Rating Industrial Noise affecting Mixed Industrial and Residential Areas

Delivery Noise

Site Name:	Aldi, Cudworth
Site Address:	Barnsley Road, Cudworth, Yorkshire S72 8SY.

Customer Name:	Aldi Stores Limited
Customer Address:	Holly Lane Atherstone, Warwickshire CV9 2SQ

KR Associates (UK) Ltd
Unit 2, Vancouver Wharf,
Hazel Road, Southampton SO19 7BN.

Report Reference:	KR03137
Report Version:	V1.1
Version Date:	25th May 2013
Test Date:	23rd May 2013
Consultant:	John Earwood

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1 EXECUTIVE SUMMARY

1.1 Introduction

KR Associates (UK) Ltd ("KRA") has been instructed by Aldi Stores Limited to undertake an environmental noise assessment at Barnsley Road, Cudworth, to determine if noise from proposed deliveries at the Aldi store will have a negative impact on local residents.

1.2 Scope of Report

The report details the background noise environment existing at proposed delivery times, predicts noise from a typical delivery and predicts the impact this will have on local residential facades using the following assessments:

- As defined in BS 4142:1997 for rating the noise of an industrial nature from an existing or proposed source. This is based on the margin by which noise exceeds a background noise level with an appropriate allowance for the acoustic features present in the noise, determining if complaints are likely to be received. (Although this standard does not strictly apply to this type of noise disturbance, the method of comparing the noise impacting residential facades to existing background levels, has proven a reasonable method for determining the likelihood of noise complaints in these circumstances).

- Comparison between typical minimum environmental noise levels existing at the residential façades and predicted combined noise levels during a typical delivery, to determine how 'noticeable' the change in noise levels is likely to be.

- Comparison of maximum noise 'events' within the existing maximum noise event environment to determine the impact of delivery noise 'events' such as door slams etc.

1.3 Proposed Delivery Details

It is proposed to perform a maximum of 3 deliveries to the store daily between the times of 07:00 and 22:00. Two deliveries (daily) will be to the loading area at the rear of the store by HGV delivery vehicle, with an additional delivery (daily) to the front of the building by a smaller bread delivery van.

1.4 Summary of Results

1.4.1 Delivery Noise (HGV to Rear of Store)

1.4.1.1 BS 4142:1997

BS 4142:1997	07:00 – 22:00
Delivery Noise	$L_{Aeq,\ 30\ min}$ 53 dB (at nearest residential façade)
Background Noise	$L_{A90,\ 5\ min}$ 45 dB (quietest 5 min period)
Result	+8 dB
Assessment	Above Marginal Significance

1.4.1.2 Change in Noise Environment

Change in Environment	07:00 – 22:00
Existing Noise Environment	$L_{Aeq,\ 5\ min}$ 49 dB (quietest 5 min period at residential façade)
Noise Environment during delivery	$L_{Aeq,\ 30\ min}$ 54 dB (typical noise level at residential façade)
Change in Levels	+5 dB
Assessment	"Perceptible" – slight impact *

* Manning "Criteria for the Environmental Assessment, Planning and Mitigation of Railway Noise" ProcIOA Vol 20 Part 1 (1998) pp 195 - 202

1.4.1.3 Maximum Noise Event Comparison

Max Comparison	07:00 – 22:00
Delivery Noise	L_{max} 73 dB (at nearest residential façade)
Background Noise	L_{max} 61 dB
Result	+12 dB
Assessment	Maximum noise events are generally higher than the maximum noise events existing in the local environment. Steps should be taken to minimise maximum noise events during deliveries.

1.4.2 Delivery Noise (Small Bread Van to Front of Store)

1.4.2.1 BS 4142:1997

BS 4142:1997	07:00 – 22:00
Delivery Noise	$L_{Aeq, 30\ min}$ 41 dB (at nearest residential façade)
Background Noise	$L_{A90, 5\ min}$ 56 dB (quietest 5 min period)
Result	-15 dB
Assessment	Complaints Unlikely

1.4.2.2 Change in Noise Environment

Change in Environment	07:00 – 22:00
Existing Noise Environment	$L_{Aeq, 5\ min}$ 59 dB (quietest 5 min period at residential façade)
Noise Environment during delivery	$L_{Aeq, 30\ min}$ 59 dB (typical noise level at residential façade)
Change in Levels	0 dB
Assessment	"Imperceptible" – no impact *

* Manning "Criteria for the Environmental Assessment, Planning and Mitigation of Railway Noise" ProcIOA Vol 20 Part 1 (1998) pp 195 - 202

1.4.2.3 Maximum Noise Event Comparison

Max Comparison	07:00 – 22:00
Delivery Noise	L_{max} 60 dB (at nearest residential façade)
Background Noise	L_{max} 71 dB
Result	-11 dB
Assessment	Maximum noise events are generally lower than the maximum noise events existing in the local environment. 'Reasonable' events are unlikely to give rise to complaints

1.5 Conclusions

1.5.1 Delivery Noise

KR Associates (UK) Ltd have undertaken an assessment of the proposed deliveries and concluded that deliveries undertaken between 07:00 – 22:00 hours are unlikely to give rise to complaints.

1.5.2 HGV Delivery to Rear of Store

Noise from this delivery will be "perceptible", although not significant, to the properties to the rear of the site. Steps should be taken to minimise noise during deliveries (see recommendations).

1.5.3 Bread Van deliveries to Front of Store

Noise from this delivery will be "imperceptible", to the properties to the side of the site. No particular steps should be required to minimise noise during deliveries.

1.6 Recommendations

1.6.1 Delivery Management Plan

Although the noise from the proposed deliveries is predicted to be reasonable, care should be taken to minimise unnecessary noise from the delivery, particularly impact noise such as door slams etc.

We would therefore recommend implementing a delivery management plan including but not limited to the following:

- Always consider local residents when making early morning / late evening deliveries;
- Turn all radios / in-vehicle entertainment devices off before approaching site;
- Turn off delivery vehicle engine during delivery;
- Open and close all doors / access ways as quietly as possible;
- Keep any verbal communication outside to a minimum and use low voice (no shouting);
- Disable audible reversing alarm – if safe to do so.

