Road, Gloucester.

Accordingly, please find enclosed the following documentation:

- Completed application forms and certificates;
- Site Location Plan;
- Environmental Noise Assessment (prepared by Sharps Redmore); and
- Decision Notice (ref: 20/01306/FUL).

A credit card payment for the application fee of £234 has been made online via the Planning Portal, and the Planning Portal reference number is (PP-10506189).

Planning History

The relevant planning history for the site, in terms of delivery hours, is summarised below:

- Ref: 16/00753/FUL – In July 2017, planning permission was granted for the demolition of the existing buildings and the erection of a new Class A1 retail store with associated access, parking, and landscaping.
- Ref: 20/01306/FUL – In April 2021, temporary planning permission was granted for the variation of condition 24 of Planning permission 16/00753/FUL to allow for an earlier start for the loading and unloading of service and delivery vehicles from 06.00hrs to 21.00hrs Monday to Saturday and 07.00 hrs to 18.00 hrs on Sundays and Bank Holidays. The condition currently allows for the loading and unloading of service and delivery vehicles from 07.00hrs to 21.00hrs Monday to Saturday and 09.00 hrs to 18.00 hrs on Sundays and Bank Holidays.

Application Proposals

Planning permission ref. 20/01306/FUL includes a delivery hours restriction. Condition 24 of planning permission 20/01306/FUL reads:

> *"For a period not exceeding 6 months from the date of this permission the loading and unloading of service and delivery vehicles together with their arrival and departure from the site shall not take place outside the following times: Monday to Saturday 06.00hrs-21.00hrs, Sunday and Bank Holidays 07.00hrs- 18.00hrs. After the expiry of the 6 month period the loading and unloading of service and delivery vehicles together with their arrival and departure from the site shall not take place outside the following times: Monday to Saturday 07.00hrs-21.00hrs, Sunday and Bank Holidays 09.00hrs-18.00hrs.*
>
> *Reason*
> *To protect the amenity of local residents."*

This application seeks make the permanent the temporary delivery hours that were approved via planning permission 20/01306/FUL. In response to demand for greater operational flexibility in the delivery hours at the store to meet the needs expectations of customers, to provide a safe environment to customers, and to allow deliveries at quieter times to avoid congestion this application seeks permission for the following proposal:

- To vary Condition 2 of planning permission 20/01306/FUL to allow the store to receive deliveries from 06.00hrs-21.00hrs on Monday to Saturday, and 07.00hrs- 18.00hrs on Sundays and Bank Holidays, on a permanent basis.

I, therefore, propose that the wording of Condition 2 of planning permission 20/01306/FUL is amended as follows:

> *"The loading and unloading of service and delivery vehicles together with their arrival and departure from the site shall not take place outside the following times: Monday to Saturday 06.00hrs-21.00hrs, Sunday and Bank Holidays 07.00hrs- 18.00hrs.*
>
> *Reason*
> *To protect the amenity of local residents."*

Relevant Planning Policy

The National Planning Policy Framework (NPPF), July 2021, sets out the Government's planning policies for England. In respect of noise, Paragraph 185 of the NPPF states the following:

"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;*
>
> *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."*

Policy SD14 (Health and Environmental Quality) of the Gloucester, Cheltenham, and Tewkesbury Joint Core Strategy 2011-2031 (2017) sates that High-quality development should protect and seek to improve environmental quality. Development should not create or exacerbate conditions that could impact on human health or cause health inequality.

New development must:

- Cause no unacceptable harm to local amenity including the amenity of neighbouring occupants
- Result in no unacceptable levels of air, noise, water, light or soil pollution or odour, either alone or cumulatively, with respect to relevant national and EU limit values
- Result in no exposure to unacceptable risk from existing or potential sources of pollution. For example, by avoiding placing sensitive uses in locations where national or EU limit values are exceeded, or by incorporating acceptable mitigation measures into development
- Incorporate, as appropriate, the investigation and remediation of any land contamination within the site
- Ensure that any risks associated with land instability are satisfactorily resolved
- Take into account the quality and versatility of any agricultural land affected by proposals, recognising that the best agricultural land is a finite resource
- Have regard to any areas of tranquillity that are identified in adopted or emerging district plans and neighbourhood plans
- Avoid any adverse impact from artificial light on intrinsically dark landscapes.

Aldi Delivery Patterns

Aldi stores receive only one or two deliveries a day from its HGVs, with additional smaller vehicles being used to bring in locally sourced goods, such as dairy produce. The extended hours will not result in additional deliveries, only the flexibility to deliver at different times. It is important for Aldi that deliveries are able to arrive in time for the fresh produce to be on the shelves before the store opens, and while the store and roads are at their quietest (i.e., before and after the store is open). This has benefits for customers and the local road network, particularly while social distancing measures are in place.

All deliveries to the store are carried out by vehicles controlled by the Aldi logistics team, with the exception of milk deliveries, which are carried out by a contractor.

Aldi's store model adopts a number of techniques to ensure noise can be effectively mitigated during times of delivery. When HGVs arrive at the store, the rear of the lorry docks onto the side of the building to create a seal, meaning no noise should escape from the vehicle or building. Once the lorry is docked, all elements of the delivery take place internally, with no noisy cages being pushed around outside of the building or the car park.

In addition, delivery unloading on average take only 45-60 minutes and refuse collections take around 15 minutes. Vehicles seek to travel directly from the main road to the service yard, and no vehicles should wait within close proximity to the site if they arrive outside of the delivery hour restrictions, although this issue should not occur if this proposal is permitted.

Further specific measures to ensure that the above stated Aldi store deliveries will be carried out in a quiet manner, and do not result in any detriment to public amenity, with particular regard to neighbouring properties, are in place. These include drivers arriving on site without excessive engine breaking noise, with the throttle and break only being used when necessary.

Aldi also utilise the latest delivery vehicles that minimise engine noise and gear change noise when vehicles are in use, and Aldi vehicles are not fitted with a tail lift, therefore no goods can be moved outside of the noise containing dock system. When

departing drivers will avoid over revving and seek to accelerate gently until the vehicle is a reasonable distance from the store, minimising excessive air brake noise.

Context

The Aldi store was granted planning permission in 2017, and is currently open and trading well. In a competitive marketplace, Aldi must have the flexibility to meet consumer demand and adapt to provide a safe environment. Given the change in the pattern of retailing over time and the desire for customers to purchase fresh produce with maximum product life, this requires a flexible system of stock management and distribution.

The sheer volume of stock that the store handles means that Aldi needs to be as efficient and safe as possible at restocking when the store is at its quietest. This is to enable the store to provide the best service and safest shopping environment to its customers. Aldi also prefer to deliver earlier in the morning and later in the evenings when the store and roads are at their quietest, which reduces any potential impact, and avoids any unnecessary delays. It is worth noting that this proposal would not result in an increase in the number of deliveries to the store, instead existing deliveries would be spread out over a longer period.

From experience with delivery times and operational needs with other Aldi stores across the country, it is apparent that this store does not have the level of flexibility for the successful operation of the store to meet customers demand, and therefore extended deliveries are required.

Furthermore at the beginning of the pandemic, at a time of national food shortages in shops, the Government issued a statement advising of the need to increase deliveries to stores to support the response to Covid-19. The Government temporarily lifted all delivery hour curfews imposed on foodstore operators during the Covid 19 pandemic through directed non-enforcement of planning conditions[1]. This advice has now been extended until 31 January 2022 at the earliest [2]. This change resulted in deliveries being received at times that would not normally be permitted. Consequently, this situation has enabled the impact of noise from 'out of hours' delivery activity to be directly assessed.

We are not aware of any noise complaints relating to early morning deliveries during this period. Additionally, Aldi are not aware of any noise complaints having been received by them or the Environmental Health department at Gloucester City Council in relation to Aldi delivery activity.

Impact on Residential Amenity

Condition 2 of Planning Permission ref. 20/01306/FUL allowed deliveries from 06.00hrs-21.00hrs on Monday to Saturday, and 07.00hrs- 18.00hrs on Sundays and Bank Holidays for a temporary period of 6 months.

This application proposal raises one principle issue, that is, the effect that the proposed permanent extension to delivery hours through the variation of Condition 2 will have on the amenity of nearby residential properties, and whether any effect would be that adverse so as to outweigh the benefit of the proposal.

In order to assess the impact of the proposals on nearby residents, an up-to-date noise impact assessment has been undertaken by Sharps Redmore Acoustic Consultants, which details the results of a noise survey undertaken at the store. The loading bay at Aldi Gloucester is located on the western side of the store. This assessment considers delivery activity noise to the closest residential properties to the west in Insley Gardens. The Aldi loading bay is well screened to the properties in Insley Gardens by a 4 metre high acoustic grade fence which runs parallel to the edge of the loading bay.

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1 Written ministerial statement -13th March 2020 -Statement made by Robert Jenrick, Secretary of State for Housing, Communities and Local Government , Conservative, Newark, Commons

2 Update on Delivery of Food and Essential Goods by Robert Jenrick on 15th July 2021 , Secretary of State for Housing, Communities and Local Government , Conservative, Newark, Commons

In addition to unattended noise measurements, attended noise measurements were also undertaken to measure source noise levels from delivery unloading activity back in 2020 and again in 2021. The delivery was made by standard Aldi type delivery vehicle and palleted goods were off loaded using a pallet truck via the dock leveller system at the store. The unloading activity was observed to take approximately 60 minutes in total.

It should be noted that the report has been prepared during the Covid-19 pandemic, and therefore at a time when the Aldi store has been delivering outside of the permitted delivery hours in accordance with the Government's temporary relaxation of delivery restrictions. We are not aware of any noise complaints relating to early morning deliveries during this period.

A summary of the noise assessment findings is set out below:

- Sharps Redmore (SR) has undertaken an updated environmental noise assessment to consider whether deliveries could be made to the Aldi store at Hucclecote Road, Gloucester between 0600 and 2300 hours Monday to Saturday and 0700 to 2100 hours on Sundays/bank holidays without associated noise giving rise to significant adverse impact.
- The assessment (and the previous December 2020 assessment) has objectively demonstrated in the context of nationally recognised standards and planning guidance that predicted noise levels from delivery activity would not give rise to significant adverse impact and hence would comply with the requirements of the NPPF during the additional delivery periods sought.

On the above basis, it is therefore considered that noise relating to the extended delivery hours will not present a material constraint to the granting of planning permission to permit extended delivery hours at the existing Aldi store at Hucclecote Road, Gloucester.

In Conclusion:

i. The Aldi store provides for the needs of local residents and the surrounding area.

ii. Aldi are not aware of any complaints received in relation to delivery noise during the implementation of the temporary delivery hours.

iii. Permitting Aldi to have permanent extended delivery hours will bring further benefits to customers, by allowing a greater operational flexibility for receiving deliveries and thus restocking shelves.

iv. The extended permanent delivery hours will not have a significant adverse impact in terms of noise and will not impact on existing nearby residents of the store.

I trust that the application is in order and that it can be processed accordingly. Please do not hesitate to contact me should you wish to discuss the above or require any additional information.

Yours faithfully,

[redacted]

Lloyd Collins

Planner

Planning Potential

Bristol

Enc.

Development Control
PO Box 3252
Gloucester, GL1 9FW
Tel: [redacted]
Email: [redacted]
Website: www.gloucester.gov.uk/planning

APPLICATION NO: 20/01306/FUL
VALIDATED ON: 24th December 2020

TO
Aldi Stores Limited
c/o Mr Lloyd Collins
Planning Potential Ltd.
13-14
Orchard Street
BRISTOL
BS1 5EH

TOWN AND COUNTRY PLANNING ACT 1990
TOWN AND COUNTRY PLANNING (DEVELOPMENT MANAGEMENT PROCEDURE) (ENGLAND) ORDER 2015

Location: 7 Hucclecote Road (Aldi) Gloucester GL3 3TQ

Proposal: Variation of condition 24 of Planning permission 16/00753/FUL to allow for an earlier start for the loading and unloading of service and delivery vehicles from 06.00hrs to 21.00hrs Monday to Saturday and 07.00 hrs to 18.00 hrs on Sundays and Bank Holidays. The condition currently allows for the loading and unloading of service and delivery vehicles from 07.00hrs to 21.00hrs Monday to Saturday and 09.00 hrs to 18.00 hrs on Sundays and Bank Holidays

In exercise of its powers under the above-mentioned Act and Order the City Council as the Local Planning Authority **GRANT PERMISSION** for the development described above in accordance with the terms of the application and the plan/s submitted therewith subject to the following conditions:

Condition 1
The development hereby permitted shall be carried out in accordance with the approved drawings comprising:

- 7903-PL01- Site Location Plan received on 16th June 2016
- 7903-PL05 E - Proposed Floor Plan received on 21st November 2017
- 7903-PL04 rev P - Proposed Elevations received on 21st November 2017
- 7903 -PL03L - Proposed Site Plan received on 21st November 2017
- 7903-PL06D - Proposed Roof Plan received on 21st November 2017

except where otherwise required by conditions of this permission.

Reason
To ensure that the development is carried out in accordance with the approved plans.

Condition 2
For a period not exceeding 6 months from the date of this permission the loading and unloading of service and delivery vehicles together with their arrival and departure from the site shall not take place outside the following times: Monday to Saturday 06.00hrs-21.00hrs, Sunday and Bank Holidays 07.00hrs- 18.00hrs. After the expiry of the 6 month period the loading and unloading of service and delivery vehicles together with their arrival and departure from the site shall not take place outside the following times: Monday to Saturday 07.00hrs-21.00hrs, Sunday and Bank Holidays 09.00hrs-18.00hrs.

Reason
To protect the amenity of local residents.

Condition 3
All delivery vehicle refrigeration units shall be switched off prior to entering the site and the recommended delivery activity noise reduction measures set out in Section 5.1 of the Submitted Environmental Noise Assessment, Prepared by Sharps Redmore (Project No. 2020030, dated 11th December 2020) shall be adhered to in all respects together with the use of soft compound wheels on pallet trucks used at the store.

Reason
To ensure that appropriate measures are in place prior to the commencement of development to minimise noise to protect the amenity of the occupiers of neighbouring residential properties.

Condition 4
The approved Sustainable Urban Drainage Systems (SUDS) Management and Maintenance Plan, shall be implemented in full in accordance with the agreed terms and conditions.

Reason
To ensure the continued operation and maintenance of drainage features serving the site and avoid flooding. It is important that these details are agreed prior to the commencement of development as any works on site could have implications for drainage in the locality.

Condition 5
The approved drainage scheme as shown on the approved Drainage Layout (drawing no. 10347-0050c), Foul Water Drainage Strategy and Calculations and Stormwater Drainage Calculations prepared by Cradddy Drainage Engineers (received by the Local Planning Authority on 18th October 2017) shall be maintained for the lifetime of the development.

Reason
To ensure that the development is provided with a satisfactory means of drainage and avoid flooding.

Condition 6
C. Implementation of Approved Remediation Scheme
The approved remediation scheme must be carried out in accordance with its terms unless otherwise agreed in writing by the Local Planning Authority.

Following completion of measures identified in the approved remediation scheme, a verification report (referred to elsewhere as a validation report) that demonstrates the effectiveness of the remediation carried out must be produced and is subject to the approval in writing of the Local Planning Authority.

D. Reporting of Unexpected Contamination
In the event that contamination is found at any time when carrying out the approved development that was not previously identified it must be reported in writing immediately to the Local Planning Authority. An investigation and risk assessment must be undertaken in accordance with the requirements of part A, and where remediation is necessary a remediation scheme must be prepared in accordance with the requirements of part B, which is subject to the approval in writing of the Local Planning Authority.

Following completion of measures identified in the approved remediation scheme a verification report must be prepared, which is subject to the approval in writing of the Local Planning Authority in accordance with part C.

E. Long Term Monitoring and Maintenance
A monitoring and maintenance scheme to include monitoring the long-term effectiveness of the proposed remediation, and the provision of reports on the same must be prepared, both of which are subject to the approval in writing of the Local Planning Authority.

Following completion of the measures identified in that scheme and when the remediation objectives have been achieved, reports that demonstrate the effectiveness of the monitoring and maintenance carried out must be produced, and submitted to the Local Planning Authority.

This must be conducted in accordance with DEFRA and the Environment Agency's 'Model Procedures for the Management of Land Contamination, CLR 11'.

Reason
To ensure that appropriate measures are in place prior to the commencement of any works to ensure that risks from land contamination to the future users of the land and neighbouring land are minimised, together with those to controlled waters, property and ecological systems, and to ensure that the development can be carried out safely without unacceptable risks to workers, neighbours and other offsite receptors.

Condition 7
The approved boundary treatment and acoustic fencing shall be maintained in accordance with the details indicated on drawing no. 7903-PL10b and received by the Local Planning Authority on 17th October 2018.

Reason
It is important that these boundary treatments are maintained to ensure that adequate protection is provided to neighbouring properties in the interests of residential amenity and to ensure dwellings have satisfactory protection and privacy.

Condition 8
The approved lighting scheme as indicated on drawing no. MJA-P105-4611-A shall be maintained for the duration of the use of the site unless otherwise agreed in writing by the Local Planning Authority. The approved lighting scheme shall remain extinguished between the hours of 23:00 and 07:00 Mondays to Saturdays and 18:00 and 09:00 on Sundays and Bank Holidays.

Reason
In the interests of crime prevention and to protect the amenities of the occupiers of neighbouring properties.

Condition 9
The approved scheme for the provision of refuse recycling and storage outlined on the submitted document "Aldi UK Waste Policy" and drawing no. AD5906 received by the Local Planning Authority on 25th July 2018 shall be maintained for the life of the development.

Reason
In the interests of amenity.

Condition 10
The approved Travel Plan (Amended Staff Travel Plan Rev A prepared by Entran Limited, received by the Local Planning Authority on 28th September 2017), shall be implemented in accordance with the details and timetable therein, and shall be continued thereafter, unless otherwise agreed in writing by the Local Planning Authority.

Reason
To ensure that the opportunities for sustainable transport modes are taken up in accordance with the National Planning Policy Framework.

Condition 11
The vehicular parking and turning and loading/unloading facilities indicated on the submitted plan 7903-PL03 Rev J, shall be maintained available for those purposes thereafter for the lifetime of the development.

Reason
To ensure that a safe, suitable and secure means of access for all people that minimises the conflict between traffic and cyclists and pedestrians is provided in accordance with Section 4 of the National Planning Policy Framework.

Condition 12
The cycle storage facilities identified on submitted plan drawing 7903-PL03 Revision J (for a minimum of 12 cycles) shall be maintained for the duration of the development.

Reason
To ensure that adequate cycle parking is provided, to promote cycle use and to ensure that the opportunities for sustainable transport modes have been taken up in accordance with paragraph 32 of the National Planning Policy Framework.

Condition 13
The landscaping scheme, as shown on the approved plan 1208-01 Rev. F shall be maintained for a period of 5 years. During this time any trees, shrubs or other plants which are removed, die, or are seriously retarded shall be replaced during the next planting season with others of similar size and species unless the local planning authority gives written consent to any variation. If any plants fail more than once they shall continue to be replaced on an annual basis until the end of the 5 year maintenance period.

Reason
To ensure a satisfactory and well planned development and to preserve and enhance the quality of the environment.

Condition 14
The store shall only open to the public between the hours of 08.00 hrs and 22.00 hrs Monday to Saturday and 10.00 hrs to 17.00 hrs on Sunday and Bank Holidays.

Reason
In the interest of the amenities of the occupiers of neighbouring residential properties.

Condition 15
The rating level of noise emitted from all fixed plant and machinery shall not exceed the background noise level when measured or calculated at 1 metre from the façade of the nearest noise sensitive property. The measurements and assessment shall be made according to BS 4142:2014.

Reason
To safeguard the amenity of the area.

Condition 16
The reversing alarms for all plant and vehicles servicing the site must be switched off when operating on the site.

Reason
In order to protect the amenity of the occupiers of neighbouring properties.

Condition 17
The gross external floorspace of the approved building shall not exceed 1,800 square metres and the net sales floorspace as defined by the National Retail Planning Forum* shall not exceed 1,254 square metres. No less than 80% of the net sales floorspace shall be used for convenience goods sales.

Reason
To define the terms of this permission and in order to protect the vitality and viability of existing centres and to ensure the store retains its status as a 'limited product line deep discount retail food-store'.

*The area within the walls of the shop or store to which the public has access or from which sales are made, including display areas, fitting rooms, checkouts, the area in front of checkouts, serving counters and the area behind used by serving staff, areas occupied by retail concessionaires, customer services areas, and internal lobbies in which goods are displayed; but not including cafes and customer toilets

Condition 18
The development hereby approved shall only be used as a Class A1 retail foodstore. This shall be restricted to 'limited product line deep discount retailing' and shall be used for no other purpose falling within Class A1 of the Town and Country Planning (Use Classes) Order 1987. 'Limited product line deep discount retailing' shall be taken to mean the sale of no more than 2,000 individual product lines. No increase in the number of product lines shall be permitted without the prior written approval of the Local Planning Authority.

Reason
To define the terms of this permission and in order to protect the vitality and viability of existing centres and to ensure the store retains its status as a deep discount retail food-store.

Notes

In accordance with the requirements of the NPPF the Local Planning Authority has worked with the applicant in a positive and proactive manner in seeking solutions to secure sustainable development which will improve the economic, social and environmental wellbeing of the area.

Date: 7th April 2021

[redacted]

Head of Place

PLEASE SEE NOTES SET OUT IN THE ENCLOSED LEAFLET

SHARPS REDMORE

ACOUSTIC CONSULTANTS • Established 1990

Report

Aldi, Hucclecote Road, Gloucester

Environmental noise assessment of a proposal to extend store delivery hours

Prepared by
K J Metcalfe BSc (Hons). MIOA

Date 17th December 2021
Project No 2020030/R02

Head Office
Sharps Redmore
The White House, London Road,
Copdock, Ipswich, IP8 3JH
[redacted]
W sharpsredmore.co.uk

Regional Locations
South England (Head Office),
South West England,
North England, Wales, Scotland

Contents

Appendices

1.0 Introduction

1.1 Deliveries to the Aldi store at Hucclecote Road, Gloucester are controlled by planning permission 20/01306/FUL, planning condition 2.

1.2 Planning condition 2 of consent 20/01306/FUL states:

"Condition 2

For a period not exceeding 6 months from the date of this permission the loading and unloading of service and delivery vehicles together with their arrival and departure from the site shall not take place outside the following times: Monday to Saturday 06.00hrs-21.00hrs, Sunday and Bank Holidays 07.00hrs- 18.00hrs. After the expiry of the 6 month period the loading and unloading of service and delivery vehicles together with their arrival and departure from the site shall not take place outside the following times: Monday to Saturday 07.00hrs-21.00hrs, Sunday and Bank Holidays 09.00hrs-18.00hrs.

Reason

To protect the amenity of local residents.

1.3 Following the completion of the 6-month trial period, Aldi has instructed SR to undertake a noise assessment to determine whether the permitted delivery times to the Aldi store at Hucclecote Road, Gloucester could be extended on a permanent basis without associated noise giving rise to significant adverse impact. Deliveries within the extended hours period would not be additional deliveries to the store rather existing deliveries spread out over a longer period.

1.4 SR prepared a noise assessment report (reference 2020030, dated 11th December 2020, reproduced at Appendix B) that accompanied the planning application that resulted in the temporary 6-month permission for deliveries to be made from 0600 hours. This report provides an update to the December 2020 noise assessment. In addition to the original noise assessment report a technical note was prepared (reference 2020030, dated 8th March 2021) to respond to consultation comments from the EHO, and to provide additional information relating to peak noise levels from delivery activity. This technical note is also included at Appendix B to this report.

1.5 The loading bay at Aldi Gloucester is located on the western side of the store. This assessment considers delivery activity noise to the closest residential properties to the west in Insley Gardens. The Aldi loading bay is well screened to the properties in Insley Gardens by a 4 metre high acoustic grade fence which runs parallel to the edge of the loading bay. A site location plan is presented at Appendix A.

1.6 The Government's temporary lifting of all delivery hour curfews imposed on foodstore operators during the Covid 19 pandemic through directed non-enforcement of planning conditions continues. This continued change, has

resulted in deliveries being received at times that would not normally be permitted. Consequently, this situation has enabled the impact of noise from 'out of hours' delivery activity to be directly determined.

1.7 Appropriate assessment methodology and criteria are detailed in Section 2 of this report, whilst details of a noise survey undertaken at the site are displayed in Section 3.

1.8 An assessment of noise from deliveries is presented in section 4; delivery activity noise reduction measures are discussed in section 5.

1.9 The assessment conclusions are presented in section 6, and a guide to the acoustic terminology used in this report is shown in Appendix E.

