KR05745

Denmark Villas

Noise Impact Assessment...

Standard: British Standard 8233: 2014

Site: Denmark Villas

Address: Land at Rear of Denmark Villas
74-82 Denmark Villas
Hove
East Sussex

Postcode: BN3 3TR

Customer: Chestnut Development Co Ltd

Address: 10 Prince Albert Street
Brighton
East Sussex

Postcode: BA1 1HE

Issue: V1.0

Date: 23rd March 2017

Status: Full Report

KR Associates (UK) Ltd

quietly confident...

Revisions…

KR05745		Project	Denmark Villas		
		Title	Noise Impact Assessment		
		Standard	British Standard 8233: 2014		
Issue	Date	Details of Revision			
v1.0	23/03/2017	Description	Issue of report for submission to Local Authority		
		Roles	Prepared by	Checked by	Issued by
		Signature	[redacted]		
		Name	Miss I. Samphier	Miss N. Truman	Mr. R Scrivener
		Position	Consultant	Project Manager	Technical Director

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KR Associates…

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Table of Contents...

1 Executive Summary... 5
1.1 Instruction 5
1.2 Outline of Proposal 5
1.3 Scope of Report 5
1.4 Outline of Methodology 5
1.5 Executive Summary 5
1.5.1 Summary of Criterion 5
1.5.2 Measurements 6
1.5.3 External Façade Levels 6
1.5.4 Mitigation Measures 6
1.6 Conclusions 6
1.6.1 British Standard 8233:2014 6
1.6.2 National Planning Policy Framework 6

2 Site Location... 7
2.1 Local Area 7
2.2 Site Plan 8
2.2.1 Existing Site Layout 8
2.2.2 Proposed Site Layout 8

3 Background Measurements.... 9
3.1 Measurement Detail 9
3.1.1 Location of Measurements 9
3.1.2 Measurement Equiptment 9
3.1.3 Measurement Period 9
3.1.4 Context of the Site 10
3.2 Weather Conditions 11
3.2.1 Temperature and dew Point 11
3.2.2 Barometric Pressire 11
3.2.3 Wind Speed and Wind Gust 11
3.2.4 Wind Direction 11
3.3 Measurement Results 12
3.3.1 Background Noise Profile 12
3.4 3D Background Noise Maps 13
3.4.1 Day Time (07:00 – 23:00) 13
3.4.2 Night Time (07:00 – 23:00) 14

4 Methodology and Criterion... 15
4.1 British Standard 8233: 2014 (“BS8233”) 15
4.1.1 Internal Ambient Noise Levels for dwellings 15
4.1.2 Maximum Noise Levels 15
4.2 National Planning Policy Framework: 2012(“NPPF”) 16

4.2.1 Scope of Document 16
4.2.2 Paragraph 14 -Requirement of Grant Planning Permission 16
4.2.3 Paragraph 123 -Aim of Planning Decisions with respect to Noise 16

5 Assessments... 17
5.1 Calculation Procedure 17
5.2 Transmission Loss Data 18
5.2.1 Ventilation (D_{ne}) 18
5.2.2 Glazing (R_{wi}) 18
5.2.3 Walls (R_{ew}) 18
5.2.4 Ceiling (R_{rr}) 18
5.3 Day Time (07:00 to 23:00) Internal Noise Levels 19
5.3.1 3D Noise Maps 19
5.4 Night Time (23:00 to 07:00) Internal Noise Levels 20
5.4.1 3D Noise Maps 20
5.5 Amenity Space 21
5.5.1 Noise Map 21
5.5.2 British Standard 8233: 2014 Day Time Assessment 22
5.5.3 British Standard 8233: 2014 Night Time Assessment 23

6 Conclusion 24
6.1 Summary of Criterion 24
6.2 Measurements 24
6.3 External Façade Levels 24
6.4 Mitigation Measures 24
6.5 Conclusions 25
6.5.1 British Standard 8233: 2014 25
6.5.2 National Planning Policy Framework 25

1 Executive Summary...

1.1 Instruction

KR Associates have been instructed by Chestnut Development Co Ltd to undertake a noise impact assessment at the land at the rear of Denmark Villas to determine if the noise from the existing roads and surrounding noise sources will have an acceptable impact on the proposed residential development.

1.2 Outline of Proposal

It is proposed to develop 2 number single storey dwellings (1 no. one-bedroom & 1 no. 2-bedroom) at the land to the rear of 74-82 Denmark Villas.