2 TEST PROCEDURE

2.1 Delivery Noise

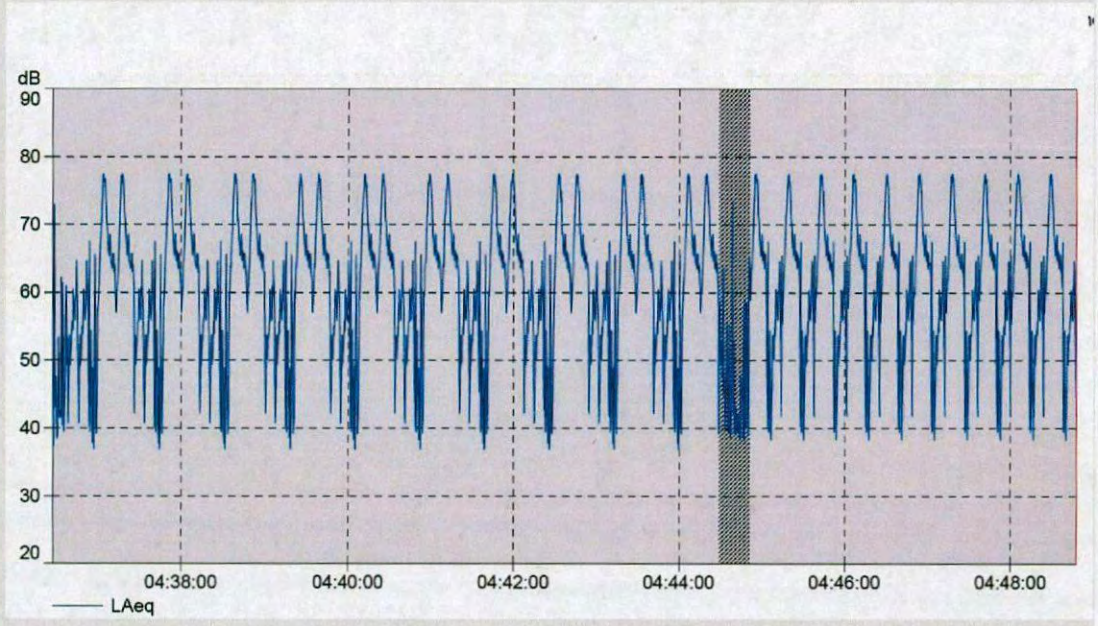
2.1.1 Standard Delivery

A rigid delivery lorry was taken to a typical site and a simulated delivery undertaken and the following key elements identified:

- Manoeuvre truck to loading bay;
- Opening / closing the roller shutter door on the rear of the lorry;
- Moving stock items within the lorry and onto the loading bay.

2.1.2 Noise Measurements

Combined Standard Delivery



3 ASSESSMENTS

3.1 DELIVERY NOISE ASSESSMENTS

3.1.1 HGV to the Rear

Delivery Noise Delivering the Goods Department for Transport Guidance		
Source	Operating Times	Source Position
12m Articulated Lorry	½ hour Delivery	Rear Car Park
Assessment Position	1m from residential houses to the rear of the site	
Background Position	The far side of the residential houses to the rear	
Distance	Delivery truck sweep in car park to the assessment position (direct line of site)	
Item	*Difference*	*Commentary*
Source Levels At Assessment Position	53 dB	Calculated from the indicative tests of delivery noise corrected to residential façade using noise map $L_{Aeq,\ 30min}$
Background Levels At Assessment Position	45 dB	Background measurements corrected to residential façade using noise map $L_{A90,\ 5min}$
Assessment Level	+8 dB (Above Marginal)	Difference between source and existing noise levels. ($L_{Aeq} - L_{A90}$)
Item	*Average Impact*	*Commentary*
Existing Levels At Assessment Position	49 dB	Background measurements corrected to residential façade using noise map $L_{Aeq,\ 5min}$
Existing + Source Levels At Assessment Position	54 dB	Predicted levels during delivery corrected to residential façade using noise map $L_{Aeq,\ 5min}$
Assessment Level	+5 dB (Slight Impact)	($L_{Aeq} - L_{Aeq}$)
Item	*Maximum*	*Commentary*
Source Max Levels At Assessment Position	73 dB	Measured existing maximum levels corrected to residential façade using noise map $L_{Aeq,\ 5min}$
Background Max Levels At Assessment Position	61 dB	Background max measurements corrected to residential façade using noise map
Assessment Level	+12 dB	($L_{Max} - L_{Max}$)
Conclusion	**There is unlikely to be a significant negative impact from deliveries**	
Test Laboratory:	4193	
Report Reference:	KR03137	
Test Date:	2nd May 2013	
Approval Date:	8th May 2013	

3.1.2 Bread Van to Front

Delivery Noise Delivering the Goods Department for Transport Guidance		
Source	Operating Times	Source Position
12m Articulated Lorry	½ hour Delivery	Front of Store
Assessment Position	1m from residential houses to the side of the site	
Background Position	The far side of the residential houses to the rear	
Distance	Delivery truck sweep in car park to the assessment position (direct line of site)	
Item	*Difference*	*Commentary*
Source Levels At Assessment Position	41 dB	Calculated from the indicative tests of delivery noise corrected to residential façade using noise map $L_{Aeq,\ 30min}$
Background Levels At Assessment Position	56 dB	Background measurements corrected to residential façade using noise map $L_{A90,\ 5min}$
Assessment Level	-15 dB (Below Unlikely)	Difference between source and existing noise levels. ($L_{Aeq} - L_{A90}$)
Item	*Average Impact*	*Commentary*
Existing Levels At Assessment Position	59 dB	Background measurements corrected to residential façade using noise map $L_{Aeq,\ 5min}$
Existing + Source Levels At Assessment Position	59 dB	Predicted levels during delivery corrected to residential façade using noise map $L_{Aeq,\ 5min}$
Assessment Level	+0 dB (No Impact)	($L_{Aeq} - L_{Aeq}$)
Item	*Maximum*	*Commentary*
Source Max Levels At Assessment Position	60 dB	Measured existing maximum levels corrected to residential façade using noise map $L_{Aeq,\ 5min}$
Background Max Levels At Assessment Position	71 dB	Background max measurements corrected to residential façade using noise map
Assessment Level	-11 dB	($L_{Max} - L_{Max}$)
Conclusion	**There is unlikely to be any negative impact from deliveries**	
Test Laboratory:	4193	
Report Reference:	KR03137	
Test Date:	2nd May 2013	
Approval Date:	8th May 2013	

4 CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

4.1.1 Delivery Noise

KR Associates (UK) Ltd have undertaken an assessment of the proposed deliveries and concluded that deliveries undertaken between 07:00 – 22:00 hours are unlikely to give rise to complaints.

4.1.2 HGV Delivery to Rear of Store

Noise from this delivery will be "perceptible", although not significant, to the properties to the rear of the site. Steps should be taken to minimise noise during deliveries (see recommendations).

4.1.3 Bread Van deliveries to Front of Store

Noise from this delivery will be "imperceptible", to the properties to the side of the site. No particular steps should be required to minimise noise during deliveries.

4.2 Recommendations

4.2.1 Delivery Management Plan

Although the noise from the proposed deliveries is predicted to be reasonable, care should be taken to minimise unnecessary noise from the delivery, particularly impact noise such as door slams etc.

We would therefore recommend implementing a delivery management plan including but not limited to the following:

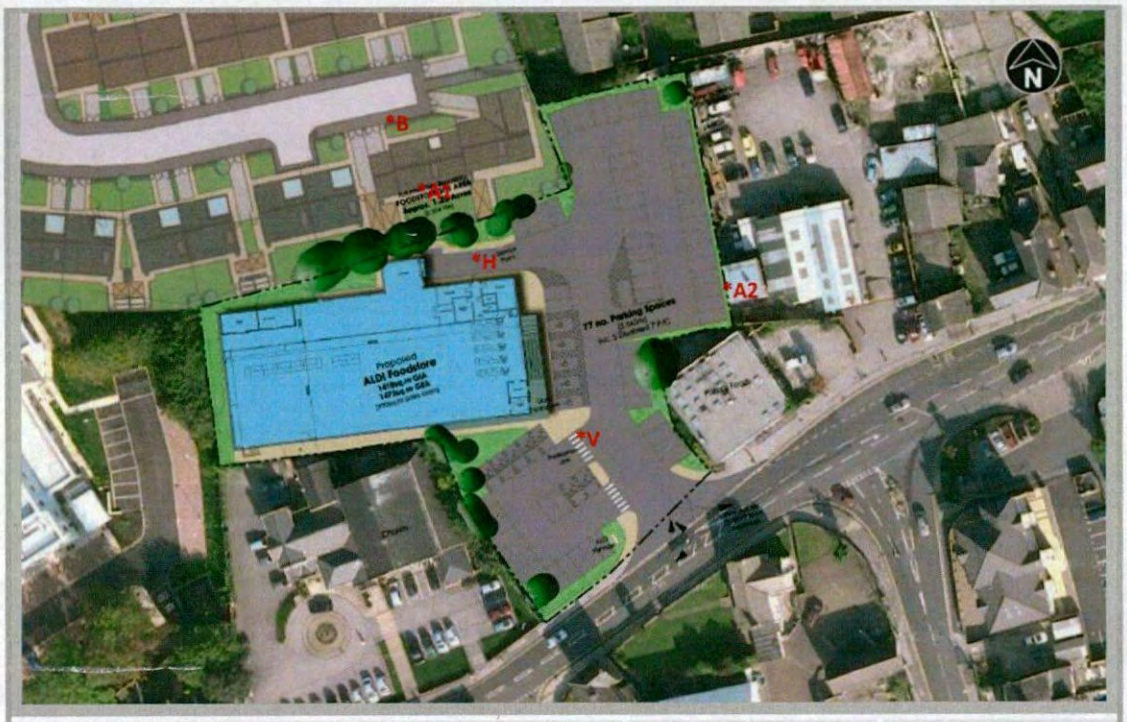
- Always consider local residents when making early morning / late evening deliveries;
- Turn all radios / in-vehicle entertainment devices off before approaching site;
- Turn off delivery vehicle engine during delivery;
- Open and close all doors / access ways as quietly as possible;
- Keep any verbal communication outside to a minimum and use low voice (no shouting);
- Disable audible reversing alarm – if safe to do so.

5 APPENDIX A - REQUIRED INFORMATION SUMMARY

Noise Measurement Equipment			
	Sound Level Meter	Microphone	Calibrator
Type	NL - 32	UC - 53A	NC - 74
Manufacturer	Rion	Rion	Rion
Serial Number	503258	316663	35084143
Verification Test Details Calibration Certificate	05442	05442	AC/10/161/01
Verification Date	09 September 2012	09 September 2012	16 July 2012
Operational Test			
Ref. Level of Calibrator	94 dB@1000Hz		
Meter Reading Before	94 dB		
Meter Reading After	94 dB		
Weather Conditions			
Wind Speed	2.0 ms^{-1}		
Wind Direction	South Westerly		
Temperature Inversion (Calm Night / No cloud)	Not Present		
Precipitation	No Precipitation		
Fog	None		
Date and Time of Measurements			
Source Measurements	07:00 on 01 July 2008 to 08:00 on 01 July 2008		
Background Measurements	13:00 Thursday 2nd May 2013 to 07:00 Friday 3rd May 2013		

6 APPENDIX B – SITE LAYOUT / PHOTOGRAPHS

6.1 Location Map



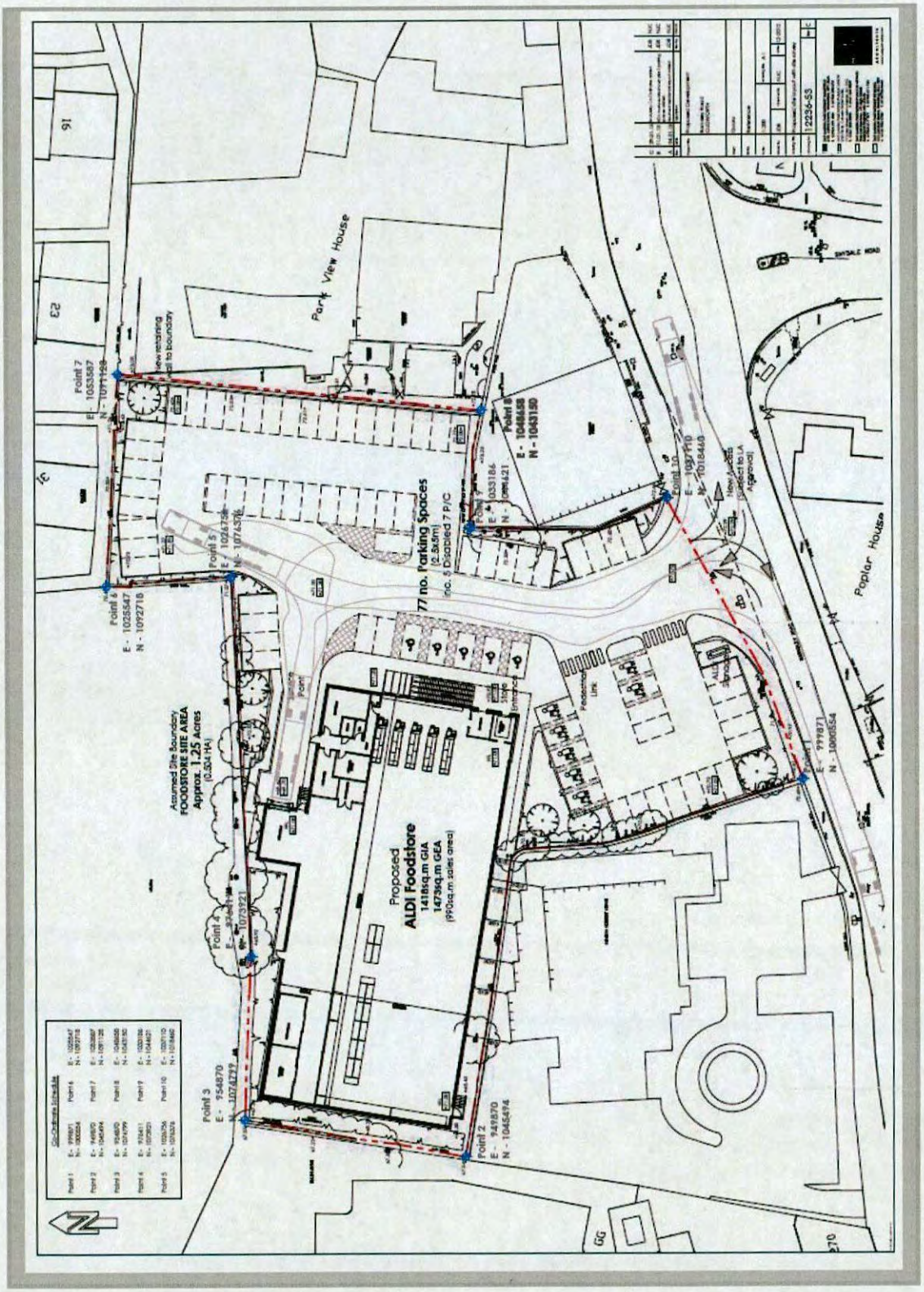
*D: Delivery:	Latitude:	Longitude:	Elevation:
*H: HGV:	53.578667	-1.415897	72m
*V: Van:	53.578381	-1.415840	73m
*A1: Assessment Position 1:	53.578749	-1.416063	73m
*A2: Assessment Position 2:	53.578605	-1.415385	74m
*B: Background Position:	53.578907	-1.416261	75m