2.0 Assessment methodology and criteria

2.1 The National Planning Policy Framework (NPPF), July 2021, sets out the Government's planning policies for England and "these policies articulate the Government's vision of sustainable development." In respect of noise, Paragraph 185 of the NPPF states the following:

"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;

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".

2.2 Guidance on the interpretation of the policy aims contained within the NPPF is contained within National Planning Policy Guidance (NPPG). The NPPG introduces the concept of a noise exposure hierarchy based on likely average response. The guidance contained in the NPPG is summarised in the table below:

TABLE 1: Noise Exposure Hierarchy

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not noticeable	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, 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 small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate ad reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, 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 character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

2.3 The NPPF and NPPG reinforce the March 2010 DEFRA publication, "Noise Policy Statement for England" (NPSE), which states three policy aims, as follows:

"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."*

2.4 Together, the first two aims require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:

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

2.5 Taking an overview of national policy aims and guidance it is clear that when considering the impact of noise that the fact can be heard and causes impact, is not reason to refusal an application as consideration should also be given to the significance of the impact and the mitigation measures available.

2.6 It is possible to apply objective standards to the assessment of noise and the effect produced by the introduction of a certain noise source may be determined by several methods, as follows:

i) The effect may be determined by reference to guideline noise values, such as those contained in the World Health Organisation (WHO) "*Guidelines for Community Noise"*.

ii) Alternatively, the impact may be determined by considering the change in noise level that would result from the proposal, in an appropriate noise index for the characteristic of the noise in question. There are various criteria linking change in noise level to effect. This is the method that is suited to, for example, the assessment of noise from road traffic because it is capable of displaying impact to all properties adjacent to a road link irrespective of their distance from the road.

iii) Another method is described within BS 4142:2014 to determine the significance of sound impact from sources of industrial and/or commercial nature. The sources that the newly revised standard is intended to assess are sound from industrial and manufacturing processes, sound from fixed plant installations, sound from loading and unloading of goods at industrial

and/or commercial premises and the sound from mobile plant and vehicles, such as forklift, train or ship movements.

Guidelines for Community Noise

2.7 This assessment is to consider noise from deliveries within extended periods that fall in both the daytime and night time. For deliveries that may occur during the night time periods the WHO Guidelines for Community Noise offer the most relevant assessment criteria. This is because for noise that occurs at night it is the absolute level of noise that is the critical factor in relation to recognised sleep disturbance criteria. During the night time period generally people are inside their properties. Therefore, the outcome of a BS 4142 assessment (discussed later in this section), which assesses the difference between the external background noise level at the receptor and the external rating level of the specific noise source under consideration, does not reflect the true nature of the noise impact at the receptors. This is confirmed in the scope of BS4142:2014+A1:2019, which states *"the methodology set out in Clauses 7, 8, and 9 of this standard is not intended to be used to assess the extent of the impact at indoor locations".*

2.8 The WHO "Community Noise Guidelines" (CNG) values are appropriate to what are termed "critical health effects". This means that the limits are at the lowest noise level that would result in any psychological or physiological effect. They are, as defined by NPSE, set at the Lowest Observed Adverse Effect Level (LOAEL), but do not define the level above which effects are significant (the SOAEL). Compliance with the LOAEL should, therefore, be seen as a robust aim.

2.9 In 2018 the WHO published the "Environmental Noise Guidelines for the European Region" (ENGER). The WHO Environmental Noise Guidelines (page 28) explain that *"The current environmental noise guidelines for the European Region supersede the CNG from 1999. Nevertheless, the GDG* (Guideline Development Group) *recommends that all CNG indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid"*. Hence the CNG remain relevant to this assessment.

2.10 The WHO ENGER brings together the latest research on the effects of specific types of noise on health in relation to transportation noise sources (road, rail and aircraft noise exposure), wind turbines and leisure noise. Hence in direct relation to the specific proposal that this noise assessment considers, the new WHO ENGER are not of material consideration.

2.11 The relevant World Health Organisation (CNG) noise values are summarised in the following table:

TABLE 2: WHO CNG values

Document	Level	Guidance
World Health Organisation "Community Noise 2000"	L_{AeqT} = 55 dB	Serious annoyance, daytime and evening. (Continuous noise, outdoor living areas)
	L_{AeqT} = 50 dB	Moderate annoyance, daytime and evening. (Continuous noise, outdoor living areas).
	L_{AeqT} = 35 dB	Moderate annoyance, daytime and evening. (Continuous noise, dwellings, indoors)
	L_{AeqT} = 30 dB	Sleep disturbance, night-time (indoors)
	L_{Amax} = 60 dB	Sleep disturbance, windows open at night. (Noise peaks outside bedrooms, external level).
	L_{Amax} = 45 dB	Sleep disturbance at night (Noise peaks inside bedrooms, internal level)

2.12 For L_{AeqT} criteria the time base (T) given in the documents is 16 hours for daytime limits and 8 hours for night time limits. When assessing impact, this has the tendency to smooth out the hourly variations in noise level. As such, our calculations are carried out to a 1 hour time base, which is a more stringent assessment than is given in WHO Guidelines for Community Noise.

2.13 The internal CNG values can be converted to an external value by the addition of the attenuation provided by a partially open window of 15 dB.

Changes in noise level

2.14 Changes in noise levels of less than 3 dBA are not perceptible under normal conditions and changes of 10 dBA are equivalent to a doubling of loudness. This guidance has been accepted by inspectors, at inquiry, to encompass changes in noise levels in the index L_{AeqT}.

2.15 Table 3 shows the response to changes in noise (known as a semantic scale); this table has been developed from general consensus opinion of acousticians.

TABLE 3: Change in noise level

Change in noise level L_{AeqT} dB	Response	Impact
<3	Imperceptible	None
3 – 5	Perceptible	Slight/moderate
6 – 10	Up to a doubling	Moderate/significant
11 – 15	More than a doubling	Substantial
>15	-	Severe

2.16 Where the existing ambient noise level is already above the criteria developed from the various guidance documents, it may be considered unreasonable to adopt such criteria. It would be reasonable, however, given the above statement, to consider criteria which do not exceed the existing noise climate, thus giving rise to an overall 3 dB increase i.e. the minimum perceptible. If it is less than the minimum perceptible it cannot be described as disturbing or to affect the amenity of residents.

Assessment using BS 4142:2014+A1:2019

2.17 As outlined, this British Standard enables the significance of sound impact to be determined in relation to industrial and commercial sources. The significance of sound impact is to be determined according to the following summary process:

i) Determine the background sound levels, in terms of the index L_{A90}, at the receptor locations of interest.

ii) Determine the specific sound level of the source being assessed, in terms of its L_{AeqT} level (T = 1 hour for day or 15 minutes for night), at the receptor location of interest.

iii) Apply a rating level acoustic feature correction if the source sound has tonal, impulsive, intermittent, or other characteristics which attract attention.

iv) Compare the rating sound level with the background sound level; the greater the difference between the two, the higher the likelihood of adverse impact.

v) A difference (rating – background) of around +10 dB is an indication of significant adverse impact, depending on the context; a difference of +5 dB is an indication of an adverse impact, depending on the context. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending upon context.

vi) The intent of the planning system is to ensure that a development does not result in "significant adverse impacts on health and quality of life." BS 4142:2014 considers that the threshold of significant adverse impact is "a difference around +10 dB or more … depending upon the context". However the NPPF and NPPG state that where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement *"…all reasonable steps should be taken to mitigate and minimise adverse effects in health and quality of life while together taking into account the guiding principles of sustainable development. This does not mean that adverse effects cannot occur but that effort should be focused on minimising such effects"*.

2.18 BS 4142:2014+A1:2019 introduces the concept of '*context*' to the process of identifying noise impact. Section 11 of BS 4142:2014 explains "*The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs* (our emphasis). A*n effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context"* (our emphasis).

2.19 There are many *context* points to consider when undertaking an assessment of sound impact including:

- The absolute level of sound;
- The character and level of the specific sound in the context of the existing noise climate; for example is the sound to occur in a location already characterised by similar activities as those proposed?
- The sensitivity of the receptors;
- The time and duration that the specific sound is to occur;
- The conclusions of assessments undertaken using alternative assessment methods, for example WHO guidelines noise values or change in noise level;

2.20 It is therefore entirely possible that whilst the numerical outcome of a BS 4142:2014+A1:2019 assessment is indicative of adverse or significant adverse impact, when the proposal is considered in *context* the significance of the impact is reduced to an acceptable level.

3.0 Noise survey details

3.1 Noise surveys have been undertaken at the site to obtain baseline measurements of the existing noise climate, and of noise from existing delivery activity at the store. The original noise surveys were undertaken in 2020, with an updated survey being carried out in November 2021.

November 2020 Baseline noise survey

3.2 A baseline noise survey was carried out between Friday 27th November and Monday 30th November 2020. A single measurement location was used, at the boundary with the loading bay on the western side of the store. This accessible location was chosen to representative of the general noise climate at the closest residential properties in Insley Gardens, and also to capture peak source noise levels from delivery unloading activity. The measured noise levels are important to establish a baseline against which an assessment in accordance with BS 4142:2014 can be carried out. The purpose of the survey was to establish the existing noise climate during the times that deliveries might be received at a position representative of the closest residential properties to the delivery area.

3.3 The baseline noise measurement location is indicated at Figure 1 below

FIGURE 1: Baseline noise measurement location

3.4 The weather conditions during the survey were generally dry but cloudy. Between Friday 27th November and Sunday 29th November 2020 winds were from the north east/east with temperatures between 4 and 9°C. The weather was similar

on Monday 30th but the winds were from the west. At all times winds were light (<5m/s). Weather conditions are therefore not considered to have materially affected the measured noise levels during the survey.

3.5 The baseline noise measurements were carried out using a Norsonic 118 sound level meter fitted with an environmental microphone kit. The sound level meter was calibrated at the start and end of the survey and no variation in levels were observed. The baseline noise measurements were taken over 15 minute sample periods (although the sound level meter was also set to 1 second resolution).

3.6 Measurements were taken in free field conditions with the microphone height of approximately 4.2 metres above local ground level, above the level of the acoustic grade fence adjacent to the loading bay.

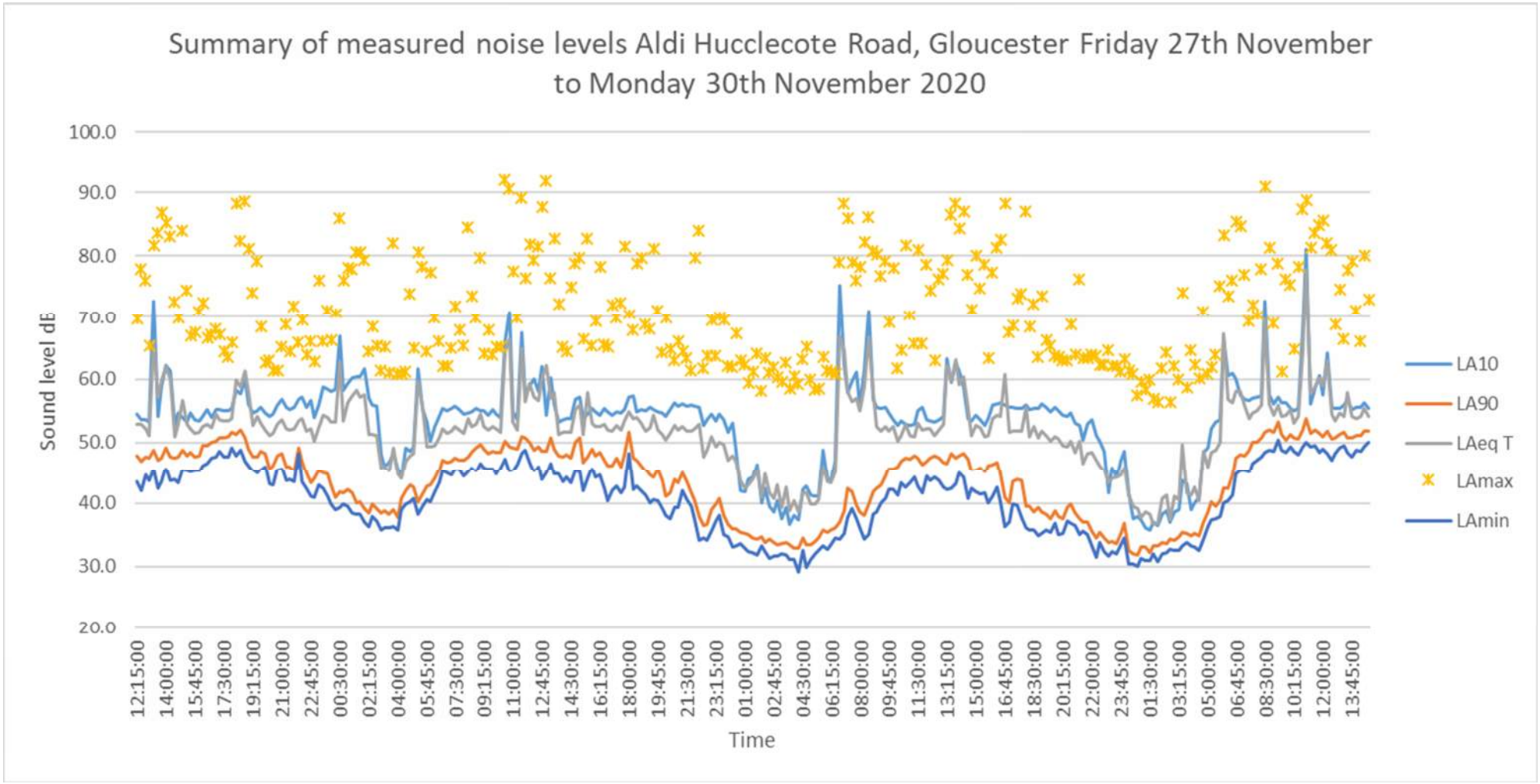
3.7 The measured baseline noise levels are summarised in Table 4 and Figure 2 below, and presented in full in Appendix C.

TABLE 4: Measured baseline noise levels: November 2020

Date	Time	Noise level dB		
		$L_{A90\ 1\ hour}$	$L_{A90\ 5\ mins}$ *	$L_{Aeq\ 1\ hour}$
27.11.20	12:00:00	47.6		52.8
	13:00:00	47.8		61.4
	14:00:00	48.0		58.6
	15:00:00	48.2		53.8
	16:00:00	49.3		52.4
	17:00:00	50.7		53.8
	18:00:00	51.5		59.3
	19:00:00	48.3		55.2
	20:00:00	47.1		51.9
	21:00:00	46.5		52.5
	22:00:00	46.1		53.0
	23:00:00		44.0	53.1
28.11.20	00:00:00		41.0	58.0
	01:00:00		40.1	57.4
	02:00:00		38.5	53.8
	03:00:00		38.2	47.0
	04:00:00		37.8	46.2
	05:00:00		40.3	55.7
	06:00:00		42.9	50.6
	07:00:00	47.2		52.0
	08:00:00	48.2		52.8
	09:00:00	48.9		53.1
	10:00:00	49.2		62.8
	11:00:00	49.9		59.9
	12:00:00	49.3		58.5
	13:00:00	49.1		58.7
	14:00:00	48.4		52.8
	15:00:00	48.6		55.3
	16:00:00	47.5		52.5
	17:00:00	47.1		52.5
	18:00:00	48.2		54.0
	19:00:00	44.9		52.8
	20:00:00	42.6		51.6
	21:00:00	43.3		52.1
	22:00:00	37.9		51.0
	23:00:00		38.1	50.1
29.11.20	00:00:00		35.5	46.8
	01:00:00		34.3	43.8

Date	Time	Noise level dB		
		$L_{A90\ 1\ hour}$	$L_{A90\ 5\ mins}$ *	$L_{Aeq\ 1\ hour}$
29.11.20	02:00:00		33.8	42.4
	03:00:00		33.4	41.3
	04:00:00		32.9	40.8
	05:00:00		33.5	42.4
	06:00:00		35.4	60.8
	07:00:00	40.7		60.4
	08:00:00	39.6		62.0
	09:00:00	43.9		52.2
	10:00:00	46.6		51.9
	11:00:00	47.4		51.9
	12:00:00	47.5		52.0
	13:00:00	47.3		60.9
	14:00:00	47.2		57.8
	15:00:00	45.8		51.9
	16:00:00	44.8		56.9
	17:00:00	42.7		51.8
	18:00:00	39.3		53.0
	19:00:00	38.3		51.1
	20:00:00	38.7		50.0
	21:00:00	37.6		48.6
	22:00:00	35.0		47.0
	23:00:00		33.7	44.0
30.11.20	00:00:00		31.8	42.4
	01:00:00		32.2	37.9
	02:00:00		33.2	39.5
	03:00:00		34.2	45.3
	04:00:00		34.8	44.6
	05:00:00		38.6	48.6
	06:00:00		42.3	62.4
	07:00:00	48.7		55.9
	08:00:00	51.2		64.1
	09:00:00	51.6		54.7
	10:00:00	51.2		59.4
	11:00:00	52.2		71.9
	12:00:00	51.1		59.2
	13:00:00	51.2		55.6
	14:00:00	51.5		54.4

FIGURE 2: Summary of measured noise levels: November 2020



3.8 In the absence of noise from delivery activity the noise climate was contributed to by road traffic sources, activity within the Aldi customer car park area and noise from Aldi plant equipment.

Delivery activity source noise levels: November 2020

3.9 As outlined at paragraph 3.5 above the sound level meter was set to measure at both 15 minute samples (to obtained the baseline noise climate) and also to 1 second resolution, in order to directly measure peak noise levels associated with unloading activity. Figure 3 below indicates the noise measurement location.

FIGURE 3: Baseline & delivery source noise measurement location: Nov 2020

3.10 The graph at Figure 2 indicates a number of deliveries were received during the noise survey. The highest peak noise levels measured during unloading activity were 92 dB L_{Amax} (at a distance of approximately 3 metres from the closest point of unloading activity). Analysis of the 1 second resolution noise level data indicates typical peak noise levels during unloading of 80 to 90 dB L_{Amax} (at 3 metres).

3.11 Although it is more difficult to precisely determine the unloading event $L_{Aeq\ T}$ of each delivery that occurred during the survey from Figure 2, it is estimated that delivery activity to this store was typically at a level of 60 dB $L_{Aeq\ 1\ hour}$ (at 10 metres). This level would compare well to SR database of Aldi delivery activity noise levels which are typically 58 to 60 dB $L_{Aeq\ 45\ to\ 60\ minutes}$ at 10 metres.

3.12 Further details of the measured peak noise levels from delivery activity at contained in Figure 1 to the technical note reproduced at Appendix B.

3.13 The deliveries to this store are made by standard Aldi type delivery vehicles (except for third party deliveries). Palleted goods are off loaded using a pallet truck via the dock leveller system at the store. The principle noise source was observed to be from pallets as they were moved within the wagon and over the levelling plates into the store warehouse.

3.14 The following table shows the source noise levels (normalised to 10 metres from the centre of activity) used in this assessment. The unloading component is from the measured source levels at this store, whilst the arrival and departure noise levels are taken from the SR database.

TABLE 5: Delivery activity source noise levels at Aldi Hucclecote Road, Gloucester

Measured delivery event source noise Level (at 10 metres)						
Arrival		Unloading		Departure		Peak noise
Duration (mins)	$L_{Aeq\,T}$ (dB)	Duration (mins)	$L_{Aeq\,T}$ (dB)	Duration (mins)	$L_{Aeq\,T}$ (dB)	L_{Amax} (dB)
2	67	57	60	1	66	73-74[1] / 82[2]

NOTES:
[1] Peak noise from delivery vehicle manoeuvring upon arrival and departure (Source: SR database);
[2] Measured peak noise level from unloading activity at Aldi Hucclecote Road.

Updated baseline and delivery activity noise survey November 2021

3.15 The updated noise survey was repeated at the same location as the November 2020 noise measurements, as shown at Figure 3 above.

3.16 The weather conditions during the survey were dry, overcast, winds were from the north east (<5m/s) with temperatures of 6°C. Weather conditions are therefore not considered to have materially affected the measured noise levels during the survey.

3.17 The delivery activity noise measurements were carried out using a Norsonic 118 sound level meter fitted with an environmental microphone kit. The sound level meter was calibrated at the start and end of the survey and no variation in levels were observed. The noise measurements were taken over 15 minute sample periods to establish the baseline noise climate and at 1 second resolution to measured delivery activity noise.

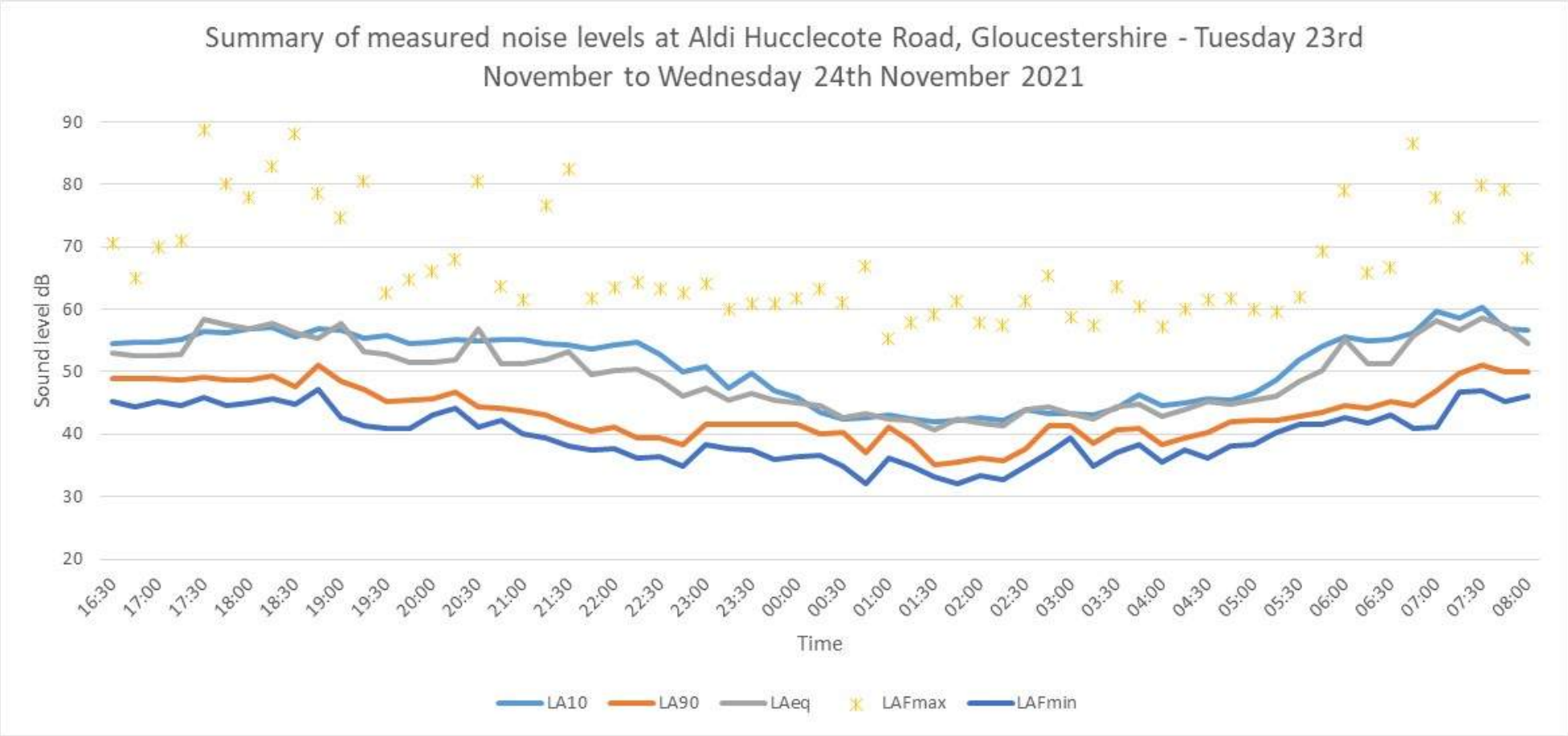
3.18 Measurements were taken in free field conditions with the microphone height of approximately 4.2 metres above local ground level, above the level of the acoustic grade fence adjacent to the loading bay.

3.19 The measured baseline noise levels from the 2021 baseline noise survey is summarised in Table 6 and Figure 4 below, and presented in full in Appendix C.