1.3 Scope of Report

Full planning permission, referenced BH2016/00559, for the erection of 2 dwellings has been refused by Brighton and Hove City Council with the following reason:

> "The proposed development would provide and unacceptable standard of accommodation to the detriment of the well-being of future occupants by reason of limited outlook and privacy to each unit. Furthermore, the applicant has failed to demonstrate that the existing neighbouring commercial uses would not have a significantly harmful impact upon future occupiers of the residential units by way of noise and disturbance. The proposal is therefore contrary to policies SU10 and QD27 of the Brighton and Hove Local Plan"

1.4 Outline of Methodology

Background noise levels are measured at an appropriate position and used along with spot measurements on site to create a 3D-Noisemap of the existing site to predict the free-field levels impacting on the façade of the proposed development. Calculations are then undertaken in accordance with British Standard 8233: 2014 with the windows closed and the trickle vents open to provide ventilation in accordance with Approved Document F: 2000 to determine the mitigation measures required to meet the required internal noise levels specified within British Standard 8233: 2014. Calculations are also undertaken to determine the noise levels within an external amenity spaces.

1.5 Executive Summary

1.5.1 Summary of Criterion

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	$L_{Aeq,\ 16\ hour}$ 35 dB	--
Dining	Dining Room	$L_{Aeq,\ 16\ hour}$ 40 dB	--
Sleeping (Daytime Resting)	Bedroom	$L_{Aeq,\ 16\ hour}$ 35 dB	$L_{Aeq,\ 8\ hour}$ 30 dB

1.5.2 Measurements

Background noise measurements were undertaken between Tuesday 21st March 2017 to Thursday 23 March 2017 at a position to the east of the proposed development on a lamp post within the existing delivery centre.

Measurement Index	Day Time (07:00 to 23:00)	Night Time (23:00 to 07:00)
Position 1	$L_{Aeq,\ 16}$ 56 dB	$L_{Aeq,\ 8\ hours}$ 49 dB.

1.5.3 External Façade Levels

A 3D-Noisemap was created using the continuous background noise measurements and spot measurements taken around site to determine the free-field façade noise levels that are likely to impact on the residential façade.

Measurement Index	Day Time (07:00 to 23:00)	Night Time (23:00 to 07:00)
Average Levels (BS8233:2014)	$L_{Aeq,ff\ 16\ hour}$ 60 dB	$L_{Aeq,ff\ 8\ hour}$ 52 dB

1.5.4 Mitigation Measures

It has been recommended that in order to meet the criterion defined within British Standard 8233: 2014 consideration be given to the following mitigation measures.

Mitigation measures	Maximum Free Field Levels Impacting on a Residential Facade
Glazing	Standard Glazing (4 – 12 – 4)
Trickle Vents	Acoustic Trickle Vents
Upper Floor Ceiling	1 Layer of 12mm Plasterboard

1.6 Conclusions

1.6.1 British Standard 8233:2014

The assessments undertaken in accordance with British Standard 8233:2014 indicate that if the proposed mitigation measures are adhered to then the required internal noise levels will be met.