6.2 Artist Impression



Impression of Front of Store

6.3 Supplied Drawings



7 APPENDIX C - BACKGROUND NOISE LEVELS

7.1 16:00 Thursday 23rd May 2013 to 07:00 Friday 24th May 2013

Time	L_{Max}	Minimum 5 minute			1 Hour			Day and Night		
		$L_{Aeq,t}$	$L_{A10,t}$	$L_{A90,t}$	$L_{Aeq,t}$	$L_{A10,t}$	$L_{A90,t}$	$L_{Aeq,t}$	$L_{A10,t}$	$L_{A90,t}$
07:00 – 08:00	--	--	--	--	--	--	--	--	--	--
08:00 – 09:00	--	--	--	--	--	--	--			
09:00 – 10:00	--	--	--	--	--	--	--			
10:00 – 11:00	--	--	--	--	--	--	--			
11:00 – 12:00	--	--	--	--	--	--	--			
12:00 – 13:00	--	--	--	--	--	--	--			
13:00 – 14:00	--	--	--	--	--	--	--			
14:00 – 15:00	--	--	--	--	--	--	--			
15:00 – 16:00	--	--	--	--	--	--	--			
16:00 – 17:00	73.6	50.4	51.2	46.0	54.9	56.9	47.5			
17:00 – 18:00	70.8	49.8	50.4	44.2	52.3	52.4	45.4			
18:00 – 19:00	65.6	43.9	45.7	40.1	47.9	49.0	42.0			
19:00 – 20:00	65.0	41.2	44.2	39.4	45.9	46.9	40.6			
20:00 – 21:00	61.7	40.5	41.9	37.1	43.7	45.5	38.5			
21:00 – 22:00	60.5	37.4	38.7	33.4	41.3	42.4	36.0			
22:00 – 23:00	49.5	35.7	36.3	32.6	39.5	40.0	34.6			
23:00 – 00:00	49.8	33.8	35.6	31.8	38.7	39.1	33.1	46.4	47.5	34.7
00:00 – 01:00	50.6	33.8	35.3	30.5	38.1	38.5	32.5			
01:00 – 02:00	47.2	35.5	35.9	33.2	39.4	40.3	34.4			
02:00 – 03:00	50.9	39.8	38.0	35.3	40.5	42.0	36.3			
03:00 – 04:00	59.9	42.7	45.0	37.6	47.5	50.5	39.0			
04:00 – 05:00	70.1	43.6	45.4	39.9	48.7	48.0	41.2			
05:00 – 06:00	68.4	46.5	47.0	42.6	49.8	49.1	43.2			
06:00 – 07:00	63.1	47.8	47.5	42.9	49.4	48.5	44.6			
	dB t = 1 hr	dB, t = 5 minutes			dB, t = 1 hour			dB, 07:00 – 23:00 t = 16 hours 23:00 – 07:00 t = 8 hours		

Sound Pressure Levels, dB. Reference level of 2×10^{-5} Nm^{-2}

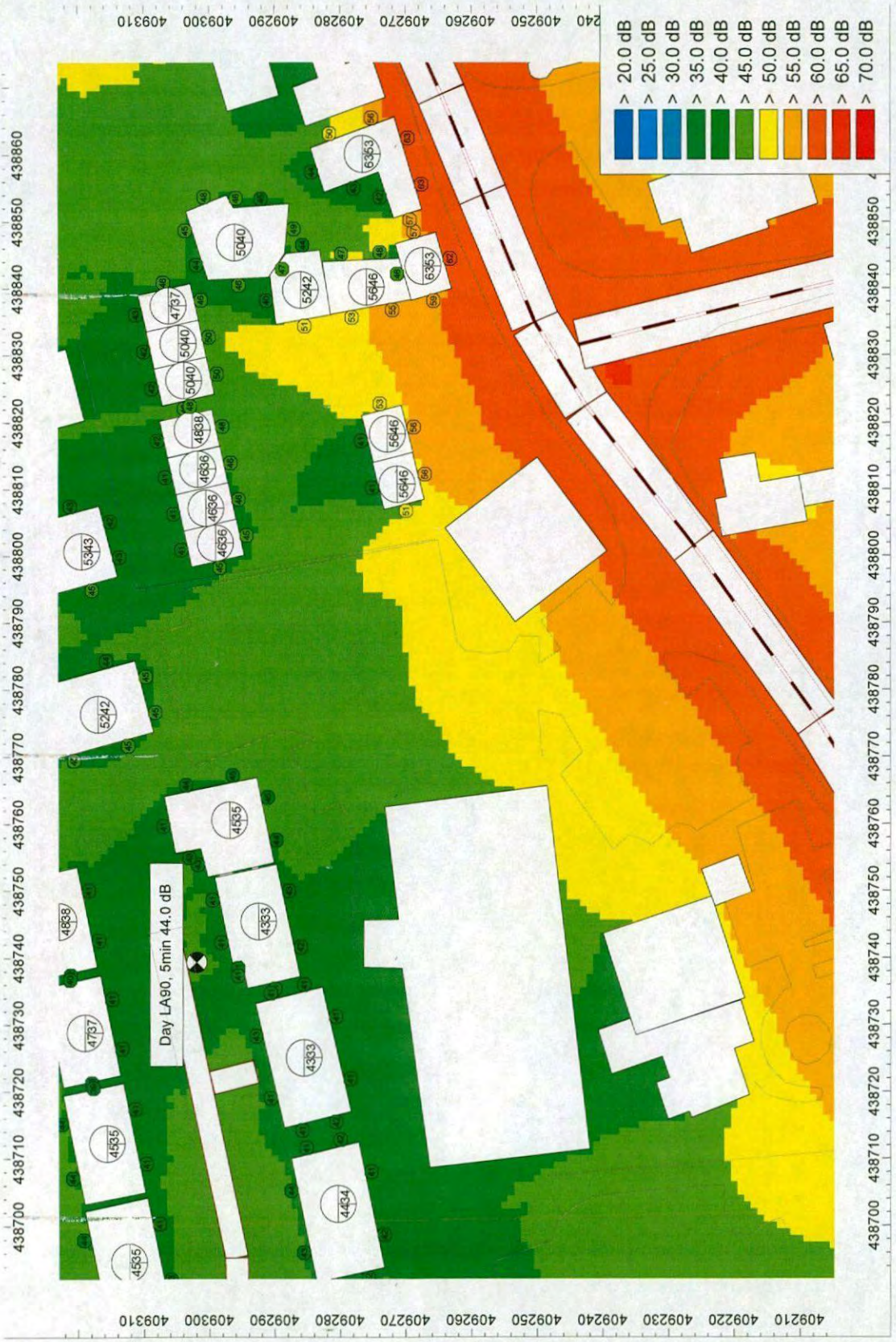
7.2 07:00 Friday 24th May 2013 to 09:00 Friday 24th May 2013