TABLE 6: Measured baseline noise levels: November 2021

Date	Time	Sound level dB		
		$L_{A90\ 1\ hour}$	$L_{A90\ 15\ minutes}$	$L_{Aeq\ 1\ hour}$
23.11.21	17:00	48.9		56.1
	18:00	49.1		56.6
	19:00	46.6		54.5
	20:00	45.2		53.6
	21:00	42.2		51.7
	22:00	39.6		49.2
	23:00		41.5	46.3
	00:00		37.0	44.0
	01:00		35.1	42.1
	02:00		35.8	43.1
24.11.21	03:00		38.5	43.8
	04:00		38.4	44.3
	05:00		42.2	48.0
	06:00		44.1	53.9
	07:00	49.5		57.8

FIGURE 4: Summary of measured noise levels: November 2021



3.20 The two sets of baseline noise data, from the November 2020 and November 2021 surveys, are comparable and indicate no material change in the existing noise climate in the absence of delivery activity.

3.21 The graphs below show the measured peak noise levels, at 1 second resolution, of delivery activity at approximately 3 metres from the source. Figure 5 is the peak noise level trace of a delivery event, as measured during the morning of Wednesday 24th November 2021.

3.22 The graph at Figure 6 is an overlaid direct comparison of delivery activity peak noise levels from the November 2020 and November 2021. The latest noise survey shows materially similar levels to those measured in 2020.

FIGURE 5: Peak noise delivery measurements: November 2021

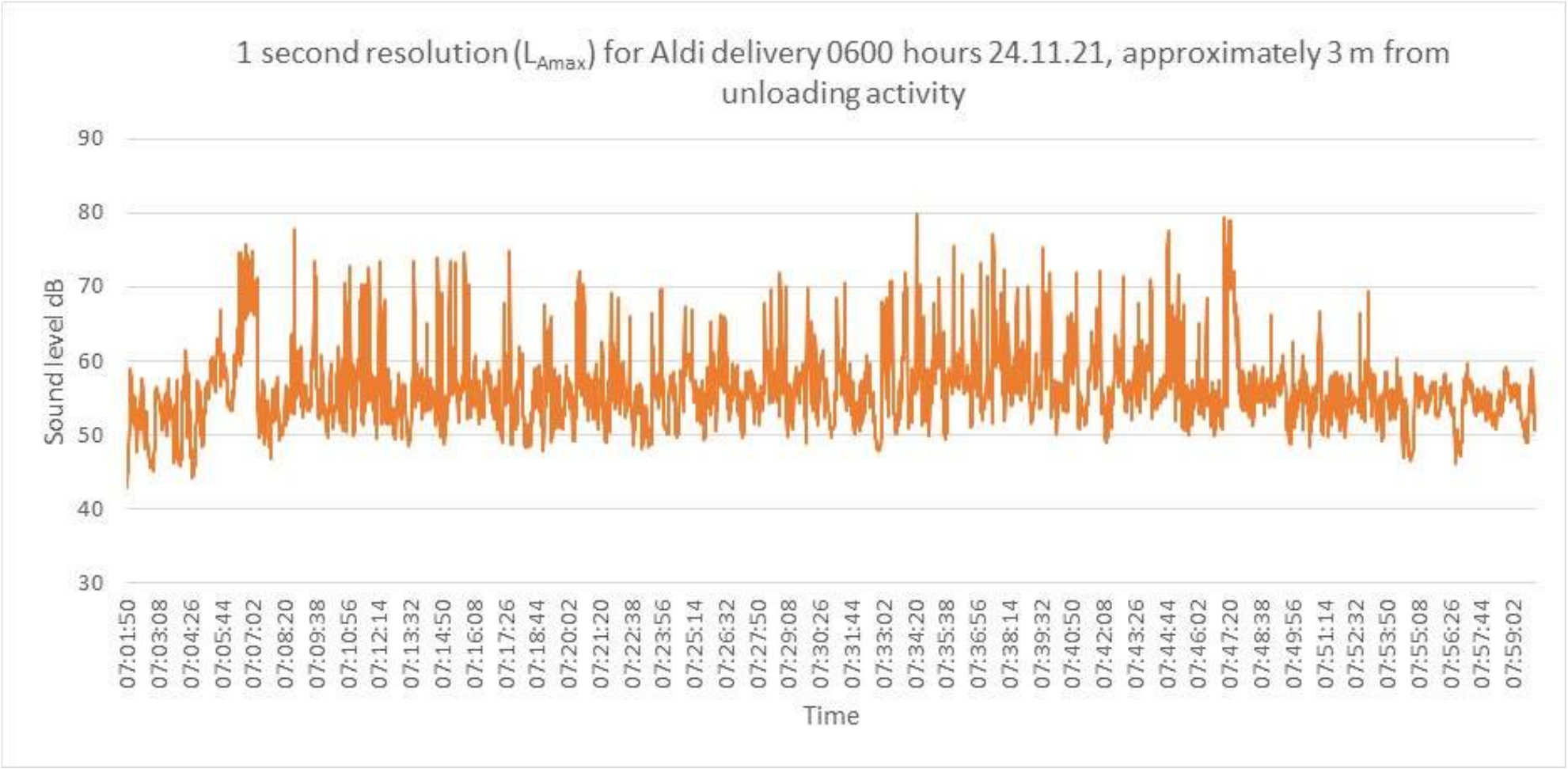
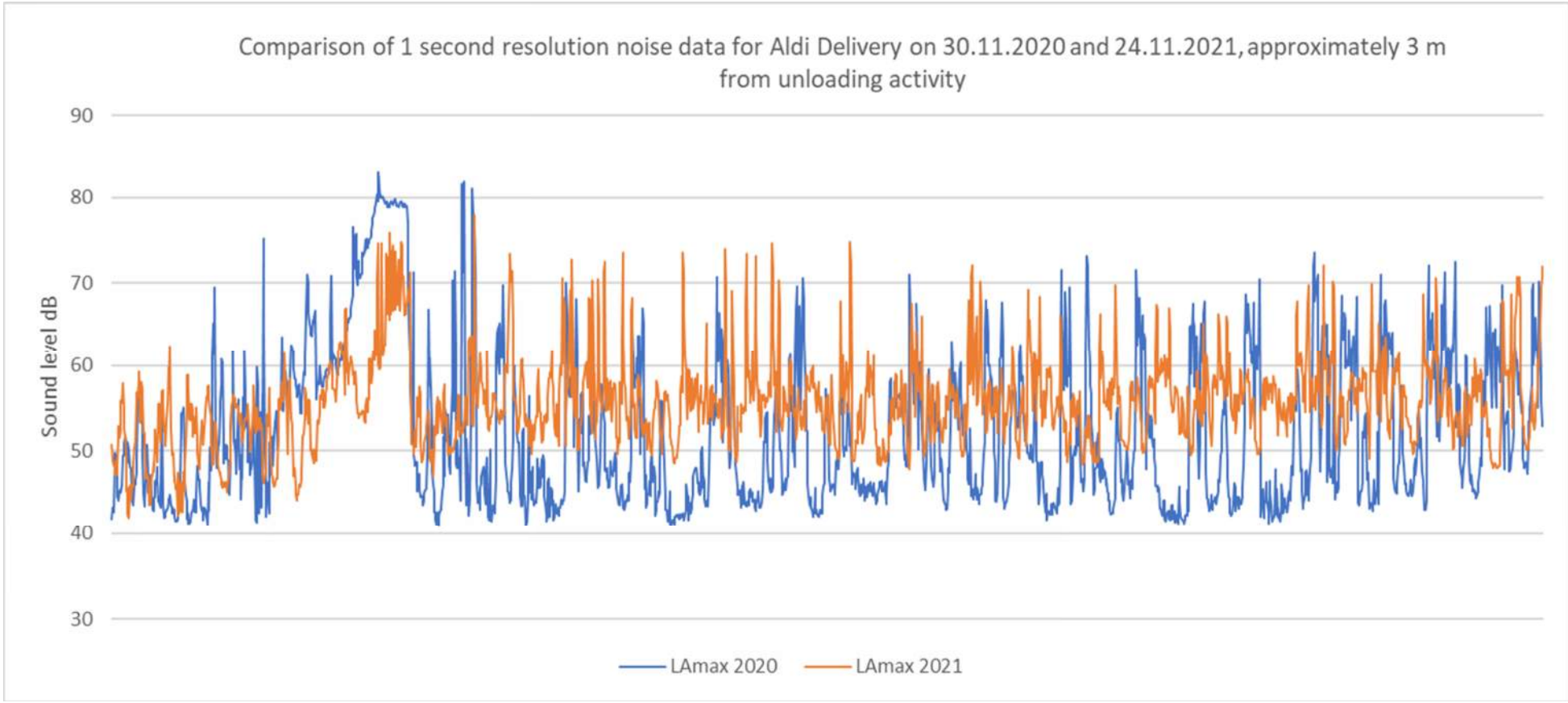


FIGURE 6: Comparison of peak noise delivery activity measurements: November 2020 and November 2021



4.0 Noise from delivery activity

4.1 The closest properties to the Aldi loading bay are in Insley Gardens to the west (as indicated at Appendix A).

4.2 The following delivery activity source noise levels are used in this assessment:

TABLE 7: Delivery activity – baseline source noise levels (free field)

Measured delivery event source noise Level (at 10 metres)						
Arrival		Unloading		Departure		Peak noise
Duration (mins)	$L_{Aeq\,T}$ (dB)	Duration (mins)	$L_{Aeq\,T}$ (dB)	Duration (mins)	$L_{Aeq\,T}$ (dB)	L_{Amax} (dB)
2	67	57	60	1	66	73-74[1] / 82[2]

4.3 Table 8 below shows the predicted ambient ($L_{Aeq\,T}$) delivery activity noise levels at the closest residential properties to the Aldi loading bay (full delivery event activity noise predictions are included at Appendix D1). The predicted delivery noise levels below include screening attenuation provided by the existing acoustic fence adjacent to the loading bay and boundary fencing (see screening calculations at Appendix D2).

TABLE 8: Predicted delivery activity noise levels

Receptor	Predicted noise level dB $L_{Aeq\ 1\ hour}$
12 Insley Gardens	41

4.4 Notwithstanding the comments at paragraph 2.7, an assessment of delivery activity noise levels using the methodology in BS 4142:2014 is presented in Appendix D3.

4.5 The BS 4142 assessment indicates differences between the rating level and background sound level between 0600 and 0700 hours of +3 dB at Insley Gardens (this is indicative of low to adverse impact, depending upon context). This level difference compares to +5 dB (adverse impact) for the same time period in the December 2020 noise assessment. This being because the updated survey indicates the background noise climate in November 2020 was 2 dB higher than that in November 2020. The guidance in BS 4142:2014, Section 11, states:

"*a) Typically, the greater this difference, the greater the magnitude of the impact.*

b) *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*

c) *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*

d) *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context"*.

4.6 Section 11 of BS 4142:2014 explains "*The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs* (my emphasis). *An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context"* (my emphasis).

4.7 As outlined in paragraph 2.7, a key contextual noise consideration (particularly for deliveries that may occur at 0600 hours) is the comparison of the predicted delivery activity noise level with the WHO CNG values. The table below shows this comparison.

TABLE 9: Comparison of predicted delivery event noise levels with the WHO CNG values

Noise level	Parameter	
	$L_{Aeq\,T}$	L_{Amax}
Receptor	12 Insley Gardens	
Predicted delivery event noise level day/night [1]	41/44	58-59/60
WHO guideline daytime/night time noise value [2]	55/45	60
Comply with WHO day/night time guidelines	YES	YES

Notes

[1] Where $L_{Aeq\,T}$ = 1 hour daytime, 15 minutes night time

[2] Where $L_{Aeq\,T}$ = 16 hour daytime and 8 hour night time

4.8 The comparison in Table 9 indicates that delivery event noise levels comply with the WHO CNG daytime and night time values; and hence would be indicative of low impact.

4.9 Predicted delivery activity noise levels can also be compared to the existing ambient noise climate to consider the change in ambient noise level.

TABLE 10: Change in noise level

Receptor	Date	Time	Noise level $L_{Aeq\,T}$*				Noise impact
			Existing noise climate	Predicted delivery activity noise	Overall existing + predicted	Change in level	
12 Insley Gardens	23.11.21	17:00	48.9	41.0	49.6	0.7	Low
		18:00	49.1	41.0	49.7	0.6	Low
		19:00	46.6	41.0	47.7	1.1	Low
		20:00	45.2	41.0	46.6	1.4	Low
		21:00	42.2	41.0	44.7	2.5	Low
		22:00	39.6	41.0	43.4	3.8	Slight
	24.11.21	06:00	44.1	44.0	47.1	3.0	Slight
		07:00	49.5	41.0	50.1	0.6	Low

4.10 The impact classification in the context of change in ambient noise level for delivery activity occurring in the proposed extended periods is low/slight.

4.11 Overall this updated assessment, and the December 2020 assessment, objectively demonstrates that when considered in context, deliveries could be made between 0600 and 2300 hours Monday to Saturday and between 0700 and 2100 hours on Sundays and bank holidays without associated noise giving rise to significant adverse impact; which is the planning test in accordance with the NPPF.

5.0 Delivery activity noise reduction measures

5.1 It is recommended that the following noise minimisation measures shall be implemented at all times to reduce noise levels from service yard activity:

- There will be adequate signage and instruction to ensure that all drivers and staff follow the noise management measures;
- All engines to be switched off as soon as vehicles are parked at the unloading dock;
- Subject to a full health and safety risk assessment, tonal reversing alarm systems shall not be used before 0700 hours and after 2200 hours (2000 hours on Sundays);
- All delivery vehicles to be driven in as quiet a manner as possible, avoiding unnecessary engine revving;
- No radios or stereos to be left on in vehicles during deliveries or at other times;
- Staff to be instructed to work quietly when outside the store or in the service yard - only performing essential tasks where noise could be generated;
- All components of the delivery system to be maintained in good working order;

5.2 The above delivery activity noise reduction measures can be secured by imposition of a suitable planning condition.

6.0 Assessment conclusions

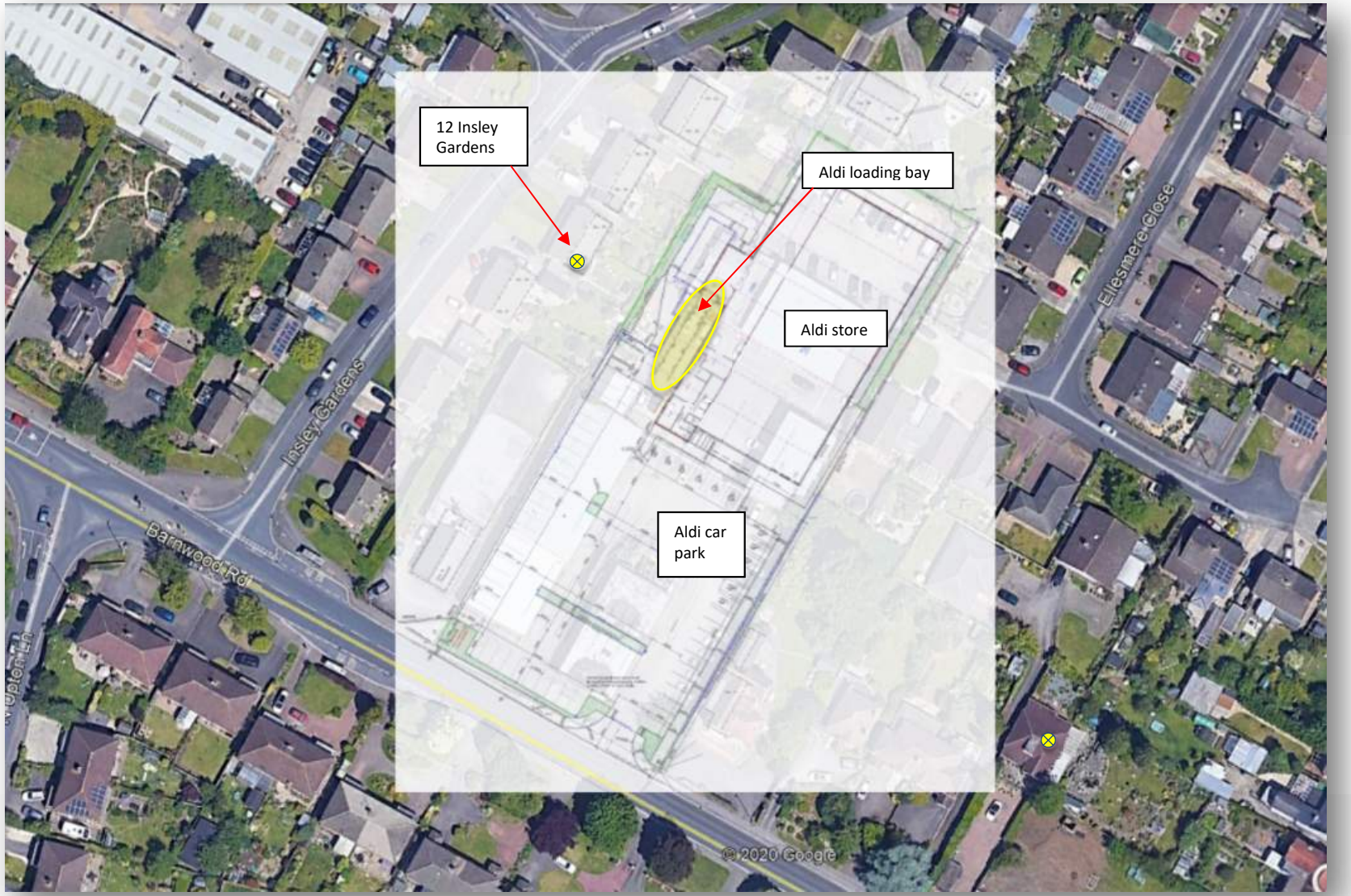
6.1 Sharps Redmore (SR) has undertaken an updated environmental noise assessment to consider whether deliveries could be made to the Aldi store at Hucclecote Road, Gloucester between 0600 and 2300 hours Monday to Saturday and 0700 to 2100 hours on Sundays/bank holidays without associated noise giving rise to significant adverse impact.

6.2 This assessment (and the previous December 2020 assessment) has objectively demonstrated in the context of nationally recognised standards and planning guidance that predicted noise levels from delivery activity would not give rise to significant adverse impact and hence would comply with the requirements of the NPPF during the additional delivery periods sought.

APPENDIX A

SITE LOCATION PLAN

Appendix A: Aldi Hucclecote Road, Gloucester, site location plan



APPENDIX B

SHARPS REDMORE NOISE ASSESSMENT REPORT (REFERENCE 2020030) DATED 11TH DECEMBER 2020 AND TECHNICAL NOTE, 2020303, DATED 8TH MARCH 2021

SHARPS REDMORE

ACOUSTIC CONSULTANTS • Established 1990

Report

Aldi, Hucclecote Road, Gloucester

Environmental Noise Assessment of a proposal to extend store delivery hours

Prepared by
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Date 11th December 2020
Project No 2020030

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Contents

Appendices

1.0 Introduction

1.1 Deliveries to the Aldi store at Hucclecote Road, Gloucester are controlled by planning permission 16/00753/FUL, planning condition 24.

1.2 Planning condition 24 of consent 16/00753/FUL states:

"Condition 24

The loading and unloading of service and delivery vehicles together with their arrival and departure from the site shall not take place outside the following times: Monday to Saturday 07.00hrs-21.00hrs, Sunday and Bank Holidays 09.00hrs-18.00hrs.

Reason

To safeguard the amenities of the locality in accordance with policy BE.21 of the Second Deposit City of Gloucester Local Plan (2002)".

1.3 Aldi has instructed SR to undertake a noise assessment to determine whether the permitted delivery times to the Aldi store at Hucclecote Road, Gloucester could be extended without associated noise giving rise to significant adverse impact. Deliveries within any extended hours period would not be additional deliveries to the store rather existing deliveries spread out over a longer period.

1.4 The loading bay at Aldi Gloucester is located on the western side of the store. This assessment considers delivery activity noise to the closest residential properties to the west in Insley Gardens. The Aldi loading bay is well screened to the properties in Insley Gardens by a 4 metre high acoustic grade fence which runs parallel to the edge of the loading bay. A site location plan is presented at Appendix A.

1.5 The Government has temporarily lifted all delivery hour curfews imposed on foodstore operators during the Covid 19 pandemic through directed non-enforcement of planning conditions. This change, has resulted in deliveries being received at times that would not normally be permitted. Consequently, this situation has enabled the impact of noise from 'out of hours' delivery activity to be directly determined.

1.6 Since the lifting of delivery curfews, Aldi has regularly been taking deliveries during the night time period. Most typically the store has received a delivery from 0500/0600 hours, however, on occasions deliveries to the store have been made at other times during the night. The times that deliveries have been received by the Hucclecote Road store since September 2020 are shown at Appendix B. It is understood that no noise complaints have been received by the Environmental Health department at Gloucester City Council in relation to Aldi delivery activity.

1.7 Appropriate assessment methodology and criteria are detailed in Section 2 of this report, whilst details of a noise survey undertaken at the site are displayed in Section 3.

1.8 An assessment of noise from deliveries is presented in section 4; delivery activity noise reduction measures are discussed in section 5.

1.9 The assessment conclusions are presented in section 6, and a guide to the acoustic terminology used in this report is shown in Appendix E.

2.0 Assessment methodology and criteria

2.1 The National Planning Policy Framework (NPPF), February 2019, sets out the Government's planning policies for England and "these policies articulate the Government's vision of sustainable development." In respect of noise, Paragraph 180 of the NPPF states the following:

"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;

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".

2.2 Guidance on the interpretation of the policy aims contained within the NPPF is contained within National Planning Policy Guidance (NPPG). The NPPG introduces the concept of a noise exposure hierarchy based on likely average response. The guidance contained in the NPPG is summarised in the table below:

TABLE 1: Noise Exposure Hierarchy

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not noticeable	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, 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 small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate ad reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, 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 character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

2.3 The NPPF and NPPG reinforce the March 2010 DEFRA publication, "Noise Policy Statement for England" (NPSE), which states three policy aims, as follows:

"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."*

2.4 Together, the first two aims require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:

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

2.5 Taking an overview of national policy aims and guidance it is clear that when considering the impact of noise that the fact can be heard and causes impact, is not reason to refusal an application as consideration should also be given to the significance of the impact and the mitigation measures available.

2.6 It is possible to apply objective standards to the assessment of noise and the effect produced by the introduction of a certain noise source may be determined by several methods, as follows:

i) The effect may be determined by reference to guideline noise values, such as those contained in the World Health Organisation (WHO) "*Guidelines for Community Noise"*.

ii) Alternatively, the impact may be determined by considering the change in noise level that would result from the proposal, in an appropriate noise index for the characteristic of the noise in question. There are various criteria linking change in noise level to effect. This is the method that is suited to, for example, the assessment of noise from road traffic because it is capable of displaying impact to all properties adjacent to a road link irrespective of their distance from the road.

iii) Another method is described within BS 4142:2014 to determine the significance of sound impact from sources of industrial and/or commercial nature. The sources that the newly revised standard is intended to assess are sound from industrial and manufacturing processes, sound from fixed plant installations, sound from loading and unloading of goods at industrial

and/or commercial premises and the sound from mobile plant and vehicles, such as forklift, train or ship movements.

Guidelines for Community Noise

2.7 This assessment is to consider noise from deliveries within extended periods that fall in both the daytime and night time. For deliveries that may occur during the night time periods the WHO Guidelines for Community Noise offer the most relevant assessment criteria. This is because for noise that occurs at night it is the absolute level of noise that is the critical factor in relation to recognised sleep disturbance criteria. During the night time period generally people are inside their properties. Therefore, the outcome of a BS 4142 assessment (discussed later in this section), which assesses the difference between the external background noise level at the receptor and the external rating level of the specific noise source under consideration, does not reflect the true nature of the noise impact at the receptors. This is confirmed in the scope of BS4142:2014+A1:2019, which states *"the methodology set out in Clauses 7, 8, and 9 of this standard is not intended to be used to assess the extent of the impact at indoor locations".*

2.8 The WHO "Community Noise Guidelines" (CNG) values are appropriate to what are termed "critical health effects". This means that the limits are at the lowest noise level that would result in any psychological or physiological effect. They are, as defined by NPSE, set at the Lowest Observed Adverse Effect Level (LOAEL), but do not define the level above which effects are significant (the SOAEL). Compliance with the LOAEL should, therefore, be seen as a robust aim.

2.9 In 2018 the WHO published the "Environmental Noise Guidelines for the European Region" (ENGER). The WHO Environmental Noise Guidelines (page 28) explain that *"The current environmental noise guidelines for the European Region supersede the CNG from 1999. Nevertheless, the GDG* (Guideline Development Group) *recommends that all CNG indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid"*. Hence the CNG remain relevant to this assessment.

2.10 The WHO ENGER brings together the latest research on the effects of specific types of noise on health in relation to transportation noise sources (road, rail and aircraft noise exposure), wind turbines and leisure noise. Hence in direct relation to the specific proposal that this noise assessment considers, the new WHO ENGER are not of material consideration.