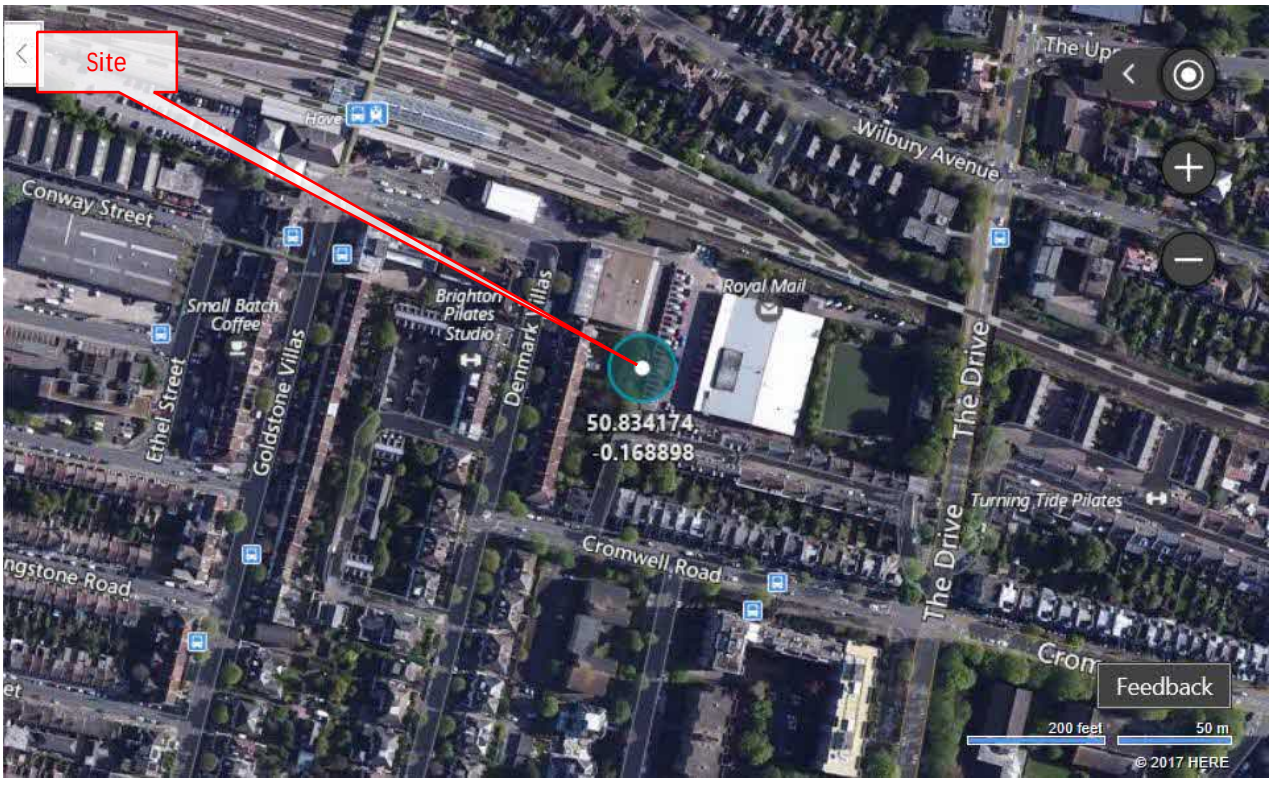
1.6.2 National Planning Policy Framework

The assessments indicate that the existing noise sources will not have a significant adverse impact on the internal or external living conditions of the residents of the proposed residential dwellings. It would therefore be recommended planning permission is granted in accordance with paragraph 14 of the National Planning Policy Framework as the benefits of the development are likely to outweigh any significant adverse impact in terms of noise.

2 Site Location...

2.1 Local Area

The site is located on the land between Denmark Villas and Cromwell Road in Brighton and Hove. The surrounding area is a mix of residential, commercial and small industrial properties. A parcel delivery unit is located to the north east of the proposed site with residential properties in all immediate surrounding areas. A railway line runs along the north of the site.