Time	L_{Max}	Minimum 5 minute			1 Hour			Day and Night		
		$L_{Aeq,t}$	$L_{A10,t}$	$L_{A90,t}$	$L_{Aeq,t}$	$L_{A10,t}$	$L_{A90,t}$	$L_{Aeq,t}$	$L_{A10,t}$	$L_{A90,t}$
07:00 – 08:00	60.8	48.0	47.0	43.9	49.1	48.1	44.4	--	--	--
08:00 – 09:00	66.7	50.1	49.9	45.3	51.6	52.9	46.3			
09:00 – 10:00	--	--	--	--	--	--	--			
10:00 – 11:00	--	--	--	--	--	--	--			
11:00 – 12:00	--	--	--	--	--	--	--			
12:00 – 13:00	--	--	--	--	--	--	--			
13:00 – 14:00	--	--	--	--	--	--	--			
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19:00 – 20:00	--	--	--	--	--	--	--			
20:00 – 21:00	--	--	--	--	--	--	--			
21:00 – 22:00	--	--	--	--	--	--	--			
22:00 – 23:00	--	--	--	--	--	--	--			
23:00 – 00:00	--	--	--	--	--	--	--	--	--	--
00:00 – 01:00	--	--	--	--	--	--	--			
01:00 – 02:00	--	--	--	--	--	--	--			
02:00 – 03:00	--	--	--	--	--	--	--			
03:00 – 04:00	--	--	--	--	--	--	--			
04:00 – 05:00	--	--	--	--	--	--	--			
05:00 – 06:00	--	--	--	--	--	--	--			
06:00 – 07:00	--	--	--	--	--	--	--			
	dB t = 1 hr	dB, t = 5 minutes			dB, t = 1 hour			dB, 07:00 – 23:00 t = 16 hours 23:00 – 07:00 t = 8 hours		

Sound Pressure Levels, dB. Reference level of 2×10^{-5} Nm^{-2}

8 APPENDIX D – BACKGROUND NOISE MAPS

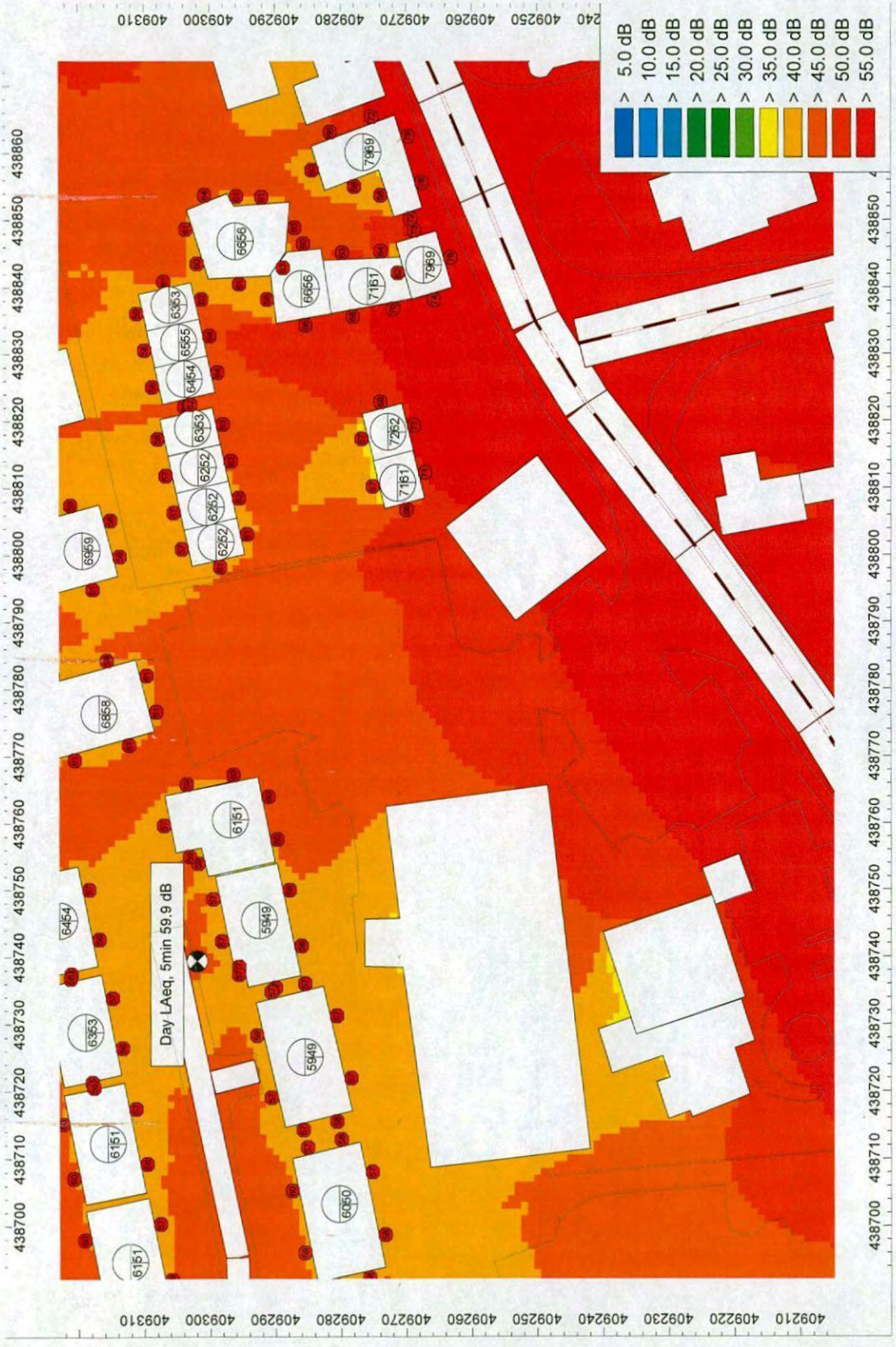
8.1 Environmental Background Levels (minimum $L_{A90, 5\ min}$) [07:00 – 22:00]