2.11 The relevant World Health Organisation (CNG) noise values are summarised in the following table:

TABLE 2: WHO CNG values

Document	Level	Guidance
World Health Organisation "Community Noise 2000"	L_{AeqT} = 55 dB	Serious annoyance, daytime and evening. (Continuous noise, outdoor living areas)
	L_{AeqT} = 50 dB	Moderate annoyance, daytime and evening. (Continuous noise, outdoor living areas).
	L_{AeqT} = 35 dB	Moderate annoyance, daytime and evening. (Continuous noise, dwellings, indoors)
	L_{AeqT} = 30 dB	Sleep disturbance, night-time (indoors)
	L_{Amax} = 60 dB	Sleep disturbance, windows open at night. (Noise peaks outside bedrooms, external level).
	L_{Amax} = 45 dB	Sleep disturbance at night (Noise peaks inside bedrooms, internal level)

2.12 For L_{AeqT} criteria the time base (T) given in the documents is 16 hours for daytime limits and 8 hours for night time limits. When assessing impact, this has the tendency to smooth out the hourly variations in noise level. As such, our calculations are carried out to a 1 hour time base, which is a more stringent assessment than is given in WHO Guidelines for Community Noise.

2.13 The internal CNG values can be converted to an external value by the addition of the attenuation provided by a partially open window of 15 dB.

Changes in noise level

2.14 Changes in noise levels of less than 3 dBA are not perceptible under normal conditions and changes of 10 dBA are equivalent to a doubling of loudness. This guidance has been accepted by inspectors, at inquiry, to encompass changes in noise levels in the index L_{AeqT}.

2.15 Table 3 shows the response to changes in noise (known as a semantic scale); this table has been developed from general consensus opinion of acousticians.

TABLE 3: Change in noise level

Change in noise level L_{AeqT} dB	Response	Impact
<3	Imperceptible	None
3 – 5	Perceptible	Slight/moderate
6 – 10	Up to a doubling	Moderate/significant
11 – 15	More than a doubling	Substantial
>15	-	Severe

2.16 Where the existing ambient noise level is already above the criteria developed from the various guidance documents, it may be considered unreasonable to adopt such criteria. It would be reasonable, however, given the above statement, to consider criteria which do not exceed the existing noise climate, thus giving rise to an overall 3 dB increase i.e. the minimum perceptible. If it is less than the minimum perceptible it cannot be described as disturbing or to affect the amenity of residents.

Assessment using BS 4142:2014+A1:2019

2.17 As outlined, this British Standard enables the significance of sound impact to be determined in relation to industrial and commercial sources. The significance of sound impact is to be determined according to the following summary process:

i) Determine the background sound levels, in terms of the index L_{A90}, at the receptor locations of interest.

ii) Determine the specific sound level of the source being assessed, in terms of its L_{AeqT} level (T = 1 hour for day or 15 minutes for night), at the receptor location of interest.

iii) Apply a rating level acoustic feature correction if the source sound has tonal, impulsive, intermittent, or other characteristics which attract attention.

iv) Compare the rating sound level with the background sound level; the greater the difference between the two, the higher the likelihood of adverse impact.

v) A difference (rating – background) of around +10 dB is an indication of significant adverse impact, depending on the context; a difference of +5 dB is an indication of an adverse impact, depending on the context. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending upon context.

vi) The intent of the planning system is to ensure that a development does not result in "significant adverse impacts on health and quality of life." BS 4142:2014 considers that the threshold of significant adverse impact is "a difference around +10 dB or more … depending upon the context". However the NPPF and NPPG state that where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement *"…all reasonable steps should be taken to mitigate and minimise adverse effects in health and quality of life while together taking into account the guiding principles of sustainable development. This does not mean that adverse effects cannot occur but that effort should be focused on minimising such effects"*.

2.18 BS 4142:2014+A1:2019 introduces the concept of '*context*' to the process of identifying noise impact. Section 11 of BS 4142:2014 explains "*The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs* (our emphasis). A*n effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context"* (our emphasis).

2.19 There are many *context* points to consider when undertaking an assessment of sound impact including:

- The absolute level of sound;
- The character and level of the specific sound in the context of the existing noise climate; for example is the sound to occur in a location already characterised by similar activities as those proposed?
- The sensitivity of the receptors;
- The time and duration that the specific sound is to occur;
- The conclusions of assessments undertaken using alternative assessment methods, for example WHO guidelines noise values or change in noise level;

2.20 It is therefore entirely possible that whilst the numerical outcome of a BS 4142:2014+A1:2019 assessment is indicative of adverse or significant adverse impact, when the proposal is considered in *context* the significance of the impact is reduced to an acceptable level.

3.0 Noise survey details

3.1 Noise surveys have been undertaken at the site to obtain baseline measurements of the existing noise climate, and of noise from existing delivery activity at the store.

Baseline noise survey

3.2 A baseline noise survey was carried out between Friday 27th November and Monday 30th November 2020. A single measurement location was used, at the boundary with the loading bay on the western side of the store. This accessible location was chosen to representative of the general noise climate at the closest residential properties in Insley Gardens, and also to capture peak source noise levels from delivery unloading activity. The measured noise levels are important to establish a baseline against which an assessment in accordance with BS 4142:2014 can be carried out. The purpose of the survey was to establish the existing noise climate during the times that deliveries might be received at a position representative of the closest residential properties to the delivery area.

3.3 The baseline noise measurement location is indicated at Figure 1 below

FIGURE 1: Baseline noise measurement location

3.4 The weather conditions during the survey were generally dry but cloudy. Between Friday 27th November and Sunday 29th November winds were from the north east/east with temperatures between 4 and 9°C. The weather was similar on Monday 30th but the winds were from the west. At all times winds were light

(<5m/s). Weather conditions are therefore not considered to have materially affected the measured noise levels during the survey.

3.5 The baseline noise measurements were carried out using a Norsonic 118 sound level meter fitted with an environmental microphone kit. The sound level meter was calibrated at the start and end of the survey and no variation in levels were observed. The baseline noise measurements were taken over 15 minute sample periods (although the sound level meter was also set to 1 second resolution).

3.6 Measurements were taken in free field conditions with the microphone height of approximately 4.2 metres above local ground level, above the level of the acoustic grade fence adjacent to the loading bay.

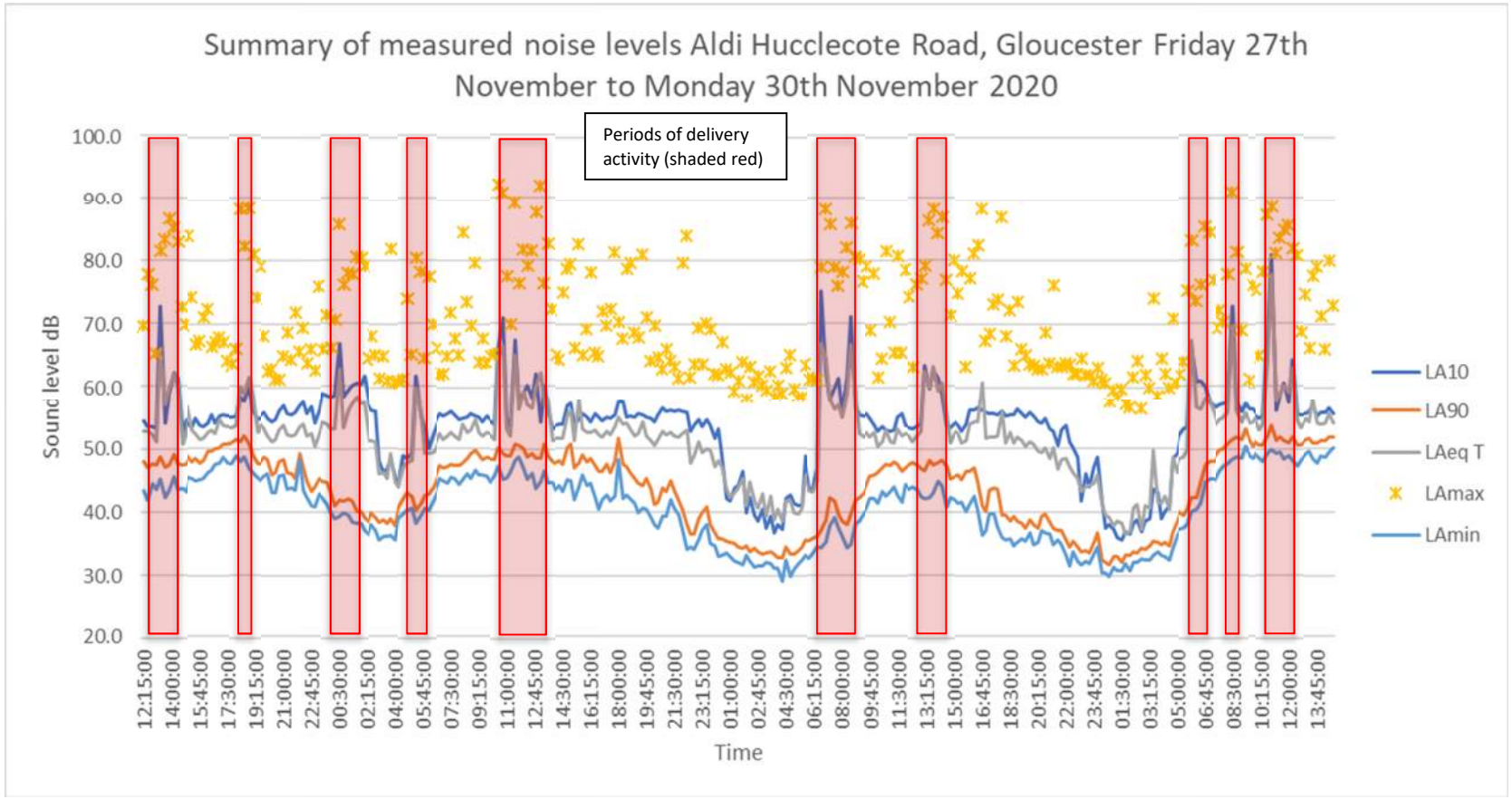
3.7 The measured baseline noise levels are summarised in Table 4 and Figure 2 below, and presented in full in Appendix C.

TABLE 4: Measured baseline noise levels

Date	Time	Noise level dB		
		$L_{A90\ 1\ hour}$	$L_{A90\ 5\ mins}$ *	$L_{Aeq\ 1\ hour}$
27.11.20	12:00:00	47.6		52.8
	13:00:00	47.8		61.4
	14:00:00	48.0		58.6
	15:00:00	48.2		53.8
	16:00:00	49.3		52.4
	17:00:00	50.7		53.8
	18:00:00	51.5		59.3
	19:00:00	48.3		55.2
	20:00:00	47.1		51.9
	21:00:00	46.5		52.5
	22:00:00	46.1		53.0
	23:00:00		44.0	53.1
28.11.20	00:00:00		41.0	58.0
	01:00:00		40.1	57.4
	02:00:00		38.5	53.8
	03:00:00		38.2	47.0
	04:00:00		37.8	46.2
	05:00:00		40.3	55.7
	06:00:00		42.9	50.6
	07:00:00	47.2		52.0
	08:00:00	48.2		52.8
	09:00:00	48.9		53.1
	10:00:00	49.2		62.8
	11:00:00	49.9		59.9
	12:00:00	49.3		58.5
	13:00:00	49.1		58.7
	14:00:00	48.4		52.8
	15:00:00	48.6		55.3
	16:00:00	47.5		52.5
	17:00:00	47.1		52.5
	18:00:00	48.2		54.0
	19:00:00	44.9		52.8
	20:00:00	42.6		51.6
	21:00:00	43.3		52.1
	22:00:00	37.9		51.0
	23:00:00		38.1	50.1
29.11.20	00:00:00		35.5	46.8
	01:00:00		34.3	43.8

Date	Time	Noise level dB		
		$L_{A90\ 1\ hour}$	$L_{A90\ 5\ mins}$ *	$L_{Aeq\ 1\ hour}$
29.11.20	02:00:00		33.8	42.4
	03:00:00		33.4	41.3
	04:00:00		32.9	40.8
	05:00:00		33.5	42.4
	06:00:00		35.4	60.8
	07:00:00	40.7		60.4
	08:00:00	39.6		62.0
	09:00:00	43.9		52.2
	10:00:00	46.6		51.9
	11:00:00	47.4		51.9
	12:00:00	47.5		52.0
	13:00:00	47.3		60.9
	14:00:00	47.2		57.8
	15:00:00	45.8		51.9
	16:00:00	44.8		56.9
	17:00:00	42.7		51.8
	18:00:00	39.3		53.0
	19:00:00	38.3		51.1
	20:00:00	38.7		50.0
	21:00:00	37.6		48.6
	22:00:00	35.0		47.0
	23:00:00		33.7	44.0
30.11.20	00:00:00		31.8	42.4
	01:00:00		32.2	37.9
	02:00:00		33.2	39.5
	03:00:00		34.2	45.3
	04:00:00		34.8	44.6
	05:00:00		38.6	48.6
	06:00:00		42.3	62.4
	07:00:00	48.7		55.9
	08:00:00	51.2		64.1
	09:00:00	51.6		54.7
	10:00:00	51.2		59.4
	11:00:00	52.2		71.9
	12:00:00	51.1		59.2
	13:00:00	51.2		55.6
	14:00:00	51.5		54.4

FIGURE 2: Summary of measured noise levels



3.8 In the absence of noise from delivery activity the noise climate was contributed to by road traffic sources, activity within the Aldi customer car park area and noise from Aldi plant equipment.

Delivery activity source noise levels

3.9 As outlined at paragraph 3.5 above the sound level meter was set to measure at both 15 minute samples (to obtained the baseline noise climate) and also to 1 second resolution, in order to directly measure peak noise levels associated with unloading activity. Figure 3 below indicates the noise measurement location.

FIGURE 3: Baseline & delivery source noise measurement location.

3.10 The graph at Figure 2 indicates a number of deliveries were received during the noise survey. The highest peak noise levels measured during unloading activity were 92 dB L_{Amax} (at a distance of approximately 3 metres from the closest point of unloading activity). Analysis of the 1 second resolution noise level data indicates typical peak noise levels during unloading of 80 to 90 dB L_{Amax} (at 3 metres).

3.11 Although it is more difficult to precisely determine the unloading event $L_{Aeq\ T}$ of each delivery that occurred during the survey from Figure 2, it is estimated that delivery activity to this store was typically at a level of 60 dB $L_{Aeq\ 1\ hour}$ (at 10 metres). This level would compare well to SR database of Aldi delivery activity noise levels which are typically 58 to 60 dB $L_{Aeq\ 45\ to\ 60\ minutes}$ at 10 metres.

3.12 The deliveries to this store are made by standard Aldi type delivery vehicles (except for third party deliveries). Palleted goods are off loaded using a pallet truck via the dock leveller system at the store. The principle noise source was observed to be from pallets as they were moved within the wagon and over the levelling plates into the store warehouse.

3.13 The following table shows the source noise levels (normalised to 10 metres from the centre of activity) used in this assessment. The unloading component is from the measured source levels at this store, whilst the arrival and departure noise levels are taken from the SR database.

TABLE 5: Delivery activity source noise levels at Aldi Hucclecote Road, Gloucester

Measured delivery event source noise Level (at 10 metres)						
Arrival		Unloading		Departure		Peak noise
Duration (mins)	$L_{Aeq\,T}$ (dB)	Duration (mins)	$L_{Aeq\,T}$ (dB)	Duration (mins)	$L_{Aeq\,T}$ (dB)	L_{Amax} (dB)
2	67	57	60	1	66	73-74[1] / 82[2]

NOTES:
[1] Peak noise from delivery vehicle manoeuvring upon arrival and departure (Source: SR database);
[2] Measured peak noise level from unloading activity at Aldi Hucclecote Road.

4.0 Noise from delivery activity

4.1 The closest properties to the Aldi loading bay are in Insley Gardens to the west (as indicated at Appendix A).

4.2 The following delivery activity source noise levels are used in this assessment:

TABLE 6: Delivery activity – baseline source noise levels (free field)

Measured delivery event source noise Level (at 10 metres)						
Arrival		Unloading		Departure		Peak noise
Duration (mins)	$L_{Aeq\,T}$ (dB)	Duration (mins)	$L_{Aeq\,T}$ (dB)	Duration (mins)	$L_{Aeq\,T}$ (dB)	L_{Amax} (dB)
2	67	57	60	1	66	73-74[1] / 82[2]

4.3 Table 7 below shows the predicted ambient ($L_{Aeq\,T}$) delivery activity noise levels at the closest residential properties to the Aldi loading bay (full delivery event activity noise predictions are included at Appendix D1). The predicted delivery noise levels below include screening attenuation provided by the existing acoustic fence adjacent to the loading bay and boundary fencing (see screening calculations at Appendix D2).

TABLE 7: Predicted delivery activity noise levels

Receptor	Predicted noise level dB $L_{Aeq\ 1\ hour}$
12 Insley Gardens	41

4.4 Notwithstanding the comments at paragraph 2.7, an assessment of delivery activity noise levels using the methodology in BS 4142:2014 is presented in Appendix D3.

4.5 The BS 4142 assessment indicates differences between the rating level and background sound level of between -1 and +7 dB at Insley Gardens (this is indicative of low to adverse impact, depending upon context). This is considering the period between 0600 and 0700 hours, and 2100 to 2300 hours Monday to Saturday, and 0700 and 0900 hours and 1800 to 2100 hours on Sundays. The guidance in BS 4142:2014, Section 11, states:

"*a) Typically, the greater this difference, the greater the magnitude of the impact.*

b) *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*

c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context".

4.6 Section 11 of BS 4142:2014 explains "*The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs* (my emphasis). *An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context"* (my emphasis).

4.7 As outlined in paragraph 2.7, a key contextual noise consideration (particularly for deliveries that may occur at 0600 hours) is the comparison of the predicted delivery activity noise level with the WHO CNG values. The table below shows this comparison.

TABLE 8: Comparison of predicted delivery event noise levels with the WHO CNG values

Noise level	Parameter	
	$L_{Aeq\,T}$	L_{Amax}
Receptor	12 Insley Gardens	
Predicted delivery event noise level day/night [1]	41/44	58-59/60
WHO guideline daytime/night time noise value [2]	55/45	60
Comply with WHO day/night time guidelines	YES	YES

Notes

[1] Where $L_{Aeq\,T}$ = 1 hour daytime, 15 minutes night time

[2] Where $L_{Aeq\,T}$ = 16 hour daytime and 8 hour night time

4.8 The comparison in Table 8 indicates that delivery event noise levels are below the WHO CNG daytime and night time values; and hence would be indicative of low impact.

4.9 Predicted delivery activity noise levels can also be compared to the existing ambient noise climate to consider the change in ambient noise level.

TABLE 9: Change in noise level

Receptor	Date	Time	Noise level $L_{Aeq\,T}$*				Noise impact
			Existing noise climate	Predicted delivery activity noise	Overall existing + predicted	Change in level	
12 Insley Gardens	27.11.20	21:00:00	52.5	41.0	52.8	0.3	Low
		22:00:00	53.0	41.0	53.3	0.3	Low
	28.11.20	06:00:00	50.6	41.0	51.1	0.5	Low
		21:00:00	52.1	41.0	52.4	0.3	Low
		22:00:00	51.0	41.0	51.4	0.4	Low
	29.11.20	07:00:00	60.4	41.0	60.4	0.0	Low
		08:00:00	62.0	41.0	62.0	0.0	Low
		18:00:00	53.0	41.0	53.3	0.3	Low
		19:00:00	51.1	41.0	51.5	0.4	Low
		20:00:00	50.0	41.0	50.5	0.5	Low
	30.11.20	06:00:00	62.4	41.0	62.4	0.0	Low

4.10 The impact classification in the context of change in ambient noise level for delivery activity occurring in the proposed extended periods is low.

4.11 Overall this assessment objectively demonstrates that when considered in context, deliveries could be made between 0600 and 2300 hours Monday to Saturday and between 0700 and 2100 hours on Sundays and bank holidays without associated noise giving rise to significant adverse impact; which is the planning test in accordance with the NPPF.

5.0 Delivery activity noise reduction measures

5.1 It is recommended that the following noise minimisation measures shall be implemented at all times to reduce noise levels from service yard activity:

- There will be adequate signage and instruction to ensure that all drivers and staff follow the noise management measures;
- All engines to be switched off as soon as vehicles are parked at the unloading dock;
- Subject to a full health and safety risk assessment, tonal reversing alarm systems shall not be used before 0700 hours and after 2200 hours (2000 hours on Sundays);
- All delivery vehicles to be driven in as quiet a manner as possible, avoiding unnecessary engine revving;
- No radios or stereos to be left on in vehicles during deliveries or at other times;
- Staff to be instructed to work quietly when outside the store or in the service yard - only performing essential tasks where noise could be generated;
- All components of the delivery system to be maintained in good working order;

5.2 The above delivery activity noise reduction measures can be secured by imposition of a suitable planning condition.

6.0 Assessment conclusions

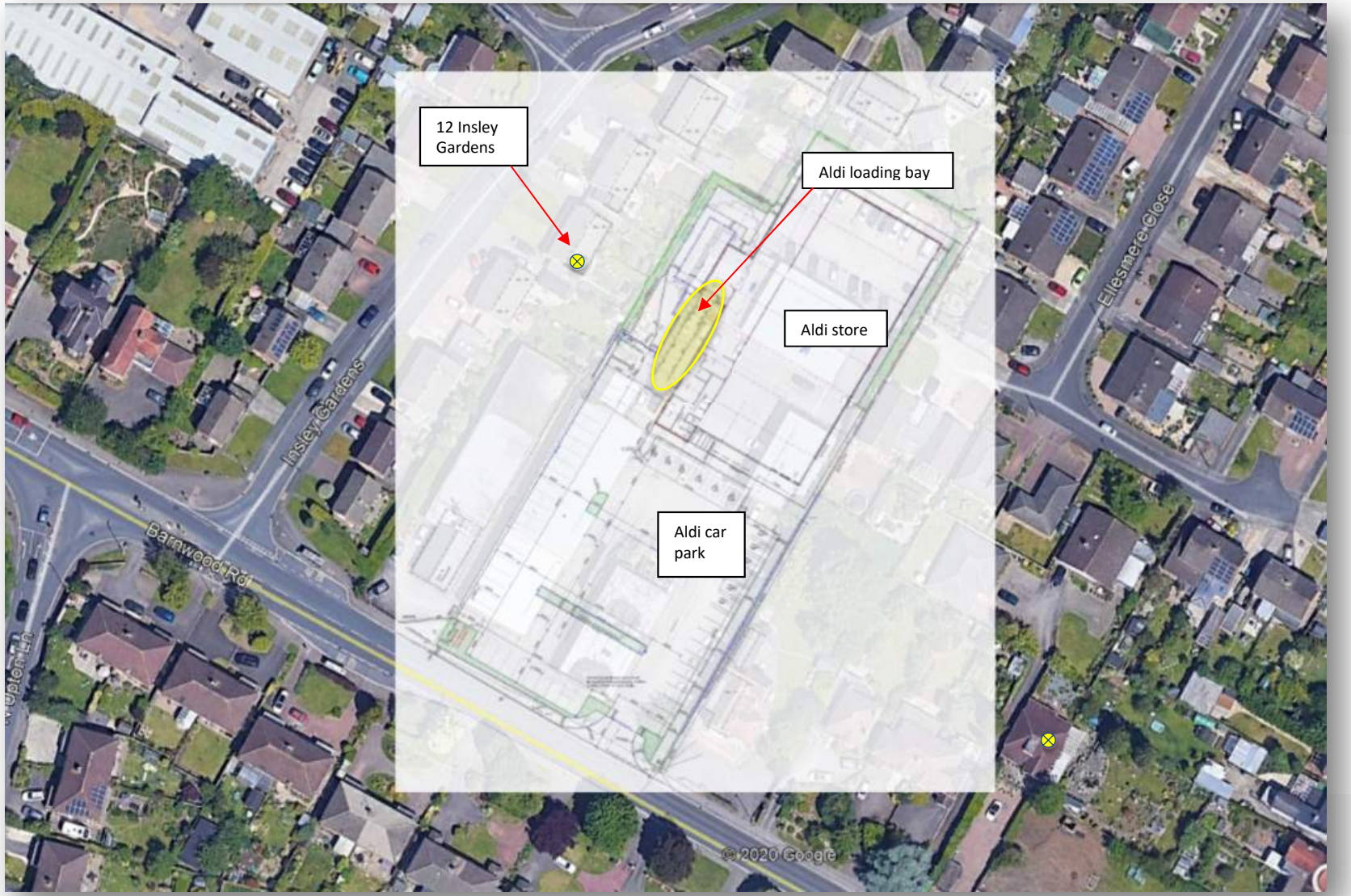
6.1 Sharps Redmore (SR) has undertaken an environmental noise assessment to consider whether deliveries could be made to the Aldi store at Hucclecote Road, Gloucester between 0600 and 2300 hours Monday to Saturday and 0700 to 2100 hours on Sundays/bank holidays without associated noise giving rise to significant adverse impact.