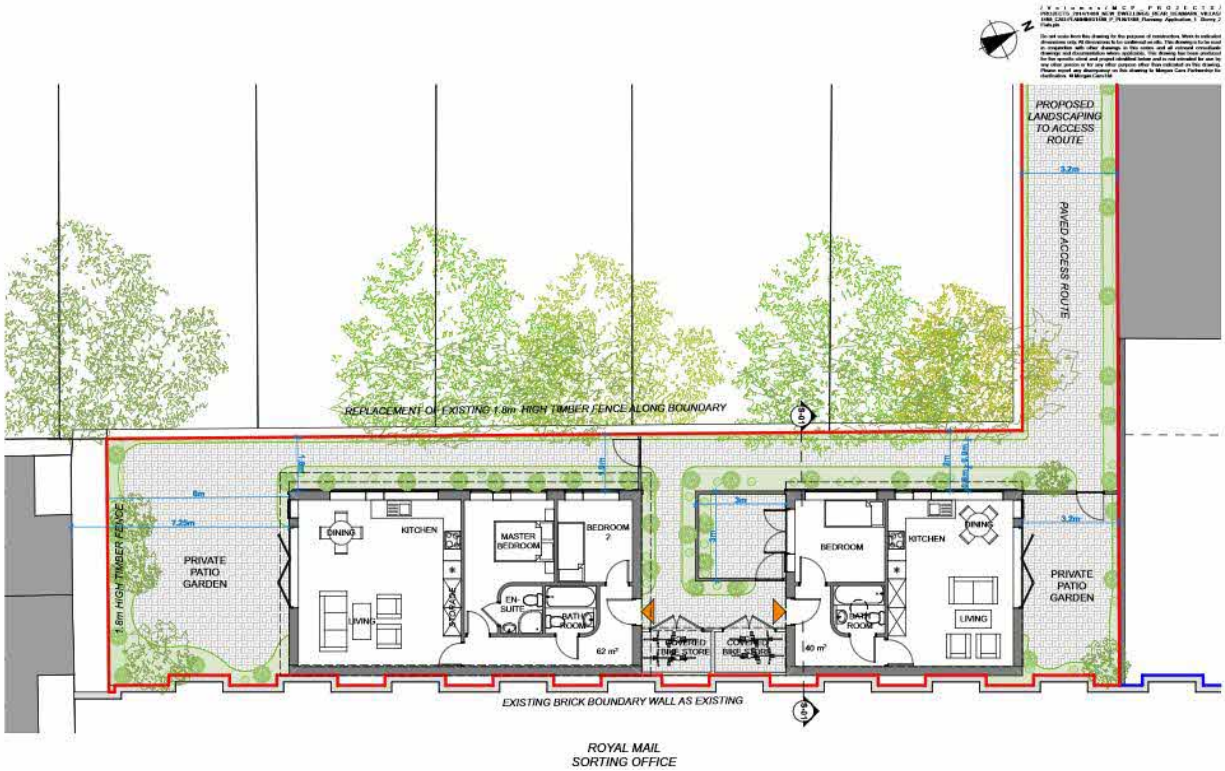


2.2 Site Plan

It is proposed to construct 2 number 2 bedroom residential properties over a single storey to the rear of the existing residential properties at 74-82 Denmark Villas in Hove.