8.2 Environmental Levels (minimum $L_{Aeq, 5\ min}$) [07:00 – 22:00]



8.3 Environmental Levels (L_{max}) [21:00 – 22:00]

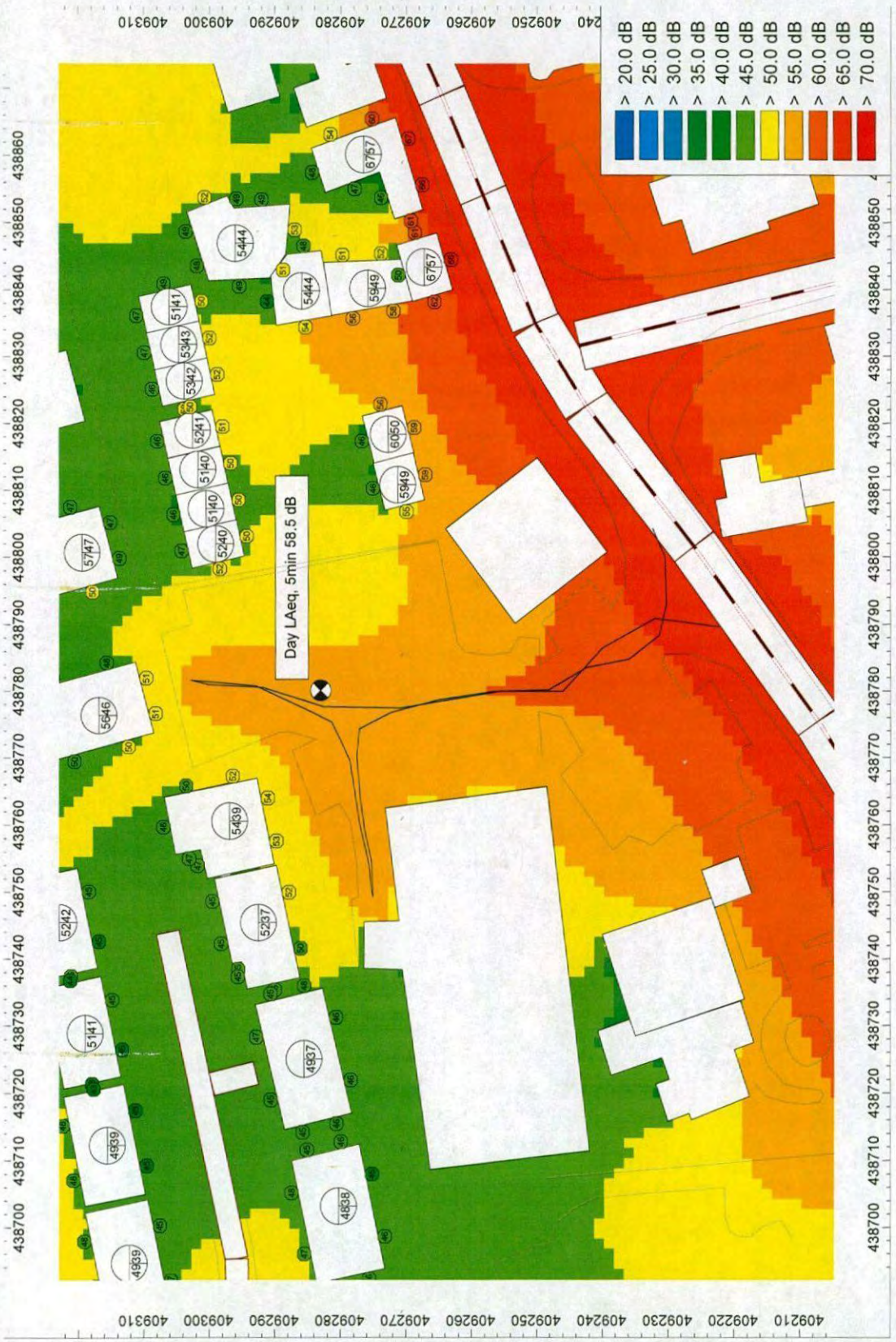


9 NOISE MAPS – HGV DELIVERY TO REAR OF SITE

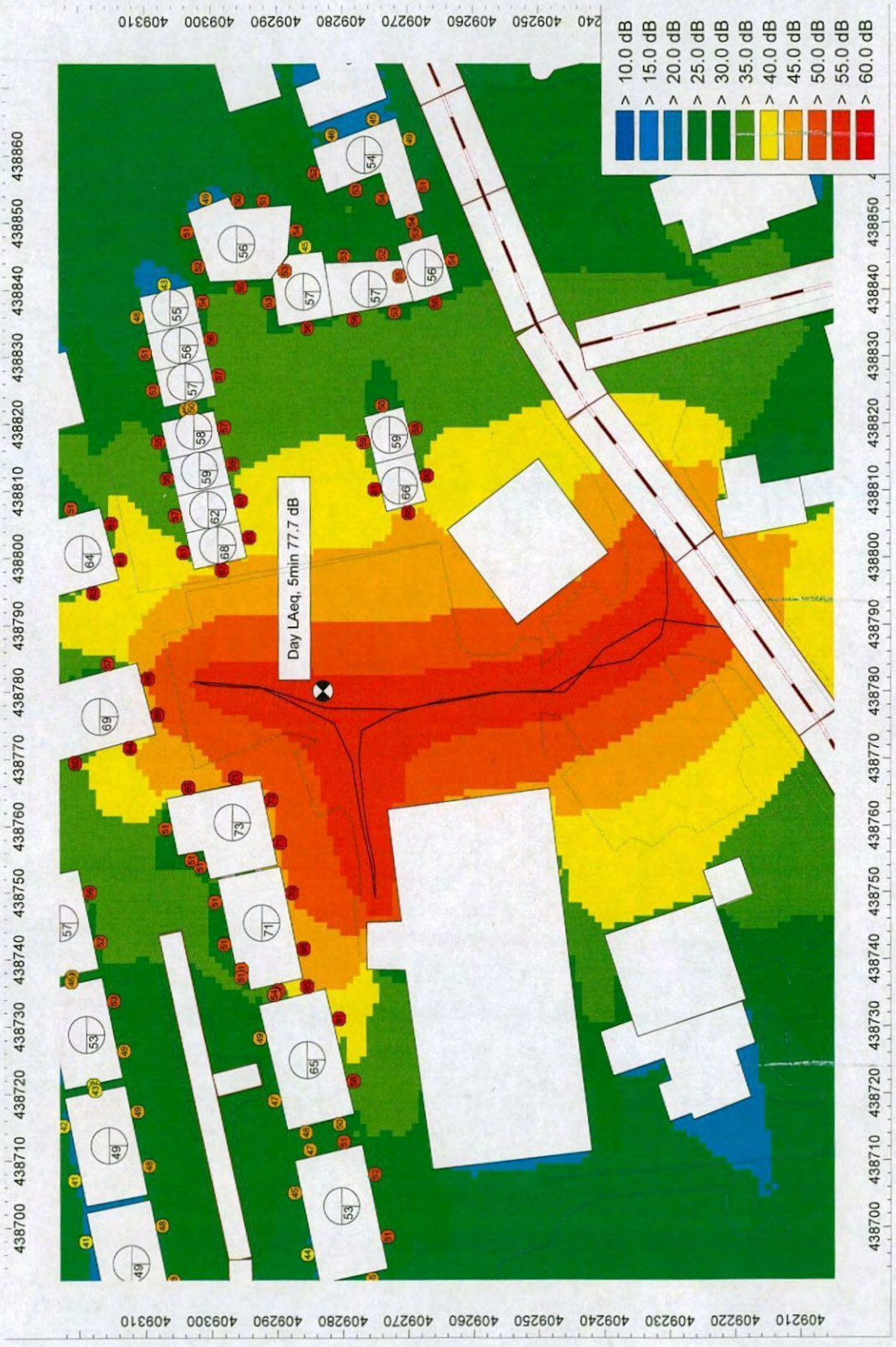
9.1 Delivery Noise Impact ($L_{Aeq, 30\ min}$)