6.2 This assessment has objectively demonstrated in the context of nationally recognised standards and planning guidance that predicted noise levels from delivery activity would not give rise to significant adverse impact and hence would comply with the requirements of the NPPF during the additional delivery periods sought.

APPENDIX A

SITE LOCATION PLAN

Appendix A: Aldi Hucclecote Road, Gloucester, ste location plan



APPENDIX B

ALDI HUCCLECOTE ROAD, GLOUCESTER DELIVERY TIMES SEPTEMBER TO NOVEMBER 2020

Aldi store ID #164 Hucclecote Road, Gloucester

SEPTEMBER				OCTOBER				NOVEMBER			
DATE	REG NUM	DEL.TYP	ARRIVAL	DATE2	REG.NUM	DEL.TYP	ARRIVAL	DATE3	REG NUM	DEL.TYP	ARRIVAL
01.09.2020	19 VDK	P20	06:12	01.10.2020	17 WYZ	P20	05:29	01.11.2020-S	67 KJE	FR+LL+AME	09:48
	67 KJE	FR+LL+AME	12:11		65 KHU	FR+LL+AME	13:25	02.11.2020	17 WYY	P20	06:01
02.09.2020	14 VPO	P20	07:13	02.10.2020	19 VDJ	P20	06:14		17 WYZ	FR+LL+AME	11:29
	19 VEA	FR+LL+AME	12:13		19 VDL	FR+LL+AME	12:05	03.11.2020	19 VDF	PR+S/L+FL	06:19
03.09.2020	19 VEA	P20	06:16	03.10.2020-S	19 BWF	P20	06:22		19 LZG	FR+LL+AME	12:15
	19 VDT	FR+LL+AME	15:02		69 AVO	FR+LL+AME	12:09	04.11.2020	17 WYL	P20	05:50
04.09.2020	19 VDT	P20	07:05	04.10.2020-S	67 KJE	P20	07:58		17 WYM	FR+LL+AME	11:36
	19 BWF	FR+LL+AME	11:52		69 AVO	FR+LL+AME	12:22	05.11.2020	19 VDY	P20	06:11
05.09.2020-S	17 WZB	P20	03:24	05.10.2020	69 AVN	P20	06:11		19 VDE	FR+LL+AME	11:36
	17 WYY	FR+LL+AME	12:54		64 BVR	FR+LL+AME	11:05	06.11.2020	19 VDJ	P20	06:30
06.09.2020-S	19 VDT	P20	05:57	06.10.2020	14 VPO	P20	05:52		70 DMY	FR+LL+AME	12:25
	17 WYS	FR+LL+AME	11:34		67 KJE	FR+LL+AME	11:29	07.11.2020-S	17 WYZ	P20	05:54
07.09.2020	65 KHT	P20	06:40	07.10.2020	65 KHK	P20	06:12		17 WYV	FR+LL+AME	11:45
	17 WYL	FR+LL+AME	13:10		17 WYY	FR+LL+AME	11:34	08.11.2020-S	70 MO	P20	03:46
08.09.2020	19 VDG	P20	06:06	08.10.2020	19 VDO	P20	05:45		17 WZC	FR+LL+AME	12:06
	17 WYK	FR+LL+AME	12:29		19 VEA	FR+LL+AME	11:45	09.11.2020	65 KHT	P20	05:46
09.09.2020	19 VEB	P20	05:51	09.10.2020	64 BUV	P20	00:35		17 WYL	FR+LL+AME	12:47
	67 KJA	FR+LL+AME	11:39		17 WYL	FR+LL+AME	12:13	10.11.2020	70 DME	P20	06:54
10.09.2020	19 VDT	P20	02:01	10.010.2020	64 BUP	P20	04:39		17 WYJ	FR+LL+AME	11:46
	19 VEA	FR+LL+AME	11:54		17 WYL	FR+LL+AME	11:10	11.11.2020	19 VEB	P20	06:03
11.09.2020	19 VDF	P20	05:43	11.10.2020-S	65 KHK	P20	06:50		17 WYH	FR+LL+AME	11:29
	19 BWF	FR+LL+AME	12:15		19 VDT	FR+LL+AME	12:40	12.11.2020	19 VDT	P20	06:04
12.09.2020-	19 VDX	P20	06:09	12.10.2020	19 VDJ	P20	06:19		19 VDG	FR+LL+AME	13:15
	64 BUP	FR+LL+AME	13:14		17 WZB	FR+LL+AME	11:57	13.11.2020	19 VDT	P20	05:57
13.09.2020-	17 WYU	PR+BR	01:41	13.10.2020	19 VDR	P20	06:04		17 WYH	FR+LL+AME	12:52
	17 WZA	S/L+FL	04:30		19 VDZ	FR+LL+AME	12:27	14.11.2020-	17 WYM	FL+BR	05:49
	17 WYP	FR+LL+AME	11:03	14.10.2020	19 VDG	P20	05:55		19 VA	O/S+PR+S/L	06:43
14.09.2020	17 WYY	P20	00:03		19 VDP	FR+LL+AME	12:00		70 DMZ	P20	13:13
	64 BUP	FR+LL+AME	13:01	15.10.2020	19 VDY	P20	06:05	15.11.2020-S	19 VO	P20	06:16
15.09.2020	17 WYK	P20	06:16		65 KHU	FR+LL+AME	11:54		17 WYH	FR+LL+AME	11:32
	19 VDF	FR+LL+AME	12:51	16.10.2020	19 VDX	P20	06:18	16.11.2020	17 WYH	P20	01:36
16.09.2020	19 VDP	P20	06:16		17 WYU	FR+LL+AME	11:57		17 WZA	FR+LL+AME	13:33
	64 BUP	FR+LL+AME	09:57	17.10.2020-S	67 KJA	PR+S/L+FL	06:05	17.11.2020	67 KJE	P20	05:57
17.09.2020	65 KHK	P20	05:45		64 BUP	BREAD	06:12		70 DMO	FR+LL+AME	11:33
	17 WYY	FR+LL+AME	12:48		17 WYH	FR+LL+AME	11:57	18.11.2020	17 VDY	P20	06:48
18.09.2020	17 WYP	P20	06:22	18.10.2020-S	64 BVW	P20	08:02		17 WYK	FR+LL+AME	11:45
	19 VDG	FR+LL+AME	14:02		17 WYU	FR+LL+AME	15:07	19.11.2020	17 WYH	P20	05:45
19.09.2020 -	64 BVS	P20	05:45	19.10.2020	19 BVDT	P20	06:33		19 VDT	FR+LL+AME	09:43
	19 VDV	FR+LL+AME	12:02		17 WZB	FR+LL+AME	12:17	20.11.2020	17 WYL	P20	05:11
20.09.2020 -	19 VEA	P20	07:08	20.10.2020	17 WYM	P20	06:26		19 VDF	FLOWERS	06:57
	17 WYY	FR+LL+AME	11:54		19 VDR	FR+LL+AME	14:56		17 WZC	FR+LL+AME	11:54
21.09.2020	17 WYR	P20	06:02	21.10.2020	67 KJE	P20	06:14	21.11.2020-S	17 WYU	PR+S/L+BR	05:08
	64 BUP	FR+LL+AME	10:42		17 WYW	FR+LL+AME	11:53		19 VDR	FR+LL+AME	12:46
22.09.2020	19 VDX	P20	06:00	22.10.2020	19 VDR	P20	06:09	22.11.2020-S	17 WYR	P20	05:48
	17 WYW	FR+LL+AME	13:33		19 LZH	FR+LL+AME	12:34		70 DME	FR+LL+AME	12:34
23.09.2020	65 KHT	P20	04:58	23.10.2020	19 VDY	P20	06:15	23.11.2020	17 WYM	P20	06:25
	17 WYJ	FR+LL+AME	14:06		17 WYM	FR+LL+AME	12:10		19 VDK	FR+LL+AME	11:43
24.09.2020	17 WYU	P20	05:58	24.10.2020-S	19 VDX	P20	06:44	24.11.2020	17 WYZ	P20	05:37
	19 VDY	FR+LL+AME	14:07		19 VEF	FR+LL+AME	12:03		17 WYV	FR+LL+AME	11:49
25.09.2020	17 WYP	P20	06:29	25.10.2020-	19 VDJ	P20	05:40	24.11.2020	17 WZA	O/S	04:10
	69 AVN	FR+LL+AME	14:44		19 VDL	FR+LL+AME	11:25		19 BWF	O/S	07:43
26.09.2020 -	64 BVW	P20	06:50	26.10.2020	17 WZA	P20	04:03		19 VDO	FR+LL+AME	12:53
	19 VDT	BREAD	07:47		17 WYP	FR+LL+AME	11:54	26.11.2020	17 WZC	P20	06:12
	19 VDZ	FR+LL+AME	13:44	27.10.2020	65 KHM	P20	06:00		17 WYR	FR+LL+AME	15:31
27.09.2020 S	19 VEA	P20	04:38		17 WYL	FR+LL+AME	12:00	27.11.2020	69 AVN	P20	06:11
	17 WYS	FR+LL+AME	13:29	28.10.2020	64 BUV	P20	06:56		19 VDO	FR+LL+AME	13:26
28.09.2020	65 KHK	P20	06:12		17 WYO	FR+LL+AME	13:11	28.11.2020-S	17 WYR	PR+S/L+FL(	00:45
	67 KJE	FR+LL+AME	11:05	29.10.2020	19 VDR	P20	05:48		17 WYU	P20	05:16
29.09.2020	17 WZC	P20	00:31		64 BUP	FR+LL+AME	10:31		19 VDF	FR+LL+AME	11:40
	67 KJA	FR+LL+AME	11:46	30.10.2020	67 KJE	P20	06:02	29.11.2020-S	17 WYR	P20	06:57
30.09.2020	65 KHT	P20	05:10		65 KHU	FR+LL+AME	11:27		70 DMZ	FR+LL+AME	13:15
	19 VDJ	FR+LL+AME	13:15					30.11.220	19 VDE	P20	06:02
									17 WYP	FR+LL+AME	11:06

APPENDIX C

NOISE SURVEY RESULTS

Appendix C1	Title: Noise survey results

Aldi Hucclecote Road, Gloucester

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
27.11.20	12:15:00	54.5	48.0	53.0	69.7	43.5
	12:30:00	53.6	47.1	53.0	77.8	42.0
	12:45:00	53.6	47.8	52.3	76.1	44.5
	13:00:00	53.2	47.6	51.2	65.3	43.7
	13:15:00	72.8	48.9	65.9	81.6	45.4
	13:30:00	54.2	47.2	57.2	83.5	42.3
	13:45:00	58.8	47.5	59.8	86.8	43.5
	14:00:00	62.2	49.2	62.0	85.2	45.7
	14:15:00	61.3	47.7	60.0	83.1	43.7
	14:30:00	52.7	47.5	50.9	72.6	43.8
	14:45:00	54.7	47.7	52.9	69.9	43.2
	15:00:00	54.0	48.8	56.6	83.9	45.5
	15:15:00	53.3	47.9	53.0	74.4	45.3
	15:30:00	54.7	48.4	52.3	67.0	45.0
	15:45:00	53.7	47.8	51.5	67.5	45.2
	16:00:00	53.5	48.0	51.6	71.1	45.3
	16:15:00	54.1	49.6	52.5	72.5	46.3
	16:30:00	55.3	49.6	52.9	66.6	46.6
	16:45:00	54.0	50.0	52.4	67.2	47.5
	17:00:00	55.2	50.2	54.5	68.0	47.8
	17:15:00	55.3	50.7	53.7	67.2	48.7
	17:30:00	55.1	50.7	53.5	64.4	47.8
	17:45:00	55.1	51.0	53.4	63.5	47.8
	18:00:00	55.4	51.6	53.9	65.9	49.1
	18:15:00	58.3	51.3	59.9	88.3	48.0
	18:30:00	57.8	52.1	58.9	82.3	48.8
	18:45:00	60.0	50.8	61.4	88.5	47.0
	19:00:00	56.1	49.0	58.2	81.0	46.3
	19:15:00	54.8	47.8	52.8	74.1	45.5
	19:30:00	55.1	47.8	54.1	79.1	44.9
	19:45:00	55.7	48.7	53.1	68.3	45.6
	20:00:00	54.7	48.3	52.0	62.6	46.1
	20:15:00	54.2	45.8	51.1	63.1	43.1
	20:30:00	54.6	46.3	51.5	61.4	43.0
	20:45:00	55.9	47.9	52.9	61.4	45.6
	21:00:00	56.8	48.2	53.6	65.1	45.8
	21:15:00	55.6	46.2	52.2	68.8	43.6
	21:30:00	55.3	46.1	52.0	64.5	43.8
	21:45:00	55.7	45.4	52.2	72.0	43.5
	22:00:00	56.8	49.2	53.5	65.8	48.2
	22:15:00	57.3	47.0	53.9	69.5	43.4
	22:30:00	55.6	44.9	51.9	64.0	42.3
	22:45:00	56.6	43.2	52.3	66.1	41.1
	23:00:00	54.0	44.0	50.3	62.9	40.9
	23:15:00	56.0	45.3	52.4	76.0	42.9
	23:30:00	58.8	44.9	54.4	66.0	42.3
	23:45:00	58.4	44.7	54.0	71.3	41.2
28.11.20	00:00:00	58.2	43.0	53.2	66.2	39.9
	00:15:00	58.4	41.0	53.2	70.7	39.0
	00:30:00	66.9	41.9	62.8	85.9	39.3
	00:45:00	58.3	41.7	53.5	76.1	39.9

Appendix C2	Title: Noise survey results

Aldi Hucclecote Road, Gloucester

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
28.11.20	01:00:00	59.4	42.2	56.3	78.0	39.5
	01:15:00	60.2	41.7	57.4	77.8	38.4
	01:30:00	60.5	40.1	58.3	80.6	38.3
	01:45:00	60.4	40.2	57.3	80.5	38.3
	02:00:00	61.7	39.1	57.5	79.2	37.1
	02:15:00	57.0	38.5	51.3	64.5	36.4
	02:30:00	56.0	39.9	51.3	68.3	38.0
	02:45:00	55.8	39.1	51.1	65.3	37.2
	03:00:00	48.1	38.5	46.0	61.5	35.7
	03:15:00	46.2	38.9	46.2	65.1	36.2
	03:30:00	46.8	38.2	45.3	61.1	36.2
	03:45:00	48.3	39.0	49.2	81.9	36.4
	04:00:00	45.7	37.8	44.7	60.9	35.7
	04:15:00	44.1	40.7	44.0	60.8	39.0
	04:30:00	49.1	42.1	47.1	61.2	39.8
	04:45:00	48.7	43.0	47.9	74.0	40.3
	05:00:00	49.3	42.6	48.2	65.0	40.7
	05:15:00	61.7	40.3	59.8	80.5	38.2
	05:30:00	55.4	41.5	55.8	78.3	39.6
	05:45:00	53.3	42.7	49.3	64.5	40.6
	06:00:00	50.2	42.9	49.3	77.4	40.3
	06:15:00	52.6	44.0	49.6	69.8	41.9
	06:30:00	54.2	45.5	50.7	66.1	43.3
	06:45:00	55.5	47.3	52.3	62.1	45.3
	07:00:00	55.1	46.9	51.5	62.2	44.9
	07:15:00	55.5	47.1	51.9	65.0	44.6
	07:30:00	55.8	47.6	52.5	72.0	45.5
	07:45:00	55.3	47.3	52.0	67.8	45.4
	08:00:00	54.5	47.3	51.5	65.3	44.4
	08:15:00	54.7	47.8	53.9	84.5	45.1
	08:30:00	54.9	48.5	52.6	73.6	46.0
	08:45:00	55.5	49.2	53.0	69.9	45.3
	09:00:00	55.1	49.7	54.6	79.7	46.6
	09:15:00	55.0	49.0	52.6	64.1	45.9
	09:30:00	54.3	48.3	52.0	67.9	45.8
	09:45:00	55.2	48.6	52.6	64.0	45.7
	10:00:00	54.5	48.5	52.3	65.1	44.8
	10:15:00	54.0	48.5	51.7	65.2	45.9
	10:30:00	65.9	50.3	64.6	91.9	47.4
	10:45:00	70.9	49.3	66.4	90.6	45.3
	11:00:00	54.9	49.1	53.3	77.5	45.5
	11:15:00	53.7	49.0	52.1	69.8	46.5
	11:30:00	67.4	50.9	64.9	89.1	48.3
	11:45:00	57.6	50.7	56.5	76.4	48.8
	12:00:00	59.0	50.1	59.3	81.7	46.9
	12:15:00	60.1	48.9	57.2	79.2	45.3
	12:30:00	58.1	49.4	56.6	81.5	46.2
	12:45:00	62.0	48.7	60.0	87.6	43.8
	13:00:00	54.4	48.6	62.2	91.8	44.9
	13:15:00	60.2	50.8	57.1	76.4	46.6
	13:30:00	56.2	49.0	58.0	82.6	44.8

Appendix C3	Title: Noise survey results

Aldi Hucclecote Road, Gloucester

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
28.11.20	13:45:00	53.3	48.0	51.4	72.3	44.7
	14:00:00	53.6	47.8	51.6	65.1	43.4
	14:15:00	53.8	48.1	51.6	64.5	44.2
	14:30:00	53.8	47.6	51.7	75.0	43.3
	14:45:00	56.8	50.1	55.2	78.7	45.2
	15:00:00	57.2	50.7	56.0	79.6	45.0
	15:15:00	53.8	46.9	51.3	66.4	42.0
	15:30:00	54.6	47.8	58.0	82.7	44.0
	15:45:00	55.5	49.0	53.1	65.3	45.8
	16:00:00	54.9	47.9	52.5	69.3	44.2
	16:15:00	54.3	48.5	52.6	78.2	44.6
	16:30:00	55.5	47.3	52.9	65.6	42.4
	16:45:00	54.9	46.4	52.1	65.1	40.5
	17:00:00	54.4	46.4	51.8	72.1	42.0
	17:15:00	54.9	47.6	52.7	69.9	42.7
	17:30:00	54.8	46.2	52.1	72.5	41.7
	17:45:00	55.3	48.1	53.4	81.4	42.6
	18:00:00	57.3	51.6	54.9	70.5	48.3
	18:15:00	57.4	47.5	53.8	67.8	42.2
	18:30:00	54.9	47.2	54.0	78.8	42.7
	18:45:00	55.2	46.3	53.1	79.7	42.1
	19:00:00	55.0	45.4	51.9	68.8	41.4
	19:15:00	55.6	44.5	52.4	68.1	40.0
	19:30:00	55.3	44.2	54.3	81.1	40.6
	19:45:00	54.9	45.4	52.0	71.2	40.4
	20:00:00	54.8	43.6	51.3	64.3	39.2
	20:15:00	54.2	41.2	50.5	69.8	38.1
	20:30:00	55.3	41.6	51.5	64.8	37.5
	20:45:00	56.4	43.9	52.8	63.0	39.3
	21:00:00	55.8	43.2	52.1	66.1	39.3
	21:15:00	56.1	44.9	52.5	64.4	42.0
	21:30:00	55.8	43.5	51.9	63.4	40.6
	21:45:00	56.0	41.7	51.8	61.5	39.6
	22:00:00	55.8	40.5	52.3	79.7	37.4
	22:15:00	55.7	38.0	53.0	84.0	34.2
	22:30:00	52.8	36.5	47.8	61.7	34.6
	22:45:00	53.7	36.6	48.9	63.7	34.1
	23:00:00	54.6	39.0	51.0	69.5	35.6
	23:15:00	53.4	39.9	49.4	63.8	37.2
	23:30:00	54.6	40.8	50.0	70.2	38.1
	23:45:00	53.6	38.1	49.7	69.4	35.1
29.11.20	00:00:00	51.6	36.7	47.2	62.2	34.7
	00:15:00	53.1	35.9	48.0	62.0	33.1
	00:30:00	48.8	35.9	47.1	67.3	33.3
	00:45:00	42.1	35.5	43.6	63.1	33.7
	01:00:00	41.8	35.2	42.4	62.4	33.0
	01:15:00	43.8	35.1	43.0	59.5	32.4
	01:30:00	44.2	34.6	43.8	61.2	32.2
	01:45:00	46.5	34.3	45.3	64.1	31.8
	02:00:00	40.0	34.7	41.0	58.2	33.2
	02:15:00	42.4	33.8	44.8	63.4	32.4

Appendix C4	Title: Noise survey results

Aldi Hucclecote Road, Gloucester

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
29.11.20	02:30:00	39.5	34.4	41.7	61.0	31.4
	02:45:00	38.6	33.9	40.7	61.9	31.6
	03:00:00	40.5	33.5	42.9	60.4	31.6
	03:15:00	37.5	33.7	39.3	59.7	32.1
	03:30:00	39.3	33.8	42.6	62.6	31.9
	03:45:00	36.7	33.4	38.9	58.6	31.2
	04:00:00	38.1	32.9	40.4	60.5	31.2
	04:15:00	37.4	32.9	38.6	59.2	29.2
	04:30:00	42.2	34.6	41.7	63.2	32.5
	04:45:00	42.7	33.4	41.7	65.2	29.9
	05:00:00	41.4	33.5	39.9	59.9	31.1
	05:15:00	41.1	34.0	39.8	58.3	32.0
	05:30:00	41.1	34.6	40.6	58.6	32.6
	05:45:00	48.9	35.7	45.9	63.5	33.3
	06:00:00	44.0	35.4	43.4	61.4	32.7
	06:15:00	43.5	35.8	43.2	61.2	33.5
	06:30:00	47.2	36.2	45.1	60.9	34.5
	06:45:00	75.2	37.1	66.8	79.0	34.3
	07:00:00	62.2	38.9	64.5	88.3	35.2
	07:15:00	58.0	42.3	58.1	85.9	37.8
	07:30:00	59.7	41.8	56.5	79.0	39.2
	07:45:00	61.2	39.7	57.1	76.0	37.5
	08:00:00	55.8	38.7	55.1	78.2	36.2
	08:15:00	61.5	38.1	58.8	82.1	34.3
	08:30:00	71.1	39.8	66.7	86.0	35.0
	08:45:00	56.8	41.9	58.0	80.7	38.3
	09:00:00	55.6	42.3	52.6	80.2	38.7
	09:15:00	55.4	43.0	51.9	76.8	40.0
	09:30:00	55.6	44.4	52.6	79.1	40.7
	09:45:00	54.8	45.7	51.8	69.1	42.2
	10:00:00	53.6	45.8	52.5	78.1	42.2
	10:15:00	52.7	46.2	50.3	61.7	41.4
	10:30:00	53.5	47.0	51.1	64.6	43.2
	10:45:00	52.9	47.5	53.0	81.6	42.5
	11:00:00	52.8	47.4	51.1	70.4	43.3
	11:15:00	53.0	47.9	50.9	65.7	44.1
	11:30:00	55.0	47.6	53.1	80.9	42.8
	11:45:00	55.6	46.5	52.0	65.7	41.6
	12:00:00	53.7	47.0	52.3	78.6	44.3
	12:15:00	53.5	47.6	52.2	74.4	43.6
	12:30:00	53.3	47.9	51.2	63.0	44.1
	12:45:00	53.6	47.6	52.1	76.2	43.7
	13:00:00	54.2	46.9	52.9	77.1	42.5
	13:15:00	63.3	46.6	62.3	79.2	42.2
	13:30:00	59.6	48.2	59.7	86.4	42.4
	13:45:00	62.6	47.6	63.1	88.2	43.1
	14:00:00	61.3	47.9	59.2	84.3	44.9
	14:15:00	58.9	48.2	60.5	87.0	44.2
	14:30:00	53.9	47.4	55.4	76.9	40.8
	14:45:00	53.4	45.4	51.1	71.4	42.3
	15:00:00	54.3	45.6	52.7	80.0	41.9