2.2.1 Existing Site Layout

2.2.2 Proposed Site Layout

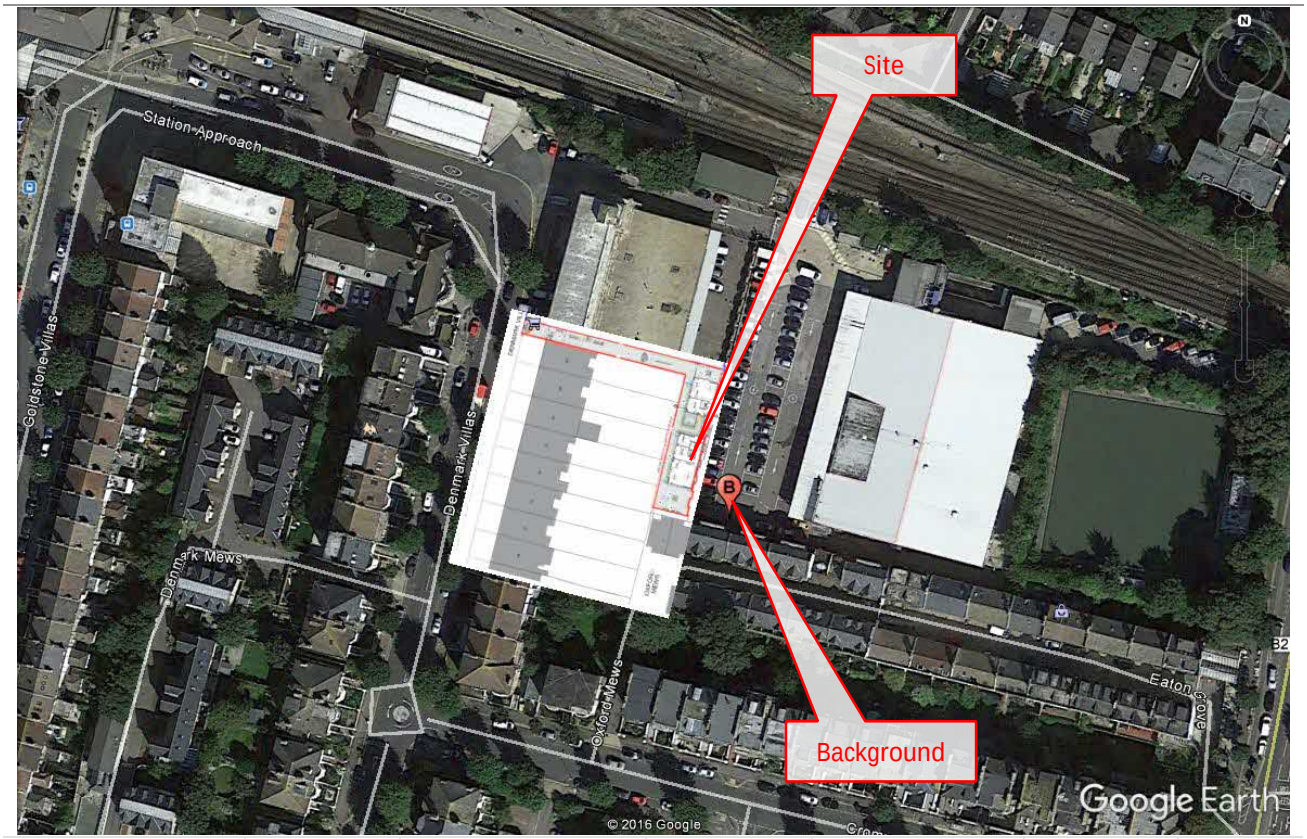


3 Background Measurements….

3.1 Measurement Detail

3.1.1 Location of Measurements

The background measurement position was determined within the post office cark park located to the west of the proposed development.



Background Position	Latitude:	50.834002°	Longitude:	-0.168778°	Elevation:	3.0 m

3.1.2 Measurement Equiptment

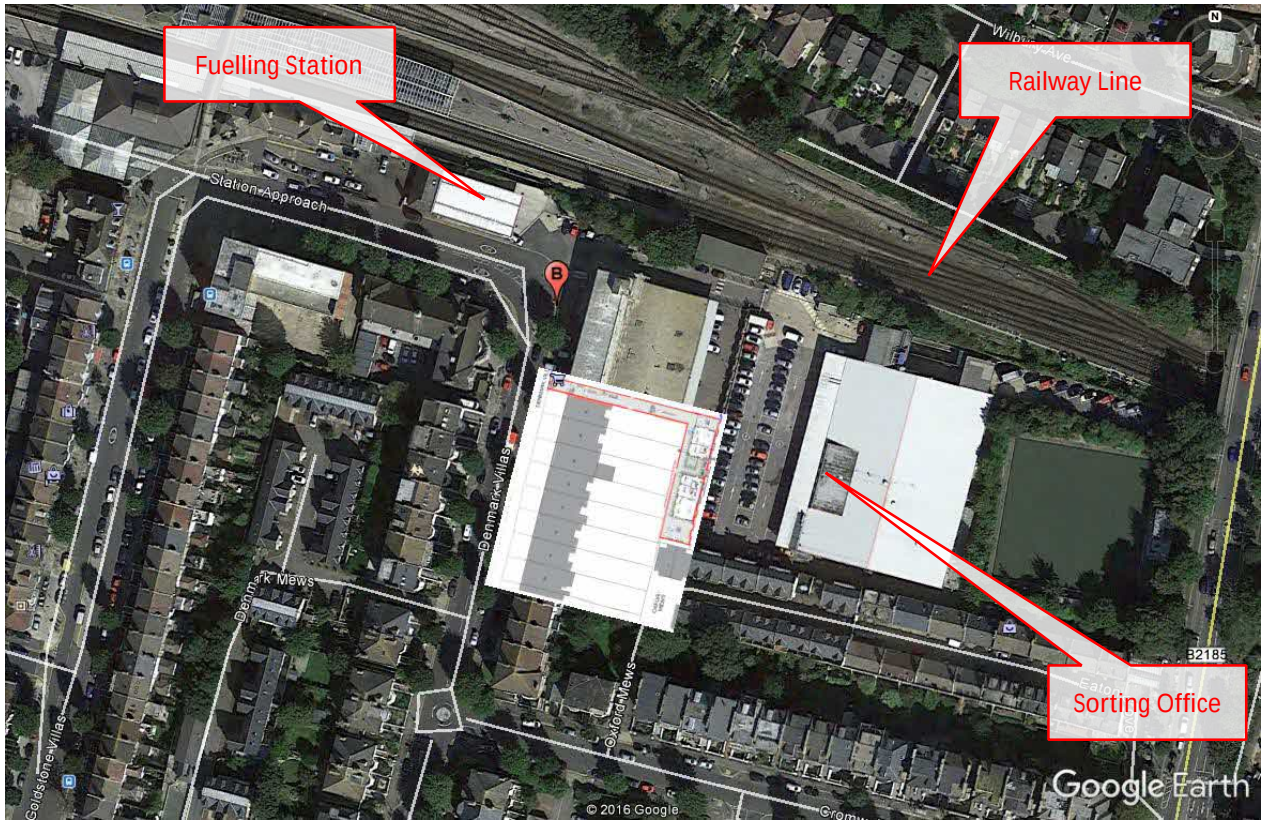
		Sound Level Meter	Microphone	Calibrator
1)	Type	KRE/027/01	KRE/027/02	KRE/027/03
2)	Manufacturer	Rion	Rion	Rion
3)	Serial Number	'00503252	320615	34304655
4)	Certificate Number	'UCRT14/1102	'U13136	7961
	Calibration Date	7th May 2016	7th May 2016	7th May 2016