9.2 Change in Environmental Levels during Delivery (minimum $L_{Aeq, 5\ min}$) [07:00 – 22:00]

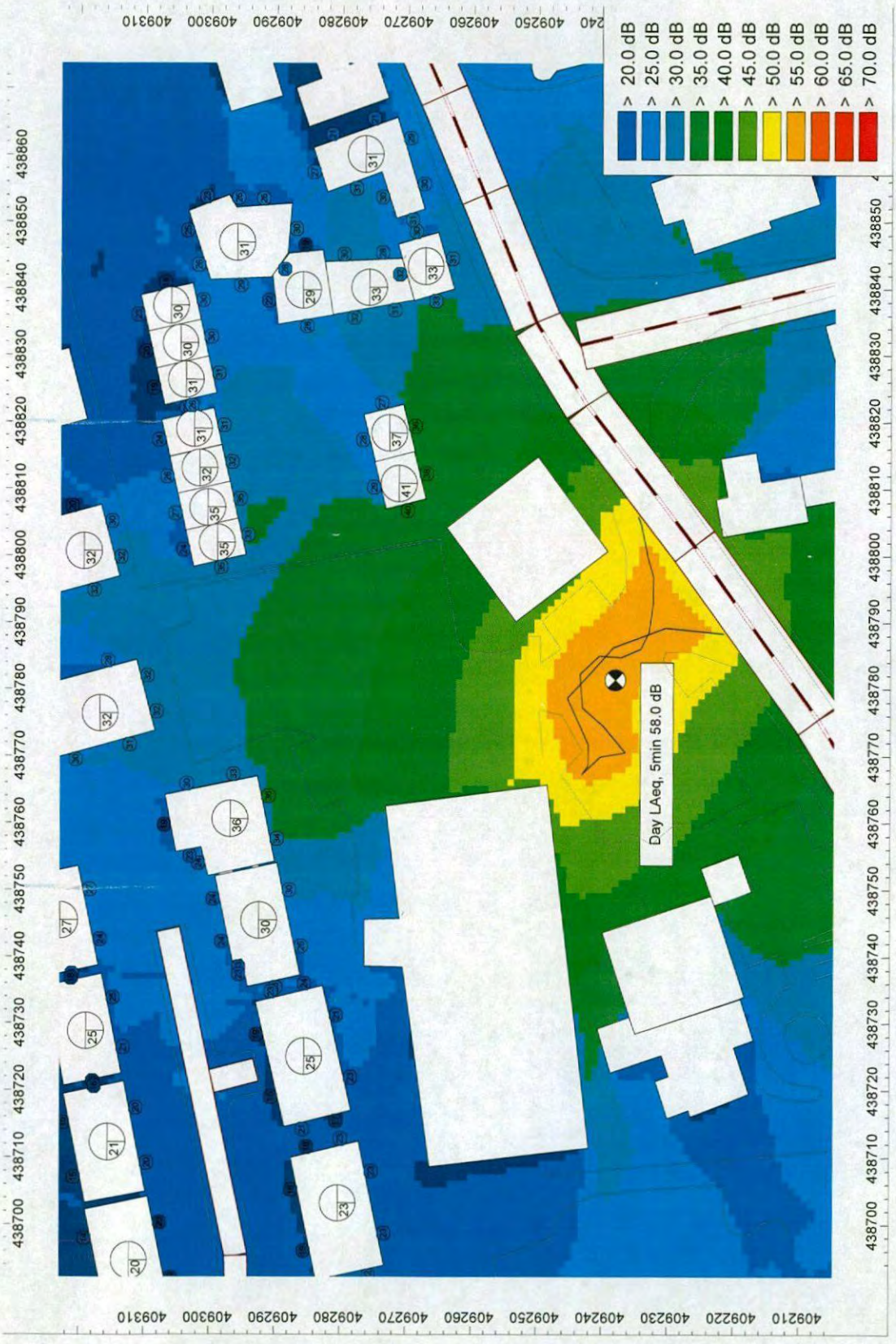


9.3 Delivery Noise Impact (L_{Max})

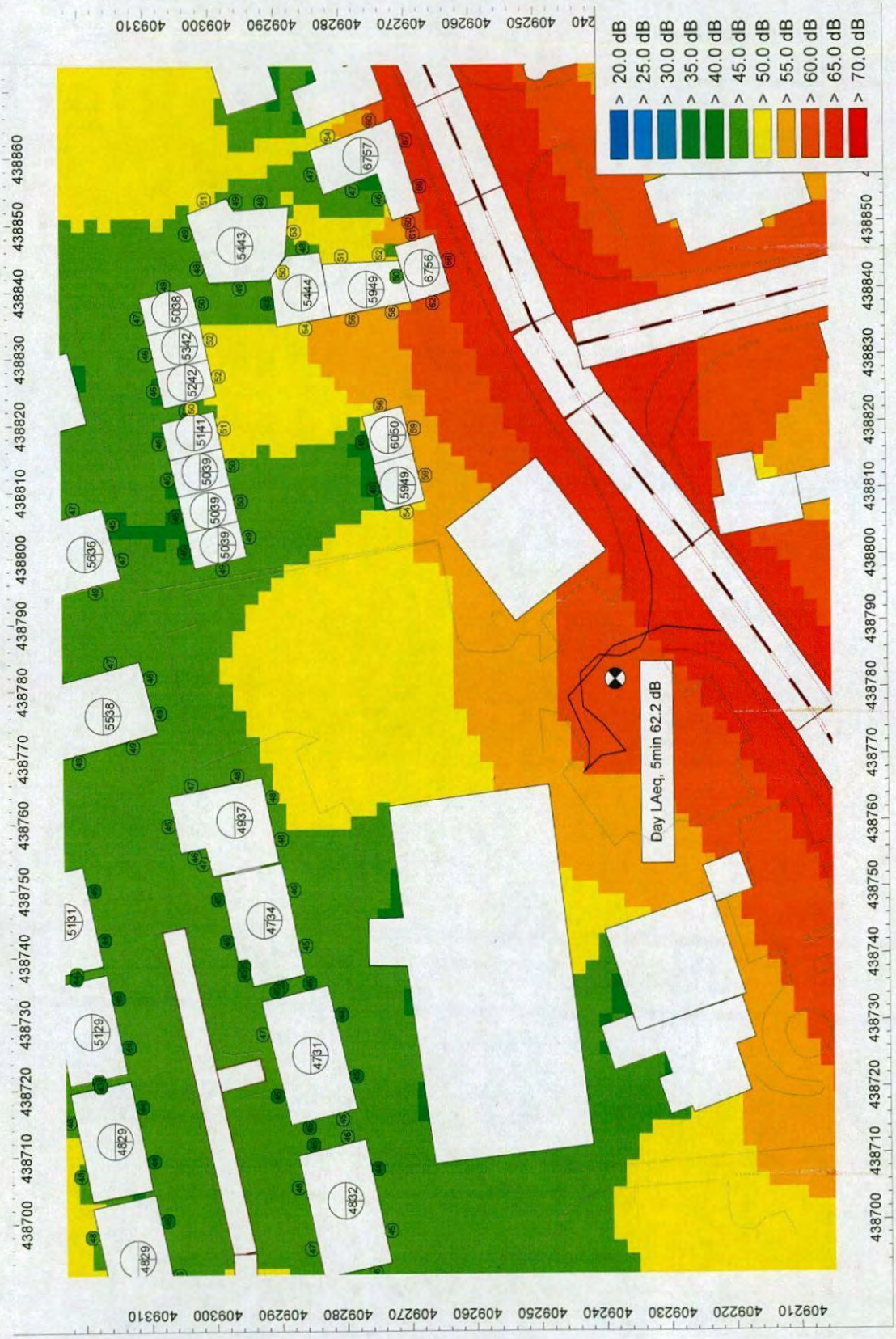


10 NOISE MAPS – BREAD VAN TO FRONT OF SITE

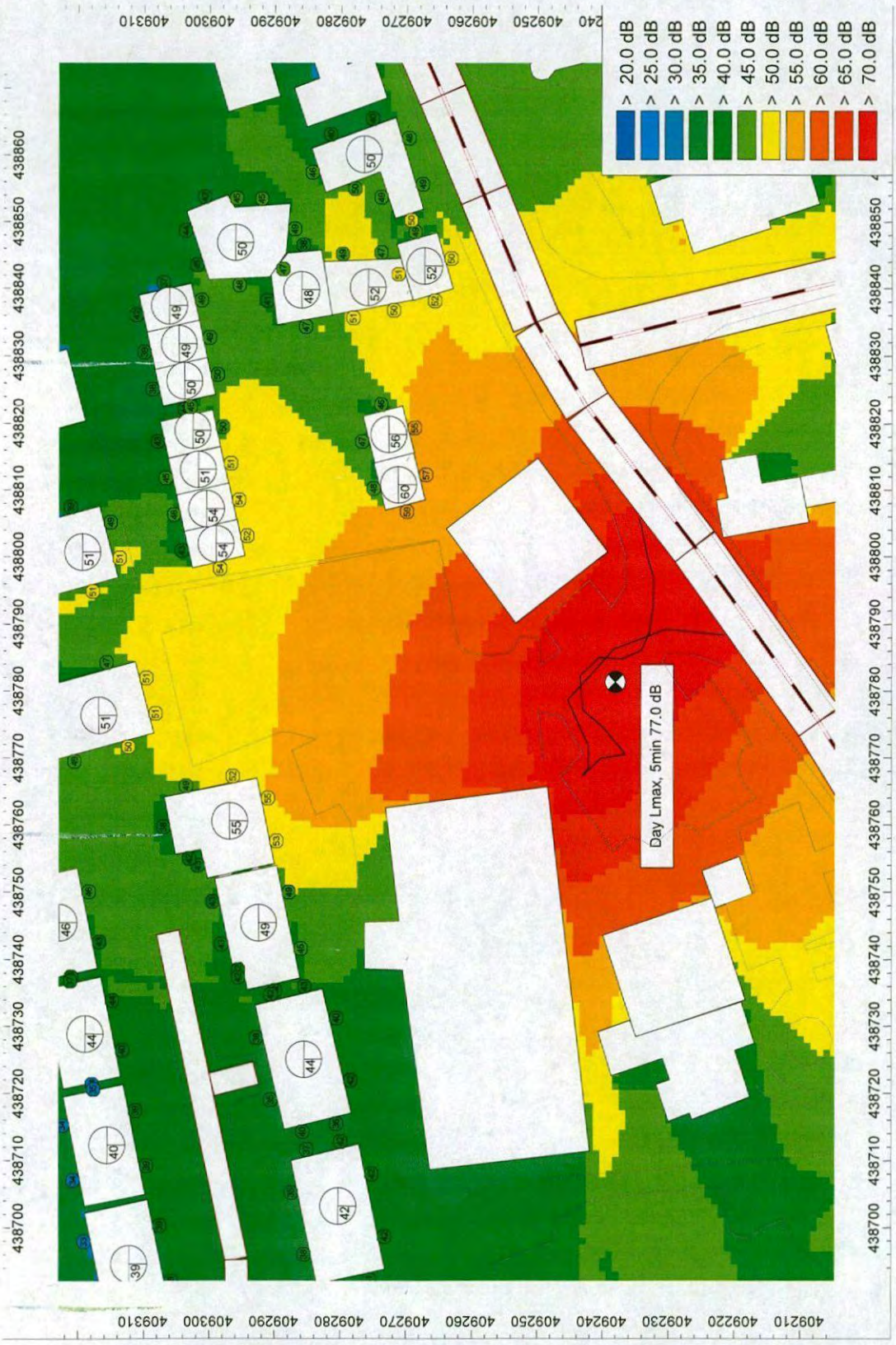
10.1 Delivery Noise Impact ($L_{Aeq, 30\ min}$)



10.2 Change in Environmental Levels during Delivery (minimum $L_{Aeq, 5\ min}$) [07:00 – 22:00]



10.3 Delivery Noise Impact (L_{Max})



11 APPENDIX H – SITE SPECIFIC CRITERIA

11.1.1.1 BS 4142 Scope

BS 4142 in section 6.3.6 recommends the following:

> *"Determine the specific noise level by calculation alone...if the source is not yet in operation. In such cases, report the method of calculation in detail and give the reason for using it"*

11.1.1.2 Integrated Pollution Prevention and Control (IPPC) – H3 Part 2

This document states in Section 2.5.1 'Methodology' that:

> *"For industrial noise it is preferable to use those principles of ISO 9613 -2 1996...."*

11.1.1.3 Relevance of Guidance

It is therefore considered appropriate to calculate the resultant noise levels from the installation of the plant using the relevant methods defined in ISO 9613:Part 2 which states in the scope:

> *"This part of ISO 9613 specifies an engineering method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources."*

The standard uses well defined calculations to take account of a variety of influences including source location, distance from the source to the receiver, atmospheric absorption and the effect of the ground and barriers.

11.1.2 British Standard 4142

This standard compares the proposed source levels against the underlying background noise levels and gives an indication on the likelihood of complaints.

11.1.2.1 Background Noise Levels

These are established as the underlying noise levels against which the assessment of the specific source can be made and are measured at the assessment position or an equivalent position where it is not appropriate to measure the noise levels at the assessment position.

11.1.2.2 Assessment Position

This is located externally at the nearest noise sensitive facade.

11.1.2.3 Rating Noise Level

The Rating Noise Level is calculated at the assessment position using the source sound power levels and includes where necessary a character correction.

11.1.2.4 British Standard 7445 – Part 2

Section 4.1.3 'Tonal Adjustment' (note 1) provides some useful guidance regarding the addition of a tonal / character correction.