Appendix C5	Title: Noise survey results

Aldi Hucclecote Road, Gloucester

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
29.11.20	15:15:00	53.6	45.9	52.4	74.9	41.5
	15:30:00	52.7	45.1	50.9	78.5	41.6
	15:45:00	53.9	46.4	51.2	63.4	40.1
	16:00:00	56.0	46.5	53.9	77.3	41.2
	16:15:00	56.1	46.9	54.3	81.2	42.5
	16:30:00	56.4	44.8	54.2	82.5	40.3
	16:45:00	56.0	41.0	60.8	88.3	36.4
	17:00:00	55.7	40.1	51.7	67.5	37.1
	17:15:00	55.6	43.4	51.8	68.6	39.8
	17:30:00	55.5	43.8	51.8	73.2	39.7
	17:45:00	55.4	43.6	51.9	74.0	37.7
	18:00:00	55.9	39.6	55.7	87.0	36.1
	18:15:00	55.2	39.6	50.9	68.3	35.7
	18:30:00	55.4	38.7	52.6	72.3	35.8
	18:45:00	55.4	39.3	50.8	63.5	34.8
	19:00:00	56.2	38.6	51.8	73.5	35.2
	19:15:00	55.6	38.3	51.2	66.2	35.8
	19:30:00	54.9	37.6	50.3	65.3	35.4
	19:45:00	55.7	38.8	51.0	63.8	36.8
	20:00:00	55.1	38.0	50.6	63.5	35.0
	20:15:00	54.3	37.5	49.6	63.1	35.2
	20:30:00	54.1	39.3	49.3	63.1	37.2
	20:45:00	54.7	39.8	50.2	68.7	36.8
	21:00:00	53.1	38.5	48.4	64.0	36.5
	21:15:00	52.8	37.5	50.2	76.2	35.0
	21:30:00	50.5	37.1	46.7	63.4	35.6
	21:45:00	53.0	37.1	48.2	63.4	35.0
	22:00:00	53.6	35.6	48.5	63.9	33.2
	22:15:00	51.1	34.5	47.2	63.7	31.5
	22:30:00	50.2	35.5	46.3	62.3	33.9
	22:45:00	48.6	34.5	45.4	62.3	32.4
	23:00:00	41.7	33.9	43.2	64.7	31.7
	23:15:00	46.0	34.0	44.0	62.1	32.3
	23:30:00	44.1	33.7	44.2	62.1	32.0
	23:45:00	47.2	35.3	44.6	61.2	33.5
30.11.20	00:00:00	48.7	36.8	45.9	63.2	34.5
	00:15:00	41.6	32.5	41.3	61.4	30.4
	00:30:00	37.5	32.1	39.6	60.8	30.5
	00:45:00	38.0	31.8	39.1	57.5	30.0
	01:00:00	37.4	33.1	37.8	59.7	31.4
	01:15:00	36.1	33.1	38.7	58.4	30.9
	01:30:00	35.7	32.2	38.2	59.9	30.9
	01:45:00	37.0	33.2	36.6	57.0	32.0
	02:00:00	36.5	33.2	36.9	56.5	30.8
	02:15:00	38.3	33.8	40.7	61.8	32.1
	02:30:00	38.8	33.7	41.3	64.3	32.2
	02:45:00	37.0	34.3	37.3	56.4	32.7
	03:00:00	38.6	34.2	41.1	62.1	32.6
	03:15:00	39.0	34.7	40.6	60.0	32.6
	03:30:00	43.6	35.4	49.8	74.1	33.3
	03:45:00	43.1	35.2	41.6	58.8	33.8

Appendix C6	Title: Noise survey results

Aldi Hucclecote Road, Gloucester

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
30.11.20	04:00:00	39.0	34.9	41.4	64.7	33.2
	04:15:00	40.1	35.2	42.5	62.3	33.1
	04:30:00	41.0	34.8	40.5	60.1	32.6
	04:45:00	48.5	37.0	48.6	71.0	34.3
	05:00:00	49.2	38.6	46.2	60.8	36.4
	05:15:00	52.2	40.2	48.5	61.9	37.3
	05:30:00	53.2	39.6	48.9	63.9	37.6
	05:45:00	53.6	40.5	50.0	75.2	38.0
	06:00:00	66.5	42.3	67.3	83.3	40.1
	06:15:00	60.7	42.4	56.8	73.6	40.4
	06:30:00	60.9	44.6	56.4	76.1	41.4
	06:45:00	60.0	47.6	58.1	85.4	44.8
	07:00:00	57.5	48.1	58.1	84.6	45.3
	07:15:00	56.9	48.0	55.8	77.0	45.3
	07:30:00	56.7	48.8	53.8	69.3	45.0
	07:45:00	57.1	50.0	54.7	72.1	46.6
	08:00:00	57.3	50.1	55.1	70.3	47.3
	08:15:00	57.4	50.8	55.9	77.8	47.7
	08:30:00	72.7	51.7	69.6	90.9	48.5
	08:45:00	57.5	52.0	56.2	81.3	48.9
	09:00:00	56.1	51.6	54.4	69.0	48.6
	09:15:00	57.3	53.2	55.9	78.8	50.5
	09:30:00	56.3	51.3	54.1	61.2	48.8
	09:45:00	56.3	50.4	54.3	76.2	48.4
	10:00:00	55.5	51.3	55.2	75.4	49.4
	10:15:00	55.0	50.7	53.1	64.8	48.6
	10:30:00	55.4	50.6	54.1	78.3	48.1
	10:45:00	68.1	52.1	64.3	87.3	49.4
	11:00:00	81.0	53.9	77.7	88.7	50.0
	11:15:00	56.2	51.5	57.7	81.2	49.3
	11:30:00	58.6	52.0	58.9	83.6	49.6
	11:45:00	60.6	51.5	60.2	84.9	48.5
	12:00:00	57.6	51.0	59.0	85.6	49.0
	12:15:00	64.2	51.9	63.0	82.0	48.2
	12:30:00	55.6	50.6	54.5	80.9	47.3
	12:45:00	55.5	50.7	53.5	68.8	48.3
	13:00:00	55.5	51.4	54.8	74.7	49.2
	13:15:00	55.9	51.7	54.2	66.4	49.6
	13:30:00	56.8	50.8	58.0	77.6	48.4
	13:45:00	55.2	50.8	54.1	79.1	47.8
	14:00:00	55.7	51.2	53.9	71.3	48.8
	14:15:00	55.7	51.2	54.1	66.1	48.6
	14:30:00	56.4	51.8	55.5	80.0	49.4
	14:45:00	55.5	51.8	54.1	73.0	50.1

APPENDIX D

PREDICTED DELIVERY EVENT NOISE LEVELS AND BS 4142 ASSESSMENT

AppendixDC1: Predicted delivery activity noise levels

APPENDIX D1

Assessment project: Aldi Hucclecote Road, Gloucester	Delivery component		
	Arrival	**Unloading**	**Departure**
Delivery noise activity - predicted ambient noise levels ($L_{Aeq\,T}$) *			
Closest residential property address:	**12 Insley Gardens**		
Source noise level at 10 metres $L_{Aeq\,T}$	67	60	66
Time - minutes	2	57	1
Distance between noise source and residential property in metres	32	24	32
Screening attenuation dB	5	14	5
Convert to 1 hour - dB	-14.8	-0.2	-17.8
Convert to 15 mins - dB	-8.8	-0.3	-
Distance attenuation correction - dB	-10.1	-7.6	-10.1
Activity $L_{Aeq\,1\,hr}$	37.1 dB	38.2 dB	33.1 dB
Activity $L_{Aeq\,15\,mins}$	43.1 dB	38.1 dB	-
Rating level correction	0 dB	6 dB	3 dB
Resultant daytime rating level $L_{Ar,\,Tr}$	37.1 dB	44.2 dB	36.1 dB
Resultant nighttime rating level $L_{Ar,\,Tr}$	43.1 dB	44.1 dB	-
Overall delivery activity noise (arrival, unloading, departure) $L_{Aeq\,1\,hr}$	**41 dB**		
Overall delivery activity noise (arrival + unloading) $L_{Aeq\,15\,mins}$	**44 dB**		
Rating level dB $L_{Aeq\,1\,hr}$	**45 dB**		
Rating level dB $L_{Aeq\,15\,mins}$	**47 dB**		
Delivery noise activity - predicted peak noise levels (L_{Amax})			
Source noise level at 10 metres L_{amax}	73	82	74
Distance between noise source and residential property in metres	32	24	32
Screening attenuation dB	5	14	5
Distance attenuation correction - dB	-10.1	-7.6	-10.1
Peak noise level L_{Amax}	**58 dB**	**60 dB**	**59 dB**

Appendix C2: Screening calculations

Appendix D2.1

BASIC BARRIER ATTENUATION

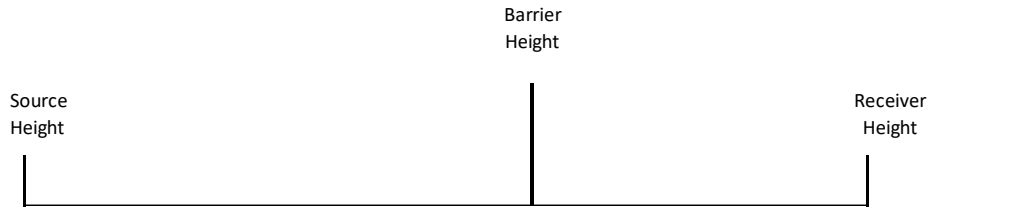
(based on Maekawa or CRTN)

Receptor: **12 Insley Gardens**

Project: **Hucclecote Road, Gloucester**

Source: **Delivery activity: arrival and departure**

Receiver: **12 Insley Gardens**



Source-to-Barrier Distance	15.0 m
Receiver-to-Barrier Distance	17.0 m

Source Height	1.0 m
Receiver Height	4.5 m
Barrier Height	2.5 m

Acoustic fence

Path difference = 0.001 m

Frequency - Hz	63	125	250	500	1K	2K	4K	8K	CRTN
Attenuation - dB	**4.8**	**4.7**	**4.7**	**4.7**	**4.6**	**4.3**	**3.9**	**2.7**	**4.6 dBA**

Appendix D2.2

BASIC BARRIER ATTENUATION

(based on Maekawa or CRTN)

Receptor: **12 Insley Gardens**

Project: **Hucclecote Road, Gloucester**

Source: **Delivery activity: unloading**

Receiver: **12 Insley Gardens**

Source-to-Barrier Distance	4.5 m
Receiver-to-Barrier Distance	19.5 m

Source Height	1.2 m
Receiver Height	4.5 m
Barrier Height	4.0 m

Acoustic fence

Path difference = 0.581 m

Frequency - Hz	63	125	250	500	1K	2K	4K	8K	CRTN
Attenuation - dB	**8.6**	**10.6**	**13.0**	**15.7**	**18.5**	**21.4**	**24.4**	**27.4**	**13.6 dBA**

APPENDIX D3: Assessment of delivery activity noise using BS 4142:2014+A1:2019

APPENDIX D3.1

Results	**Time**											**Relevant clause**	**Commentary**
	27.11.20		28.11.20			29.11.20					30.11.20		
	21:00:00	22:00:00	06:00:00	21:00:00	22:00:00	07:00:00	08:00:00	18:00:00	19:00:00	20:00:00	06:00:00		
Receptor	**12 Insley Gardens**												
Background sound level dB (L_{A90})	46 dB	46 dB	43 dB	43 dB	38 dB	41 dB	40 dB	39 dB	38 dB	39 dB	42 dB	**8.1, 8.1.3**	For daytime the background sound level is the $L_{A90\ 1hour}$ value, and night time $L_{A90\ 15\ minute}$ value, these are the lowest measured levels from the survey
Specific sound level - predicted delivery event noise level	41 dB	41 dB	44 dB	41 dB	41 dB	41 dB	41 dB	41 dB	41 dB	41 dB	44 dB		Predicted delivery activity noise level is $L_{Aeq\ 15\ minute}$ for nighttime and $L_{Aeq\ 1\ hour}$ for daytime
Acoustic feature correction (applied in delivery calc sheet)	rating level corection +6 dB											**9.2**	rating level corection of +6 dB is applied within delivery calculation to unloading activty for clearly perceptible impulsivity
Rating level	45 dB	45 dB	47 dB	45 dB	45 dB	45 dB	45 dB	45 dB	45 dB	45 dB	47 dB	**9.2**	
Background sound level	46 dB	46 dB	43 dB	43 dB	38 dB	41 dB	40 dB	39 dB	38 dB	39 dB	42 dB	**8.1**	
Excess of rating level over background level	-1	-1	+4	+2	+7	+4	+5	+6	+7	+6	+5	**11**	
Assessment is indicative of between low and adverse impact	**Relevant clause 11** The context is: 1. Predicted delivery event noise levels ($L_{Aeq\ 1\ hour}$) are below the WHO Community Noise daytime and night time guideline values 2. The predicted delivery event noise levels are generally below the existing daytime and night time ambient noise climate 3. In consideration of noise impact that may occur during the early morning period, the difference between an external rating noise level and the existing (external) background noise level does not best represent the true impact. This is because people are generally inside properties at this time sleeping. Therefore the key noise impact indicator is the absolute level of noise in relation to sleep disturbance criteria, such as those contained in the WHO CNG.												
Uncertainty of the assessment	**Relevant clause 10**												
	Weather conditions during the survey were good and as such are not considered to have influenced the measured background noise climate												
	The excess of the rating level over the background sound level is between -1 dB and +7 dB in this instance the uncertainty of the measurement is unlikey to have any significance to the outcome of the assessment.												
	The night time background noise levels used in this assessment are the lowest 15 minute sample in each hour, as opposed to the typical $L_{A90\ 15\ minute}$ value as required by BS 4142:2014+A1:2019. This provides a more robust assessment than is required by the Standard.												
	Uncertainty of the delivery noise source data is reduced by comparing the measured delivery activity noise levels at this store with the large sample of delivery activity source noise levels collected at numerous Aldi stores nationwide.												

APPENDIX E

ACOUSTIC TERMINOLOGY

Acoustic Terminology

E1 Noise, defined as unwanted sound, is measured in units of decibels, dB. The range of audible sounds is from 0 dB to 140 dB. Two equal sources of sound, if added together will result in an increase in level of 3 dB, i.e. 50 dB + 50 dB = 53 dB. Increases in continuous sound are perceived in the following manner:

1 dB increase - barely perceptible.

3 dB increase - just noticeable.

10 dB increase - perceived as twice as loud.

E2 Frequency (or pitch) of sound is measured in units of Hertz. 1 Hertz (Hz) = 1 cycle/second. The range of frequencies audible to the human ear is around 20Hz to 18000Hz (or 18kHz). The capability of a person to hear higher frequencies will reduce with age. The ear is more sensitive to medium frequency than high or low frequencies.

E3 To take account of the varying sensitivity of people to different frequencies a weighting scale has been universally adopted called "A-weighting". The measuring equipment has the ability automatically to weight (or filter) a sound to this A scale so that the sound level it measures best correlates to the subjective response of a person. The unit of measurement thus becomes dBA (decibel, A-weighted).

E4 The second important characteristic of sound is amplitude or level. Two units are used to express level, a) sound power level - L_w and b) sound pressure level - L_p. Sound power level is an inherent property of a source whilst sound pressure level is dependent on surroundings/distance/directivity, etc. The sound level that is measured on a meter is the sound pressure level, L_p.

E5 External sound levels are rarely steady but rise or fall in response to the activity in the area - cars, voices, planes, birdsong, etc. A person's subjective response to different noises has been found to vary dependent on the type and temporal distribution of a particular type of noise. A set of statistical indices have been developed for the subjective response to these different noise sources.

E6 The main noise indices in use in the UK are:

L_{A90}: The sound level (in dBA) exceeded for 90% of the time. This level gives an indication of the sound level during the quieter periods of time in any given sample. It is used to describe the "background sound level" of an area.

L_{Aeq}: The equivalent continuous sound level in dBA. This unit may be described as "the notional steady noise level that would provide, over a period, the same energy as the intermittent noise". In other words, the energy average level. This unit is now used to measure a wide variety of different types of noise of an industrial or commercial nature, as well as aircraft and trains.

L_{A10}: The sound level (in dBA) exceeded for 10% of the time. This level gives an indication of the sound level during the noisier periods of time in any given

sample. It has been used over many years to measure and assess road traffic noise.

L_{AMAX}: The maximum level of sound measured in any given period. This unit is used to measure and assess transient noises, i.e. gun shots, individual vehicles, etc.

E7 The sound energy of a transient event may be described by a term SEL - Sound Exposure Level. This is the L_{Aeq} level normalised to one second. That is the constant level in dBA which lasting for one second has the same amount of acoustic energy as a given A weighted noise event lasting for a period of time. The use of this unit allows the prediction of the L_{Aeq} level over any period and for any number of events using the equation;

$$L_{AeqT} = SEL + 10 \log n - 10 \log T \text{ dB}.$$

Where

n = Number of events in time period T.

T = Total sample period in seconds.

E8 In the open, known as free field, sound attenuates at a rate of 6 dB per each doubling of distance. This is known as geometric spreading or sometimes referred to as the Inverse Square Law. As noise is measured on a Logarithmic scale, this attenuation in distance = 20 Log (ratio of distances), e.g. for a noise level of 60 dB at ten metres, the corresponding level at 160 metres is:

$$60 - 20 \text{ Log } {}^{160}/_{10} = 60 - 24 = 36 \text{ dB}.$$

Reference: Aldi Hucclecote Road, Gloucester; proposal to extend permitted delivery hours
Application reference: 20/01306
SR Project No: 2020030

Technical note

Comments responding to EHO planning application consultation

Introduction

- This technical note is provided in response to the comments received from Toni Ainscough, Environmental Health Officer at Worcestershire Regulatory Services (WRS), in an email, dated 5th March 2021, in relation to the Sharps Redmore (SR) noise assessment report (reference R1, dated 11th December 2020), that accompanied the planning application (reference 20/01306).
- The comments from the EHO are objective and reasonable; this note seeks to provide the technical clarifications sought.

Response to queries raised

1 Toni Ainscough [TA] wrote:

"*Within the main body of the report, the reliance is primarily of the World Health Organisation (WHO) levels which is a totally acceptable standard for comparison. My concern is how close the levels are to acceptability and there is no information that I can see which details how many LAmax incidents it is anticipated that a delivery will cause. I understand from reading the report that an arrival unloading and delivery event cycle is an hour (ish) but in the context of WHO levels the anticipated Lmax events is important as over ten occurrences is unfavourable and is suggested will disturb sleep. I understand from reading the report that this data should be available for comparison. The context of this question is discussed below, any further comment would be much appreciated*".

Keith Metcalfe [KM] wrote:

Figure 1 to this note provides a 1 second time trace of the peak noise levels from the three deliveries measured that occur during the night time period. The levels are the peak noise levels (L_{Amax}) at a distance of approximately 3 metres from the closest point of unloading activity.

The three night time deliveries shown at Figure 1 vary in duration from 30 mins to 1 hour 20 minutes, depending on the number of pallets to be off loaded. A full Aldi delivery wagon can have up to 38 pallets on board.

In terms of overall noise level, the first two deliveries produced the highest noise levels of typically 78 to 80 dB L_{Amax} at 3 metres, with a couple of other peak noise levels across the three deliveries of 85.9 dB L_{Amax} (from the first delivery) and 83.3 dB L_{Amax} (from the third delivery) both from the vehicle upon arrival.

When normalised to 10 metres these levels correspond to typical values of 68 to 70 dB L_{Amax}, and hence are consistent with those in Table 5 of the SR noise assessment report.

The first (and longest delivery) has the most peak noise events, with typically 50 events during unloading activity. The second delivery was the shortest in duration with just over 20 peak noise events, and the third delivery had just under 40 peak noise events.

In relation to absolute peak noise level and number of exceedances, the guidance in WHO Guidelines for Community Noise states:

"*For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB LAmax more than 10-15 times per night (Vallet and Vernet 1991)…*"

TA wrote:

"The World Health Organisation document – Guidelines on Community Noise advises of certain 'acceptable' noise levels at night time (23:00-07:00) and day time (07:00-23:00) levels.

This is important as this variation requests an hour that falls into the night time criteria (weekdays) and I believe the focus should be on how this could effect sleep.

Table 1: Guideline values for community noise in specific environments.

Specific environment	Critical health effect(s)	L_{Aeq} [dB(A)]	Time base [hours]	L_{Amax} fast [dB]
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling, indoors	Speech intelligibility & moderate annoyance, daytime & evening	35	16	
Inside bedrooms	Sleep disturbance, night-time	30	8	45

Below is the results from the noise report submitted in support of this application.

TABLE 8: Comparison of predicted delivery event noise levels with the WHO CNG values

Noise level	Parameter	
	$L_{Aeq\,T}$	L_{Amax}
Receptor	12 Insley Gardens	
Predicted delivery event noise level day/night [1]	41/44	58-59/60
WHO guideline daytime/night time noise value [2]	55/45	60
Comply with WHO day/night time guidelines	YES	YES

Notes

[1] Where $L_{Aeq\,T}$ = 1 hour daytime, 15 minutes night time

[2] Where $L_{Aeq\,T}$ = 16 hour daytime and 8 hour night time

A 12-15dB reduction can be assumed for a partially open window so it can be seen from above that there is the potential here for the increased hours to disturb sleep (inside bedrooms for both LAeq measurements and LAmax)".

KM response:

It is agreed that the principle assessment concern with regard to the proposal to allow deliveries within the night time period are associated peak noise levels in the context of recognised sleep disturbance criteria. In particular consideration should be given to the level and frequency of occurrence of peak noise events.

With regard to the 1 second resolution peak noise levels associated with all three night time delivery events presented at Figure 1, there are only two events that would result in predicted noise levels at the closest residential properties above 60 dB L_{Amax}. It is appreciated that the predicted peak noise levels are close to the WHO peak noise guideline value, but they do not typically exceed the 60 dB L_{Amax} value associated with the onset of sleep disturbance (at the nearest residential properties).

The National Physical Laboratory (NPL) 1998 report entitled "Health effects based noise assessment methods: a review and feasibility study" was a review of the, then, draft WHO guidelines for Community Noise. The summary of this report explains "*In essence, the WHO guidelines represent a consensus view of international expert opinion on the lowest threshold noise levels below which the occurrence rates of particular effects can be assumed to be negligible. Exceedances of the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached".*

External WHO guideline values are derived from the internal values "*by assuming that noise reduction from outside to inside with the window open is 15 dB*". It is accepted that other publications contain a range of attenuation levels provided by open or partially open windows, however in the context of this assessment with regard to the WHO Guidelines for Community, the 15 dB value is consistent and appropriate.

TA wrote:

"It is acknowledged using the assessment criteria of BS 4142 that deliveries will give a rating level of +5 at the sensitive times that this application seeks to remove the condition of deliveries. Any rating level over the background noise level that is over 3dB is considered audibly perceptible. This calculation also relies on a character correction of +6dB.

Could the justification for a correction of +6dB please be provided and in point 4.7-4.6 within the noise report 'context' is referred to however the reliance on such is not explained so if this point could please be expanded upon".

KM response:

The +6 dB rating level correction is made on the basis of clearly perceptible impulsivity as explained at Appendix D3. It is considered that, with windows open, inside the closest residences, as a worse case, delivery activity noise may be clearly audible. However, as outlined above, predicted peak noise levels from delivery activity are below the level at which the onset of sleep disturbance would occur.

General contextual considerations are described at paragraph 2.19, with the main considerations in this instance being that BS 4142 is not the most appropriate assessment method in this instance, for the reason explained at paragraph 2.7. Another key contextual consideration is that physical mitigation is in place in the form of extensive acoustic screening around the loading bay area.

TA wrote:

"*I note from the noise report that there is a helpful section on what the store could do in terms of noise management to assist with neighbourly relations. These are welcomed and should be taken on board by Aldi particularly as from reading the objections to this application, neighbourly relations are not on the best terms. It is not possible to condition these recommendations however there is work that clearly needs to be done here to aid harmony. I note from the report that the noisiest activity is when pallets are moved within the wagon over levelling plates when deliveries occur. Is there any specific mitigation that could be applied here such as rubber matting to try and assist with noisy activities?*"

KM response:

The noise reduction measures presented at Section 5 of the noise assessment report are recommended to the store management for implementation. These measures could be secured by the imposition of an appropriately worded planning condition.

In terms of noise associated with the movement of pallets over the levelling plates. Nominal reductions of a 2-3 dB have been found when pallet trucks with rubber wheels are used, and such could be used at this site, and secured as a measure within a delivery noise management plan.

Rubber matting and alike have been trialled by many retailers over the years. Unfortunately, such measures have been found to introduce health and safety issues, for example, by using matting or rubber damping material on the levelling plates increases the height of the gap between the levelling plate and wagon/store, which can lead to pallets becoming unbalanced as they are moved into the warehouse. Another issue with such systems is the limited durability of such materials, such that any acoustic benefit has an extremely short life span.