3.1.3 Measurement Period

Background noise measurements were undertaken between Tuesday 21st March 2017 to Thursday 23rd March 2017 at a position to the east of the proposed development. The background measurements were designed to capture a typical 24-hour measurement period.

3.1.4 Context of the Site

Spot measurements were taken in and around the site to determine the dominant noise sources that are likely to impact on the proposed development.



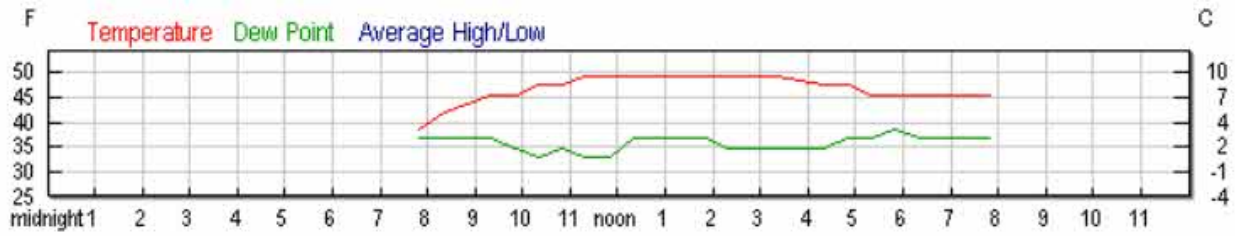
Railway Line	Latitude:	50.834765°	Longitude:	-0.168545°	Elevation:	1m
Sorting Office	Latitude:	50.834126°	Longitude:	-0.168322°	Elevation:	3m

.

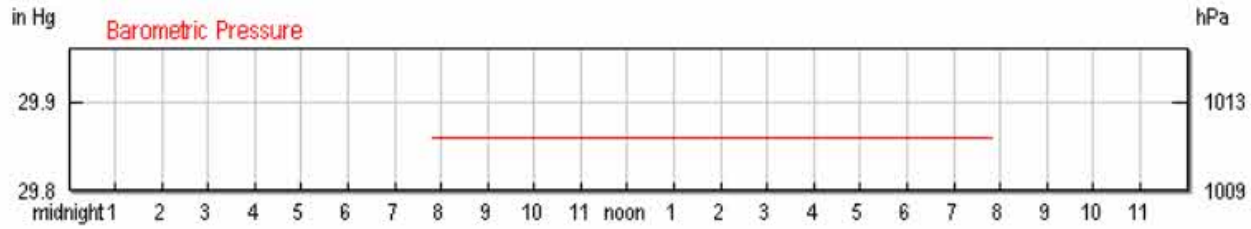
3.2 Weather Conditions

The following weather conditions were taken from a nearby weather station at Shoreham Down using the data supplied by the website www.wunderground.com. Observations on site indicate that the weather conditions were very similar to those at the nearby weather station.