> *"..a prominent tonal component may be detected in one third octave spectra if the level of a one-third octave band exceeds the level of the adjacent bands by more than 5 dB...*

11.1.2.5 BS4142 Conclusion

This establishes the difference between the specific noise level and the background noise level and gives an indication of the likelihood that the proposed plant will give rise to complaints. These are defined within three distinct categories.

> *"Assess the likelihood of complaints by subtracting the measured background noise level from the rating level. The greater this difference the greater the likelihood of complaints.*
> - *A difference of around +10 dB or more indicates that complaints are likely.*
> - *A difference of around +5dB is of marginal significance.*
> - *If the rating level is more than 10 dB below the measured background level then there is a positive indication that complaints are unlikely."*

11.1.2.6 BS4142 – Complaints Unlikely

Though a -10 dB criterion under BS4142 gives a conclusion of 'complaints unlikely', care needs to be taken when setting this criteria when the background noise level is very low as detailed in the scope of this standard.

> *"The method is not suitable for assessing the noise....when the background and rating noise are both very low.*
> *Note. For the purposes of this standard, background noise levels below 30dB and rating levels below 35 dB are considered to be very low."*

11.1.3 Criteria

With regard to the guidance within BS4142, it is considered the following are the appropriate criteria against which the plant noise emissions should be assessed to ensure they do not have an adverse effect on local amenity.

The criteria level is set at the level defined as *'Complaints Marginal'* within BS4142. The criteria level has been set above the minimum perceptible change in level (3 dB) and well below the level which will have an adverse impact on amenity.

Assessment Period	BS4142[1] Assessment
Day Time – 07:00 to 23:00 hours	+5 dB
Night Time – 23:00 to 07:00 hours	+5 dB

12 APPENDIX J - REFERENCES

12.1 BS 4142:1997

Method for rating industrial noise affecting mixed residential and industrial areas

12.2 BS ISO 9613 – Part 1:1993

Acoustics – Attenuation of sound propagation outdoors.

Part 1 - Part 1: Calculation of the absorption of sound by the atmosphere

12.3 ISO 9613 – Part 2:1996

Acoustics – Attenuation of sound during propagation outdoors.

Part 2 – General method of calculation

*End of Report *