Keith Metcalfe BSc(Hons), MIOA 8th March 2021

FIGURE 1A:

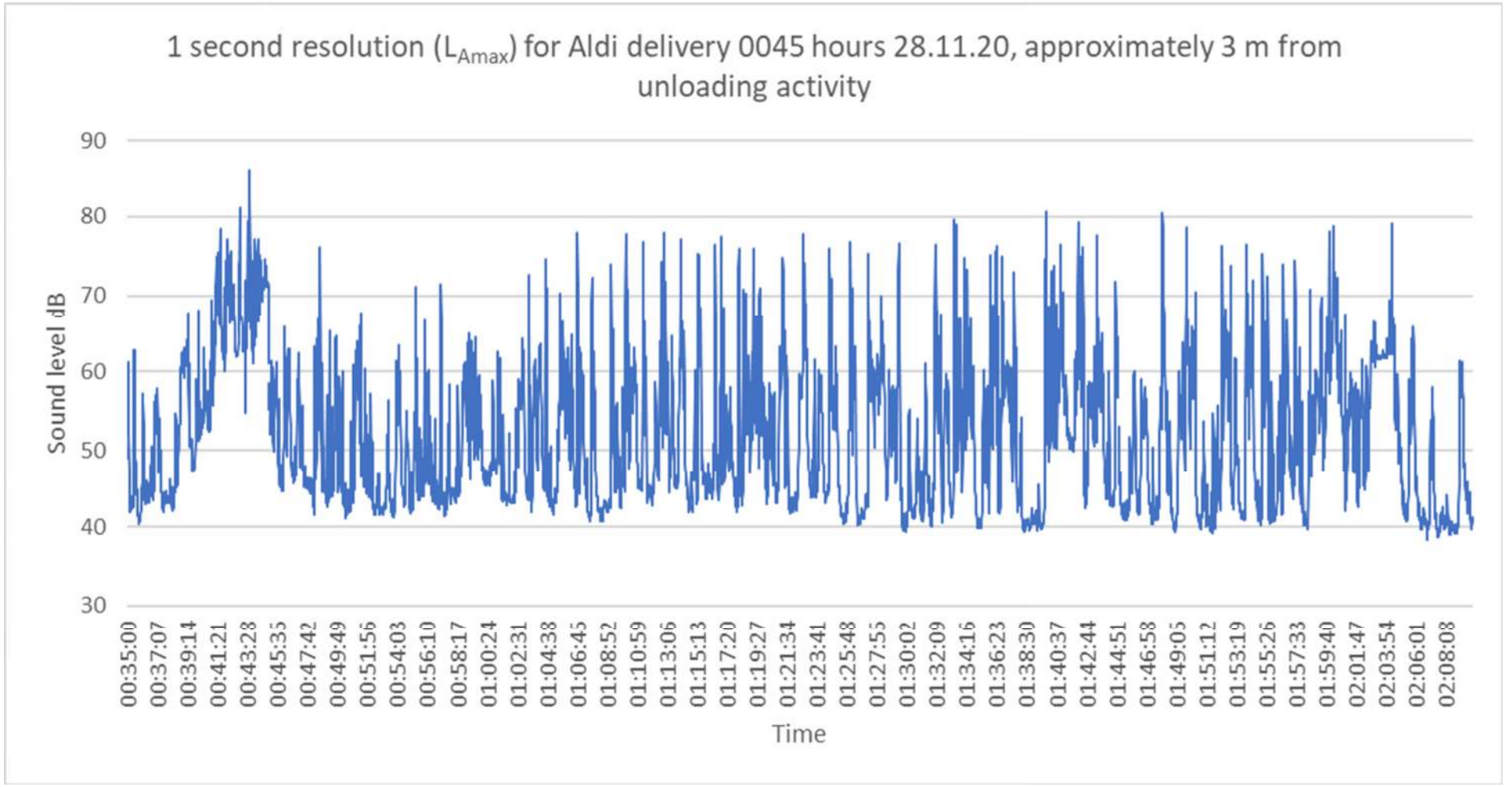

1 second resolution (L_{Amax}) for Aldi delivery 0045 hours 28.11.20, approximately 3 m from unloading activity
Sound level dB
90
80
70
60
50
40
30
00:35:00
00:37:07
00:39:14
00:41:21
00:43:28
00:45:35
00:47:42
00:49:49
00:51:56
00:54:03
00:56:10
00:58:17
01:00:24
01:02:31
01:04:38
01:06:45
01:08:52
01:10:59
01:13:06
01:15:13
01:17:20
01:19:27
01:21:34
01:23:41
01:25:48
01:27:55
01:30:02
01:32:09
01:34:16
01:36:23
01:38:30
01:40:37
01:42:44
01:44:51
01:46:58
01:49:05
01:51:12
01:53:19
01:55:26
01:57:33
01:59:40
02:01:47
02:03:54
02:06:01
02:08:08
Time

FIGURE 1B:

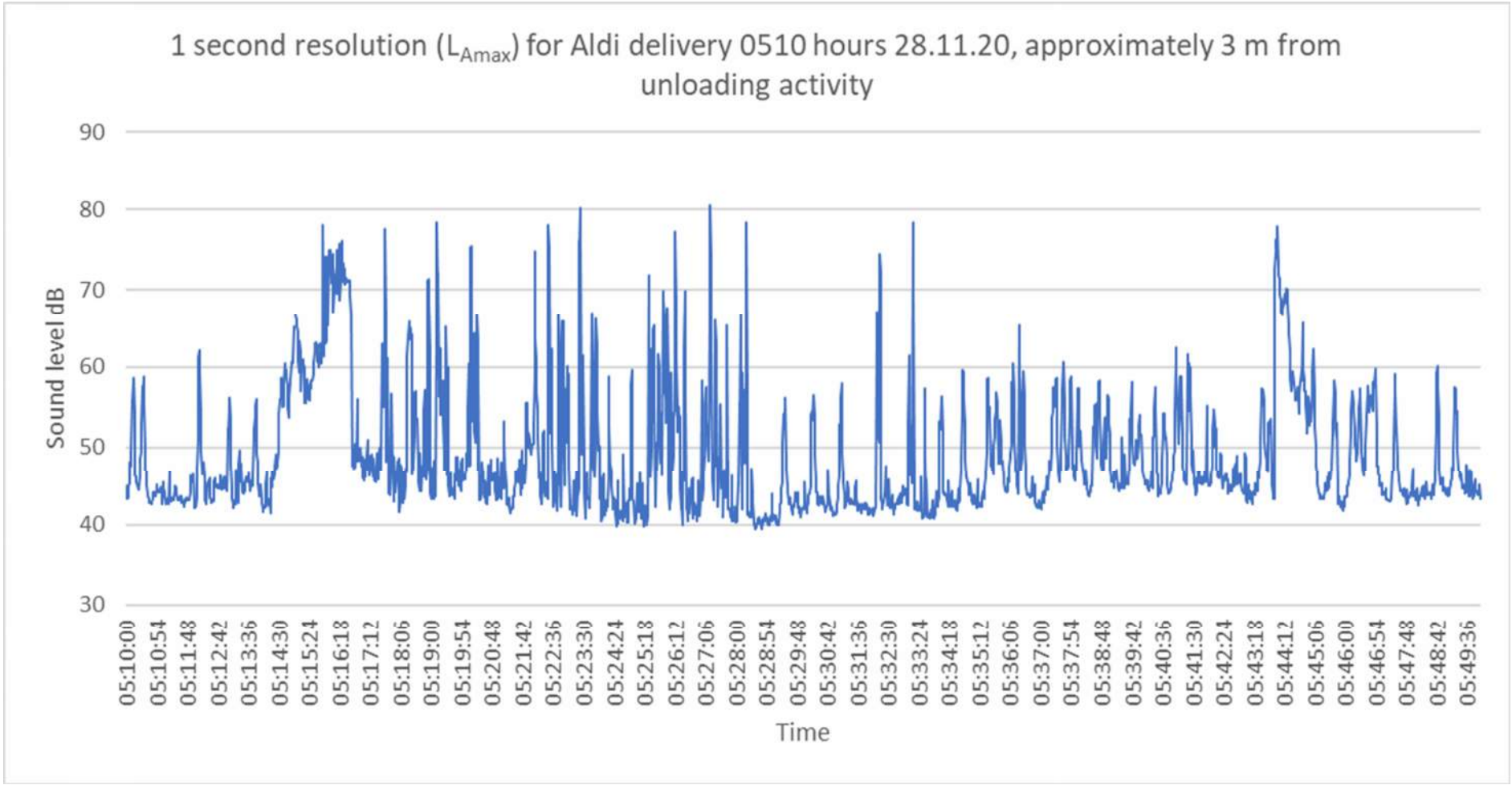
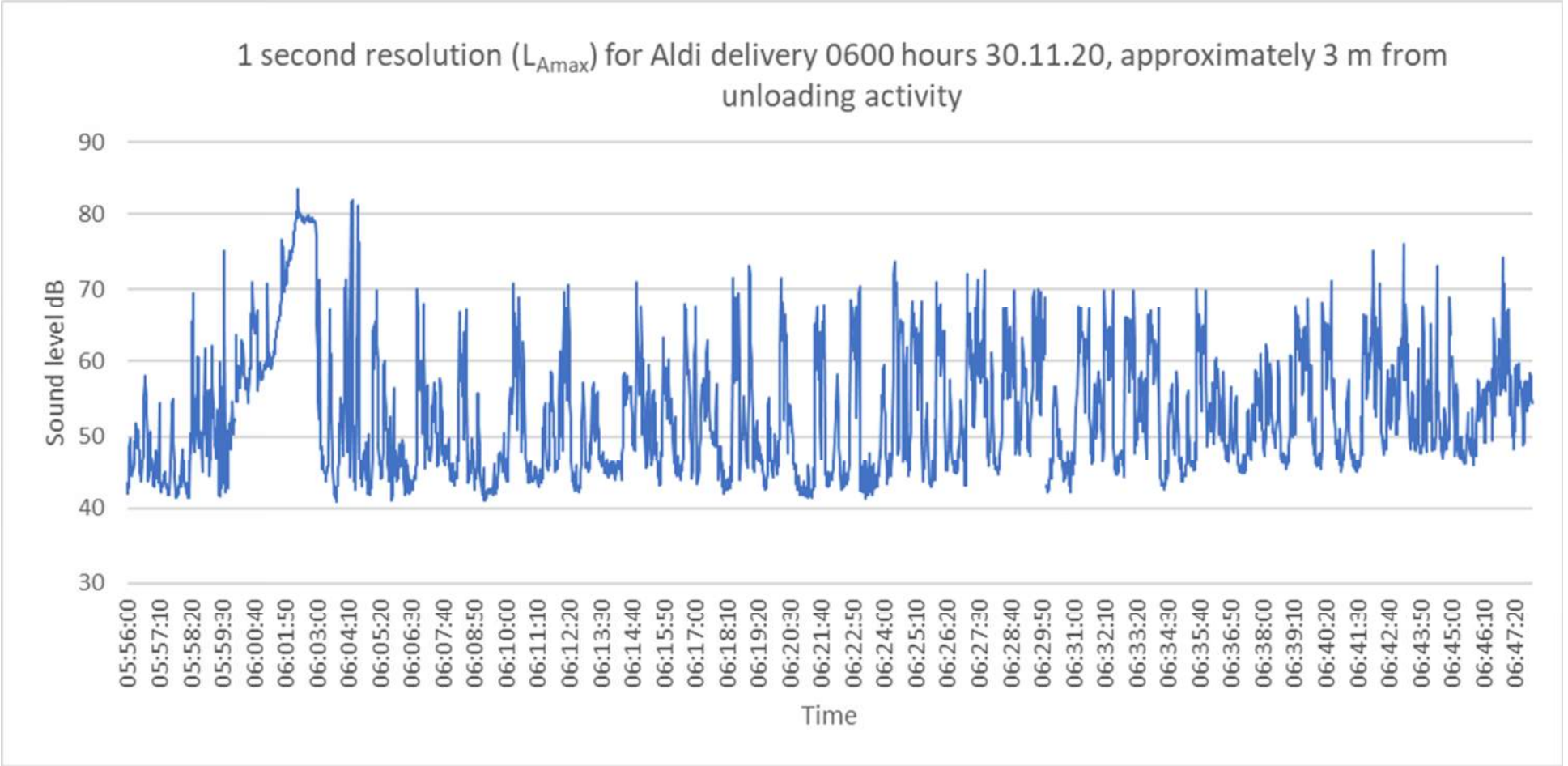

1 second resolution (L_{Amax}) for Aldi delivery 0510 hours 28.11.20, approximately 3 m from unloading activity
Sound level dB
90
80
70
60
50
40
30
05:10:00
05:10:54
05:11:48
05:12:42
05:13:36
05:14:30
05:15:24
05:16:18
05:17:12
05:18:06
05:19:00
05:19:54
05:20:48
05:21:42
05:22:36
05:23:30
05:24:24
05:25:18
05:26:12
05:27:06
05:28:00
05:28:54
05:29:48
05:30:42
05:31:36
05:32:30
05:33:24
05:34:18
05:35:12
05:36:06
05:37:00
05:37:54
05:38:48
05:39:42
05:40:36
05:41:30
05:42:24
05:43:18
05:44:12
05:45:06
05:46:00
05:46:54
05:47:48
05:48:42
05:49:36
Time

FIGURE 1C:


1 second resolution (L_{Amax}) for Aldi delivery 0600 hours 30.11.20, approximately 3 m from unloading activity
Sound level dB
90
80
70
60
50
40
30
05:56:00
05:57:10
05:58:20
05:59:30
06:00:40
06:01:50
06:03:00
06:04:10
06:05:20
06:06:30
06:07:40
06:08:50
06:10:00
06:11:10
06:12:20
06:13:30
06:14:40
06:15:50
06:17:00
06:18:10
06:19:20
06:20:30
06:21:40
06:22:50
06:24:00
06:25:10
06:26:20
06:27:30
06:28:40
06:29:50
06:31:00
06:32:10
06:33:20
06:34:30
06:35:40
06:36:50
06:38:00
06:39:10
06:40:20
06:41:30
06:42:40
06:43:50
06:45:00
06:46:10
06:47:20
Time

APPENDIX C

NOISE SURVEY RESULTS (2020 AND 2021 SURVEYS)

Appendix C1	Title: Noise survey results

Aldi Hucclecote Road, Gloucester: 2020 survey

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
27.11.20	12:15:00	54.5	48.0	53.0	69.7	43.5
	12:30:00	53.6	47.1	53.0	77.8	42.0
	12:45:00	53.6	47.8	52.3	76.1	44.5
	13:00:00	53.2	47.6	51.2	65.3	43.7
	13:15:00	72.8	48.9	65.9	81.6	45.4
	13:30:00	54.2	47.2	57.2	83.5	42.3
	13:45:00	58.8	47.5	59.8	86.8	43.5
	14:00:00	62.2	49.2	62.0	85.2	45.7
	14:15:00	61.3	47.7	60.0	83.1	43.7
	14:30:00	52.7	47.5	50.9	72.6	43.8
	14:45:00	54.7	47.7	52.9	69.9	43.2
	15:00:00	54.0	48.8	56.6	83.9	45.5
	15:15:00	53.3	47.9	53.0	74.4	45.3
	15:30:00	54.7	48.4	52.3	67.0	45.0
	15:45:00	53.7	47.8	51.5	67.5	45.2
	16:00:00	53.5	48.0	51.6	71.1	45.3
	16:15:00	54.1	49.6	52.5	72.5	46.3
	16:30:00	55.3	49.6	52.9	66.6	46.6
	16:45:00	54.0	50.0	52.4	67.2	47.5
	17:00:00	55.2	50.2	54.5	68.0	47.8
	17:15:00	55.3	50.7	53.7	67.2	48.7
	17:30:00	55.1	50.7	53.5	64.4	47.8
	17:45:00	55.1	51.0	53.4	63.5	47.8
	18:00:00	55.4	51.6	53.9	65.9	49.1
	18:15:00	58.3	51.3	59.9	88.3	48.0
	18:30:00	57.8	52.1	58.9	82.3	48.8
	18:45:00	60.0	50.8	61.4	88.5	47.0
	19:00:00	56.1	49.0	58.2	81.0	46.3
	19:15:00	54.8	47.8	52.8	74.1	45.5
	19:30:00	55.1	47.8	54.1	79.1	44.9
	19:45:00	55.7	48.7	53.1	68.3	45.6
	20:00:00	54.7	48.3	52.0	62.6	46.1
	20:15:00	54.2	45.8	51.1	63.1	43.1
	20:30:00	54.6	46.3	51.5	61.4	43.0
	20:45:00	55.9	47.9	52.9	61.4	45.6
	21:00:00	56.8	48.2	53.6	65.1	45.8
	21:15:00	55.6	46.2	52.2	68.8	43.6
	21:30:00	55.3	46.1	52.0	64.5	43.8
	21:45:00	55.7	45.4	52.2	72.0	43.5
	22:00:00	56.8	49.2	53.5	65.8	48.2
	22:15:00	57.3	47.0	53.9	69.5	43.4
	22:30:00	55.6	44.9	51.9	64.0	42.3
	22:45:00	56.6	43.2	52.3	66.1	41.1
	23:00:00	54.0	44.0	50.3	62.9	40.9
	23:15:00	56.0	45.3	52.4	76.0	42.9
	23:30:00	58.8	44.9	54.4	66.0	42.3
	23:45:00	58.4	44.7	54.0	71.3	41.2
28.11.20	00:00:00	58.2	43.0	53.2	66.2	39.9
	00:15:00	58.4	41.0	53.2	70.7	39.0
	00:30:00	66.9	41.9	62.8	85.9	39.3
	00:45:00	58.3	41.7	53.5	76.1	39.9

Appendix C2	Title: Noise survey results

Aldi Hucclecote Road, Gloucester: 2020 survey

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
28.11.20	01:00:00	59.4	42.2	56.3	78.0	39.5
	01:15:00	60.2	41.7	57.4	77.8	38.4
	01:30:00	60.5	40.1	58.3	80.6	38.3
	01:45:00	60.4	40.2	57.3	80.5	38.3
	02:00:00	61.7	39.1	57.5	79.2	37.1
	02:15:00	57.0	38.5	51.3	64.5	36.4
	02:30:00	56.0	39.9	51.3	68.3	38.0
	02:45:00	55.8	39.1	51.1	65.3	37.2
	03:00:00	48.1	38.5	46.0	61.5	35.7
	03:15:00	46.2	38.9	46.2	65.1	36.2
	03:30:00	46.8	38.2	45.3	61.1	36.2
	03:45:00	48.3	39.0	49.2	81.9	36.4
	04:00:00	45.7	37.8	44.7	60.9	35.7
	04:15:00	44.1	40.7	44.0	60.8	39.0
	04:30:00	49.1	42.1	47.1	61.2	39.8
	04:45:00	48.7	43.0	47.9	74.0	40.3
	05:00:00	49.3	42.6	48.2	65.0	40.7
	05:15:00	61.7	40.3	59.8	80.5	38.2
	05:30:00	55.4	41.5	55.8	78.3	39.6
	05:45:00	53.3	42.7	49.3	64.5	40.6
	06:00:00	50.2	42.9	49.3	77.4	40.3
	06:15:00	52.6	44.0	49.6	69.8	41.9
	06:30:00	54.2	45.5	50.7	66.1	43.3
	06:45:00	55.5	47.3	52.3	62.1	45.3
	07:00:00	55.1	46.9	51.5	62.2	44.9
	07:15:00	55.5	47.1	51.9	65.0	44.6
	07:30:00	55.8	47.6	52.5	72.0	45.5
	07:45:00	55.3	47.3	52.0	67.8	45.4
	08:00:00	54.5	47.3	51.5	65.3	44.4
	08:15:00	54.7	47.8	53.9	84.5	45.1
	08:30:00	54.9	48.5	52.6	73.6	46.0
	08:45:00	55.5	49.2	53.0	69.9	45.3
	09:00:00	55.1	49.7	54.6	79.7	46.6
	09:15:00	55.0	49.0	52.6	64.1	45.9
	09:30:00	54.3	48.3	52.0	67.9	45.8
	09:45:00	55.2	48.6	52.6	64.0	45.7
	10:00:00	54.5	48.5	52.3	65.1	44.8
	10:15:00	54.0	48.5	51.7	65.2	45.9
	10:30:00	65.9	50.3	64.6	91.9	47.4
	10:45:00	70.9	49.3	66.4	90.6	45.3
	11:00:00	54.9	49.1	53.3	77.5	45.5
	11:15:00	53.7	49.0	52.1	69.8	46.5
	11:30:00	67.4	50.9	64.9	89.1	48.3
	11:45:00	57.6	50.7	56.5	76.4	48.8
	12:00:00	59.0	50.1	59.3	81.7	46.9
	12:15:00	60.1	48.9	57.2	79.2	45.3
	12:30:00	58.1	49.4	56.6	81.5	46.2
	12:45:00	62.0	48.7	60.0	87.6	43.8
	13:00:00	54.4	48.6	62.2	91.8	44.9
	13:15:00	60.2	50.8	57.1	76.4	46.6
	13:30:00	56.2	49.0	58.0	82.6	44.8

Appendix C3	Title: Noise survey results

Aldi Hucclecote Road, Gloucester: 2020 survey

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
28.11.20	13:45:00	53.3	48.0	51.4	72.3	44.7
	14:00:00	53.6	47.8	51.6	65.1	43.4
	14:15:00	53.8	48.1	51.6	64.5	44.2
	14:30:00	53.8	47.6	51.7	75.0	43.3
	14:45:00	56.8	50.1	55.2	78.7	45.2
	15:00:00	57.2	50.7	56.0	79.6	45.0
	15:15:00	53.8	46.9	51.3	66.4	42.0
	15:30:00	54.6	47.8	58.0	82.7	44.0
	15:45:00	55.5	49.0	53.1	65.3	45.8
	16:00:00	54.9	47.9	52.5	69.3	44.2
	16:15:00	54.3	48.5	52.6	78.2	44.6
	16:30:00	55.5	47.3	52.9	65.6	42.4
	16:45:00	54.9	46.4	52.1	65.1	40.5
	17:00:00	54.4	46.4	51.8	72.1	42.0
	17:15:00	54.9	47.6	52.7	69.9	42.7
	17:30:00	54.8	46.2	52.1	72.5	41.7
	17:45:00	55.3	48.1	53.4	81.4	42.6
	18:00:00	57.3	51.6	54.9	70.5	48.3
	18:15:00	57.4	47.5	53.8	67.8	42.2
	18:30:00	54.9	47.2	54.0	78.8	42.7
	18:45:00	55.2	46.3	53.1	79.7	42.1
	19:00:00	55.0	45.4	51.9	68.8	41.4
	19:15:00	55.6	44.5	52.4	68.1	40.0
	19:30:00	55.3	44.2	54.3	81.1	40.6
	19:45:00	54.9	45.4	52.0	71.2	40.4
	20:00:00	54.8	43.6	51.3	64.3	39.2
	20:15:00	54.2	41.2	50.5	69.8	38.1
	20:30:00	55.3	41.6	51.5	64.8	37.5
	20:45:00	56.4	43.9	52.8	63.0	39.3
	21:00:00	55.8	43.2	52.1	66.1	39.3
	21:15:00	56.1	44.9	52.5	64.4	42.0
	21:30:00	55.8	43.5	51.9	63.4	40.6
	21:45:00	56.0	41.7	51.8	61.5	39.6
	22:00:00	55.8	40.5	52.3	79.7	37.4
	22:15:00	55.7	38.0	53.0	84.0	34.2
	22:30:00	52.8	36.5	47.8	61.7	34.6
	22:45:00	53.7	36.6	48.9	63.7	34.1
	23:00:00	54.6	39.0	51.0	69.5	35.6
	23:15:00	53.4	39.9	49.4	63.8	37.2
	23:30:00	54.6	40.8	50.0	70.2	38.1
	23:45:00	53.6	38.1	49.7	69.4	35.1
29.11.20	00:00:00	51.6	36.7	47.2	62.2	34.7
	00:15:00	53.1	35.9	48.0	62.0	33.1
	00:30:00	48.8	35.9	47.1	67.3	33.3
	00:45:00	42.1	35.5	43.6	63.1	33.7
	01:00:00	41.8	35.2	42.4	62.4	33.0
	01:15:00	43.8	35.1	43.0	59.5	32.4
	01:30:00	44.2	34.6	43.8	61.2	32.2
	01:45:00	46.5	34.3	45.3	64.1	31.8
	02:00:00	40.0	34.7	41.0	58.2	33.2
	02:15:00	42.4	33.8	44.8	63.4	32.4

Appendix C4	Title: Noise survey results

Aldi Hucclecote Road, Gloucester: 2020 survey

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
29.11.20	02:30:00	39.5	34.4	41.7	61.0	31.4
	02:45:00	38.6	33.9	40.7	61.9	31.6
	03:00:00	40.5	33.5	42.9	60.4	31.6
	03:15:00	37.5	33.7	39.3	59.7	32.1
	03:30:00	39.3	33.8	42.6	62.6	31.9
	03:45:00	36.7	33.4	38.9	58.6	31.2
	04:00:00	38.1	32.9	40.4	60.5	31.2
	04:15:00	37.4	32.9	38.6	59.2	29.2
	04:30:00	42.2	34.6	41.7	63.2	32.5
	04:45:00	42.7	33.4	41.7	65.2	29.9
	05:00:00	41.4	33.5	39.9	59.9	31.1
	05:15:00	41.1	34.0	39.8	58.3	32.0
	05:30:00	41.1	34.6	40.6	58.6	32.6
	05:45:00	48.9	35.7	45.9	63.5	33.3
	06:00:00	44.0	35.4	43.4	61.4	32.7
	06:15:00	43.5	35.8	43.2	61.2	33.5
	06:30:00	47.2	36.2	45.1	60.9	34.5
	06:45:00	75.2	37.1	66.8	79.0	34.3
	07:00:00	62.2	38.9	64.5	88.3	35.2
	07:15:00	58.0	42.3	58.1	85.9	37.8
	07:30:00	59.7	41.8	56.5	79.0	39.2
	07:45:00	61.2	39.7	57.1	76.0	37.5
	08:00:00	55.8	38.7	55.1	78.2	36.2
	08:15:00	61.5	38.1	58.8	82.1	34.3
	08:30:00	71.1	39.8	66.7	86.0	35.0
	08:45:00	56.8	41.9	58.0	80.7	38.3
	09:00:00	55.6	42.3	52.6	80.2	38.7
	09:15:00	55.4	43.0	51.9	76.8	40.0
	09:30:00	55.6	44.4	52.6	79.1	40.7
	09:45:00	54.8	45.7	51.8	69.1	42.2
	10:00:00	53.6	45.8	52.5	78.1	42.2
	10:15:00	52.7	46.2	50.3	61.7	41.4
	10:30:00	53.5	47.0	51.1	64.6	43.2
	10:45:00	52.9	47.5	53.0	81.6	42.5
	11:00:00	52.8	47.4	51.1	70.4	43.3
	11:15:00	53.0	47.9	50.9	65.7	44.1
	11:30:00	55.0	47.6	53.1	80.9	42.8
	11:45:00	55.6	46.5	52.0	65.7	41.6
	12:00:00	53.7	47.0	52.3	78.6	44.3
	12:15:00	53.5	47.6	52.2	74.4	43.6
	12:30:00	53.3	47.9	51.2	63.0	44.1
	12:45:00	53.6	47.6	52.1	76.2	43.7
	13:00:00	54.2	46.9	52.9	77.1	42.5
	13:15:00	63.3	46.6	62.3	79.2	42.2
	13:30:00	59.6	48.2	59.7	86.4	42.4
	13:45:00	62.6	47.6	63.1	88.2	43.1
	14:00:00	61.3	47.9	59.2	84.3	44.9
	14:15:00	58.9	48.2	60.5	87.0	44.2
	14:30:00	53.9	47.4	55.4	76.9	40.8
	14:45:00	53.4	45.4	51.1	71.4	42.3
	15:00:00	54.3	45.6	52.7	80.0	41.9

Appendix C5	Title: Noise survey results

Aldi Hucclecote Road, Gloucester: 2020 survey

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
29.11.20	15:15:00	53.6	45.9	52.4	74.9	41.5
	15:30:00	52.7	45.1	50.9	78.5	41.6
	15:45:00	53.9	46.4	51.2	63.4	40.1
	16:00:00	56.0	46.5	53.9	77.3	41.2
	16:15:00	56.1	46.9	54.3	81.2	42.5
	16:30:00	56.4	44.8	54.2	82.5	40.3
	16:45:00	56.0	41.0	60.8	88.3	36.4
	17:00:00	55.7	40.1	51.7	67.5	37.1
	17:15:00	55.6	43.4	51.8	68.6	39.8
	17:30:00	55.5	43.8	51.8	73.2	39.7
	17:45:00	55.4	43.6	51.9	74.0	37.7
	18:00:00	55.9	39.6	55.7	87.0	36.1
	18:15:00	55.2	39.6	50.9	68.3	35.7
	18:30:00	55.4	38.7	52.6	72.3	35.8
	18:45:00	55.4	39.3	50.8	63.5	34.8
	19:00:00	56.2	38.6	51.8	73.5	35.2
	19:15:00	55.6	38.3	51.2	66.2	35.8
	19:30:00	54.9	37.6	50.3	65.3	35.4
	19:45:00	55.7	38.8	51.0	63.8	36.8
	20:00:00	55.1	38.0	50.6	63.5	35.0
	20:15:00	54.3	37.5	49.6	63.1	35.2
	20:30:00	54.1	39.3	49.3	63.1	37.2
	20:45:00	54.7	39.8	50.2	68.7	36.8
	21:00:00	53.1	38.5	48.4	64.0	36.5
	21:15:00	52.8	37.5	50.2	76.2	35.0
	21:30:00	50.5	37.1	46.7	63.4	35.6
	21:45:00	53.0	37.1	48.2	63.4	35.0
	22:00:00	53.6	35.6	48.5	63.9	33.2
	22:15:00	51.1	34.5	47.2	63.7	31.5
	22:30:00	50.2	35.5	46.3	62.3	33.9
	22:45:00	48.6	34.5	45.4	62.3	32.4
	23:00:00	41.7	33.9	43.2	64.7	31.7
	23:15:00	46.0	34.0	44.0	62.1	32.3
	23:30:00	44.1	33.7	44.2	62.1	32.0
	23:45:00	47.2	35.3	44.6	61.2	33.5
30.11.20	00:00:00	48.7	36.8	45.9	63.2	34.5
	00:15:00	41.6	32.5	41.3	61.4	30.4
	00:30:00	37.5	32.1	39.6	60.8	30.5
	00:45:00	38.0	31.8	39.1	57.5	30.0
	01:00:00	37.4	33.1	37.8	59.7	31.4
	01:15:00	36.1	33.1	38.7	58.4	30.9
	01:30:00	35.7	32.2	38.2	59.9	30.9
	01:45:00	37.0	33.2	36.6	57.0	32.0
	02:00:00	36.5	33.2	36.9	56.5	30.8
	02:15:00	38.3	33.8	40.7	61.8	32.1
	02:30:00	38.8	33.7	41.3	64.3	32.2
	02:45:00	37.0	34.3	37.3	56.4	32.7
	03:00:00	38.6	34.2	41.1	62.1	32.6
	03:15:00	39.0	34.7	40.6	60.0	32.6
	03:30:00	43.6	35.4	49.8	74.1	33.3
	03:45:00	43.1	35.2	41.6	58.8	33.8

Appendix C6	Title: Noise survey results

Aldi Hucclecote Road, Gloucester: 2020 survey

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
30.11.20	04:00:00	39.0	34.9	41.4	64.7	33.2
	04:15:00	40.1	35.2	42.5	62.3	33.1
	04:30:00	41.0	34.8	40.5	60.1	32.6
	04:45:00	48.5	37.0	48.6	71.0	34.3
	05:00:00	49.2	38.6	46.2	60.8	36.4
	05:15:00	52.2	40.2	48.5	61.9	37.3
	05:30:00	53.2	39.6	48.9	63.9	37.6
	05:45:00	53.6	40.5	50.0	75.2	38.0
	06:00:00	66.5	42.3	67.3	83.3	40.1
	06:15:00	60.7	42.4	56.8	73.6	40.4
	06:30:00	60.9	44.6	56.4	76.1	41.4
	06:45:00	60.0	47.6	58.1	85.4	44.8
	07:00:00	57.5	48.1	58.1	84.6	45.3
	07:15:00	56.9	48.0	55.8	77.0	45.3
	07:30:00	56.7	48.8	53.8	69.3	45.0
	07:45:00	57.1	50.0	54.7	72.1	46.6
	08:00:00	57.3	50.1	55.1	70.3	47.3
	08:15:00	57.4	50.8	55.9	77.8	47.7
	08:30:00	72.7	51.7	69.6	90.9	48.5
	08:45:00	57.5	52.0	56.2	81.3	48.9
	09:00:00	56.1	51.6	54.4	69.0	48.6
	09:15:00	57.3	53.2	55.9	78.8	50.5
	09:30:00	56.3	51.3	54.1	61.2	48.8
	09:45:00	56.3	50.4	54.3	76.2	48.4
	10:00:00	55.5	51.3	55.2	75.4	49.4
	10:15:00	55.0	50.7	53.1	64.8	48.6
	10:30:00	55.4	50.6	54.1	78.3	48.1
	10:45:00	68.1	52.1	64.3	87.3	49.4
	11:00:00	81.0	53.9	77.7	88.7	50.0
	11:15:00	56.2	51.5	57.7	81.2	49.3
	11:30:00	58.6	52.0	58.9	83.6	49.6
	11:45:00	60.6	51.5	60.2	84.9	48.5
	12:00:00	57.6	51.0	59.0	85.6	49.0
	12:15:00	64.2	51.9	63.0	82.0	48.2
	12:30:00	55.6	50.6	54.5	80.9	47.3
	12:45:00	55.5	50.7	53.5	68.8	48.3
	13:00:00	55.5	51.4	54.8	74.7	49.2
	13:15:00	55.9	51.7	54.2	66.4	49.6
	13:30:00	56.8	50.8	58.0	77.6	48.4
	13:45:00	55.2	50.8	54.1	79.1	47.8
	14:00:00	55.7	51.2	53.9	71.3	48.8
	14:15:00	55.7	51.2	54.1	66.1	48.6
	14:30:00	56.4	51.8	55.5	80.0	49.4
	14:45:00	55.5	51.8	54.1	73.0	50.1

Appendix C7	Title: Noise survey results

Aldi Hucclecote Road, Gloucester: 23rd to 24th November 2021

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
23.11.21	16:30	54.5	48.9	53.1	70.6	45.3
	16:45	54.7	48.9	52.5	64.9	44.3
	17:00	54.8	49.0	52.6	70.0	45.2
	17:15	55.2	48.6	52.8	71.0	44.7
	17:30	56.5	49.2	58.4	88.7	45.8
	17:45	56.2	48.7	57.5	80.0	44.5
	18:00	56.8	48.6	56.8	77.9	45.0
	18:15	57.1	49.3	57.8	82.8	45.6
	18:30	55.5	47.6	56.2	88.1	44.8
	18:45	56.8	51.0	55.4	78.5	47.2
	19:00	56.6	48.4	57.8	74.7	42.7
	19:15	55.3	47.3	53.2	80.6	41.3
	19:30	55.9	45.2	52.7	62.6	41.0
	19:45	54.6	45.4	51.5	64.8	40.9
	20:00	54.8	45.7	51.6	66.0	43.0
	20:15	55.1	46.8	52.0	68.1	44.1
	20:30	55.0	44.3	56.8	80.6	41.1
	20:45	55.2	44.1	51.3	63.8	42.3
	21:00	55.1	43.8	51.2	61.5	40.1
	21:15	54.6	43.1	51.9	76.7	39.4
	21:30	54.4	41.5	53.3	82.4	38.1
	21:45	53.7	40.5	49.5	61.7	37.5
	22:00	54.3	41.1	50.2	63.4	37.8
	22:15	54.7	39.4	50.5	64.3	36.2
	22:30	52.9	39.4	48.6	63.2	36.5
	22:45	49.9	38.3	46.2	62.6	35.0
	23:00	50.9	41.5	47.5	64.1	38.3
	23:15	47.5	41.6	45.4	60.1	37.6
	23:30	49.8	41.5	46.5	60.9	37.5
	23:45	47.0	41.5	45.5	60.9	36.0
24.11.21	00:00	45.8	41.5	45.1	61.7	36.5
	00:15	43.5	40.0	44.6	63.2	36.7
	00:30	42.5	40.2	42.6	61.2	34.8
	00:45	42.7	37.0	43.3	66.9	32.1
	01:00	43.0	41.1	42.5	55.3	36.1
	01:15	42.4	38.8	42.3	57.8	34.8
	01:30	42.0	35.1	40.8	59.1	33.2
	01:45	42.2	35.5	42.4	61.4	32.2
	02:00	42.7	36.2	41.8	57.9	33.4
	02:15	42.2	35.8	41.4	57.4	32.7
	02:30	44.0	37.7	44.0	61.3	35
	02:45	43.4	41.3	44.4	65.5	37.1
	03:00	43.4	41.4	43.4	58.7	39.5
	03:15	43.2	38.5	42.4	57.4	34.9
	03:30	44.1	40.8	44.4	63.8	37.1
	03:45	46.3	41.0	44.8	60.5	38.3
	04:00	44.6	38.4	42.8	57.2	35.6

Appendix C8	Title: Noise survey results

Aldi Hucclecote Road, Gloucester: 23rd to 24th November 2021

Date	Sample start time	Noise Parameter - dB				
		L_{A10}	L_{A90}	L_{Aeq}	L_{AFmax}	L_{AFmin}
24.11.21	04:15	45.0	39.5	44.0	60.1	37.5
	04:30	45.6	40.3	45.2	61.6	36.3
	04:45	45.4	42.0	44.8	61.8	38.2
	05:00	46.6	42.2	45.4	60.0	38.4
	05:15	48.7	42.3	46.2	59.6	40.2
	05:30	51.9	42.8	48.4	62.0	41.5
	05:45	54.0	43.5	50.3	69.3	41.5
	06:00	55.6	44.6	55.2	79.0	42.6
	06:15	55.0	44.1	51.2	65.8	41.7
	06:30	55.2	45.3	51.4	66.8	43.2
	06:45	56.2	44.5	55.8	86.6	40.9
	07:00	59.8	47.0	58.3	77.9	41.1
	07:15	58.7	49.8	56.6	74.8	46.7
	07:30	60.4	51.1	58.7	79.8	46.9
	07:45	57.0	50.1	57.4	79.3	45.2
	08:00	56.7	50.0	54.5	68.2	46.1

APPENDIX D

PREDICTED DELIVERY EVENT NOISE LEVELS AND BS 4142 ASSESSMENT

AppendixD1: Predicted delivery activity noise levels

APPENDIX D1

Assessment project: Aldi Hucclecote Road, Gloucester	Delivery component		
	Arrival	**Unloading**	**Departure**
Delivery noise activity - predicted ambient noise levels ($L_{Aeq\,T}$) *			
Closest residential property address:	**12 Insley Gardens**		
Source noise level at 10 metres $L_{Aeq\,T}$	67	60	66
Time - minutes	2	57	1
Distance between noise source and residential property in metres	32	24	32
Screening attenuation dB	5	14	5
Convert to 1 hour - dB	-14.8	-0.2	-17.8
Convert to 15 mins - dB	-8.8	-0.3	-
Distance attenuation correction - dB	-10.1	-7.6	-10.1
Activity $L_{Aeq\,1\,hr}$	37.1 dB	38.2 dB	33.1 dB
Activity $L_{Aeq\,15\,mins}$	43.1 dB	38.1 dB	-
Rating level correction	0 dB	6 dB	3 dB
Resultant daytime rating level $L_{Ar,\,Tr}$	37.1 dB	44.2 dB	36.1 dB
Resultant nighttime rating level $L_{Ar,\,Tr}$	43.1 dB	44.1 dB	-
Overall delivery activity noise (arrival, unloading, departure) $L_{Aeq\,1\,hr}$	**41 dB**		
Overall delivery activity noise (arrival + unloading) $L_{Aeq\,15\,mins}$	**44 dB**		
Rating level dB $L_{Aeq\,1\,hr}$	**45 dB**		
Rating level dB $L_{Aeq\,15\,mins}$	**47 dB**		
Delivery noise activity - predicted peak noise levels (L_{Amax})			
Source noise level at 10 metres L_{amax}	73	82	74
Distance between noise source and residential property in metres	32	24	32
Screening attenuation dB	5	14	5
Distance attenuation correction - dB	-10.1	-7.6	-10.1
Peak noise level L_{Amax}	**58 dB**	**60 dB**	**59 dB**

Appendix D2: Screening calculations

Appendix D2.1

BASIC BARRIER ATTENUATION

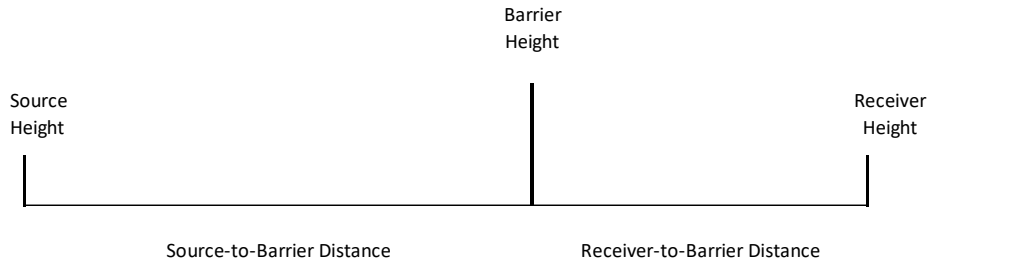
(based on Maekawa or CRTN)

Receptor: **12 Insley Gardens**

Project: **Hucclecote Road, Gloucester**

Source: **Delivery activity: arrival and departure**

Receiver: **12 Insley Gardens**



Source-to-Barrier Distance	15.0 m
Receiver-to-Barrier Distance	17.0 m

Source Height	1.0 m
Receiver Height	4.5 m
Barrier Height	2.5 m

Acoustic fence

Path difference = 0.001 m

Frequency - Hz	63	125	250	500	1K	2K	4K	8K	CRTN
Attenuation - dB	**4.8**	**4.7**	**4.7**	**4.7**	**4.6**	**4.3**	**3.9**	**2.7**	**4.6 dBA**

Appendix D2.2

BASIC BARRIER ATTENUATION

(based on Maekawa or CRTN)

Receptor: **12 Insley Gardens**

Project: **Hucclecote Road, Gloucester**

Source: **Delivery activity: unloading**

Receiver: **12 Insley Gardens**

Source-to-Barrier Distance	4.5 m
Receiver-to-Barrier Distance	19.5 m

Source Height	1.2 m
Receiver Height	4.5 m
Barrier Height	4.0 m

Acoustic fence

Path difference = 0.581 m

Frequency - Hz	63	125	250	500	1K	2K	4K	8K	CRTN
Attenuation - dB	**8.6**	**10.6**	**13.0**	**15.7**	**18.5**	**21.4**	**24.4**	**27.4**	**13.6 dBA**

APPENDIX D3: Assessment of delivery activity noise using BS 4142:2014+A1:2019

APPENDIX D3.1

Results	**Time period**								**Relevant clause**	**Commentary**
	23.11.21						24.11.21			
	17:00:00	18:00:00	19:00:00	20:00:00	21:00:00	22:00:00	06:00:00	07:00:00		
Receptor	**12 Insley Gardens**									
Background sound level dB (L_{A90})	49 dB	49 dB	47 dB	45 dB	42 dB	40 dB	44 dB	50 dB	**8.1, 8.1.3**	For daytime the background sound level is the $L_{A90\ 1hour}$ value, and night time $L_{A90\ 15\ minute}$ value, these are the lowest measured levels from the survey
Specific sound level - predicted delivery event noise level	41 dB	41 dB	44 dB	41 dB	41 dB	41 dB	44 dB	41 dB		Predicted delivery activity noise level is $L_{Aeq\ 15\ minute}$ for nighttime and $L_{Aeq\ 1\ hour}$ for daytime
Acoustic feature correction (applied in delivery calc sheet)	rating level correction +6 dB								**9.2**	rating level correction of +6 dB is applied within delivery calculation to unloading activty for clearly perceptible impulsivity
Rating level	45 dB	45 dB	45 dB	45 dB	45 dB	45 dB	47 dB	45 dB	**9.2**	
Background sound level	49 dB	49 dB	47 dB	45 dB	42 dB	40 dB	44 dB	50 dB	**8.1**	
Excess of rating level over background level	-4	-4	-2	-0	+3	+5	+3	-5	**11**	
Assessment is indicative of between low and adverse impact	**Relevant clause 11** The context is: 1. Predicted delivery event noise levels ($L_{Aeq\ 1\ hour}$) are below the WHO Community Noise daytime and night time guideline values 2. The predicted delivery event noise levels are generally below the existing daytime and night time ambient noise climate 3. In consideration of noise impact that may occur during the early morning period, the difference between an external rating noise level and the existing (external) background noise level does not best represent the true impact. This is because people are generally inside properties at this time sleeping. Therefore the key noise impact indicator is the absolute level of noise in relation to sleep disturbance criteria, such as those contained in the WHO CNG.									
Uncertainty of the assessment	**Relevant clause 10**									
	Weather conditions during the survey were good and as such are not considered to have influenced the measured background noise climate									
	The excess of the rating level over the background sound level is between -5 dB and +5 dB in this instance the uncertainty of the measurement is unlikey to have any significance to the outcome of the assessment.									
	The night time background noise levels used in this assessment are the lowest 15 minute sample in each hour, as opposed to the typical $L_{A90\ 15\ minute}$ value as required by BS 4142:2014+A1:2019. This provides a more robust assessment than is required by the Standard.									
	Uncertainty of the delivery noise source data is reduced by comparing the measured delivery activity noise levels at this store with the large sample of delivery activity source noise levels collected at numerous Aldi stores nationwide.									

APPENDIX E

ACOUSTIC TERMINOLOGY

Acoustic Terminology

E1 Noise, defined as unwanted sound, is measured in units of decibels, dB. The range of audible sounds is from 0 dB to 140 dB. Two equal sources of sound, if added together will result in an increase in level of 3 dB, i.e. 50 dB + 50 dB = 53 dB. Increases in continuous sound are perceived in the following manner:

1 dB increase - barely perceptible.

3 dB increase - just noticeable.

10 dB increase - perceived as twice as loud.

E2 Frequency (or pitch) of sound is measured in units of Hertz. 1 Hertz (Hz) = 1 cycle/second. The range of frequencies audible to the human ear is around 20Hz to 18000Hz (or 18kHz). The capability of a person to hear higher frequencies will reduce with age. The ear is more sensitive to medium frequency than high or low frequencies.

E3 To take account of the varying sensitivity of people to different frequencies a weighting scale has been universally adopted called "A-weighting". The measuring equipment has the ability automatically to weight (or filter) a sound to this A scale so that the sound level it measures best correlates to the subjective response of a person. The unit of measurement thus becomes dBA (decibel, A-weighted).

E4 The second important characteristic of sound is amplitude or level. Two units are used to express level, a) sound power level - L_w and b) sound pressure level - L_p. Sound power level is an inherent property of a source whilst sound pressure level is dependent on surroundings/distance/directivity, etc. The sound level that is measured on a meter is the sound pressure level, L_p.

E5 External sound levels are rarely steady but rise or fall in response to the activity in the area - cars, voices, planes, birdsong, etc. A person's subjective response to different noises has been found to vary dependent on the type and temporal distribution of a particular type of noise. A set of statistical indices have been developed for the subjective response to these different noise sources.

E6 The main noise indices in use in the UK are:

L_{A90}: The sound level (in dBA) exceeded for 90% of the time. This level gives an indication of the sound level during the quieter periods of time in any given sample. It is used to describe the "background sound level" of an area.

L_{Aeq}: The equivalent continuous sound level in dBA. This unit may be described as "the notional steady noise level that would provide, over a period, the same energy as the intermittent noise". In other words, the energy average level. This unit is now used to measure a wide variety of different types of noise of an industrial or commercial nature, as well as aircraft and trains.

L_{A10}: The sound level (in dBA) exceeded for 10% of the time. This level gives an indication of the sound level during the noisier periods of time in any given

sample. It has been used over many years to measure and assess road traffic noise.

L_{AMAX}: The maximum level of sound measured in any given period. This unit is used to measure and assess transient noises, i.e. gun shots, individual vehicles, etc.

E7 The sound energy of a transient event may be described by a term SEL - Sound Exposure Level. This is the L_{Aeq} level normalised to one second. That is the constant level in dBA which lasting for one second has the same amount of acoustic energy as a given A weighted noise event lasting for a period of time. The use of this unit allows the prediction of the L_{Aeq} level over any period and for any number of events using the equation;

$$L_{AeqT} = SEL + 10 \log n - 10 \log T \text{ dB}.$$

Where

n = Number of events in time period T.

T = Total sample period in seconds.

E8 In the open, known as free field, sound attenuates at a rate of 6 dB per each doubling of distance. This is known as geometric spreading or sometimes referred to as the Inverse Square Law. As noise is measured on a Logarithmic scale, this attenuation in distance = 20 Log (ratio of distances), e.g. for a noise level of 60 dB at ten metres, the corresponding level at 160 metres is:

$$60 - 20 \text{ Log } {}^{160}/_{10} = 60 - 24 = 36 \text{ dB}.$$