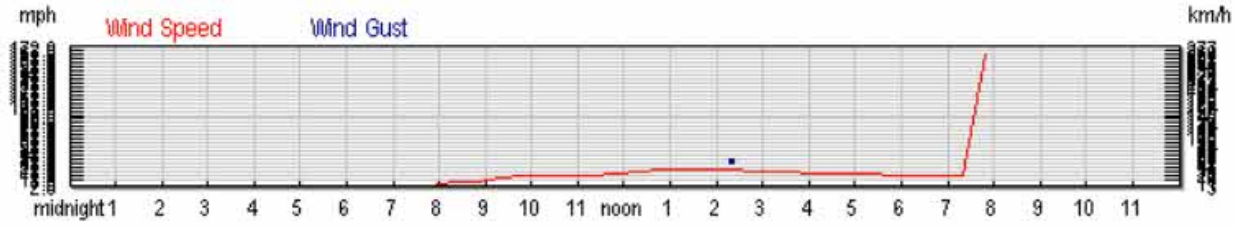
3.2.1 Temperature and dew Point



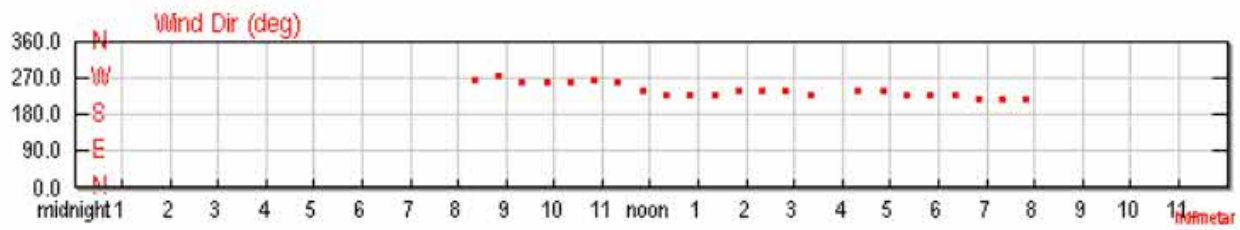
3.2.2 Barometric Pressire



3.2.3 Wind Speed and Wind Gust

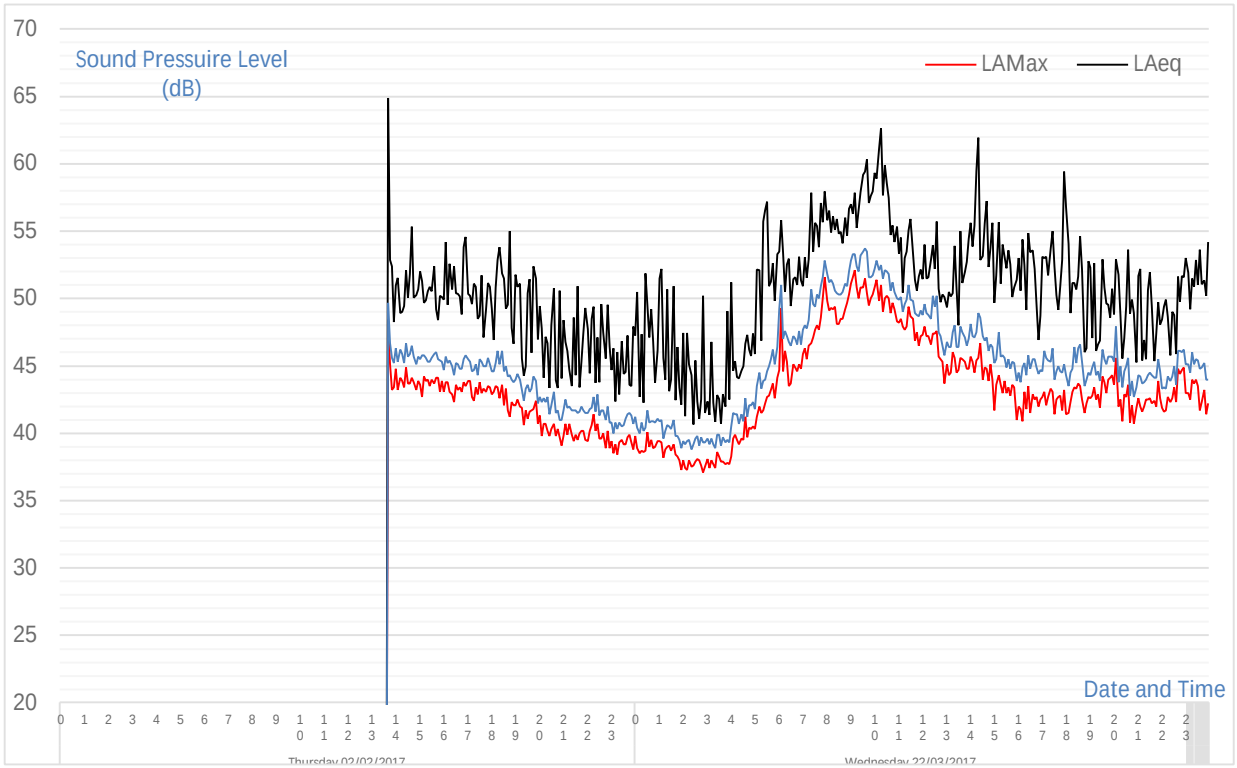


3.2.4 Wind Direction



3.3 Measurement Results

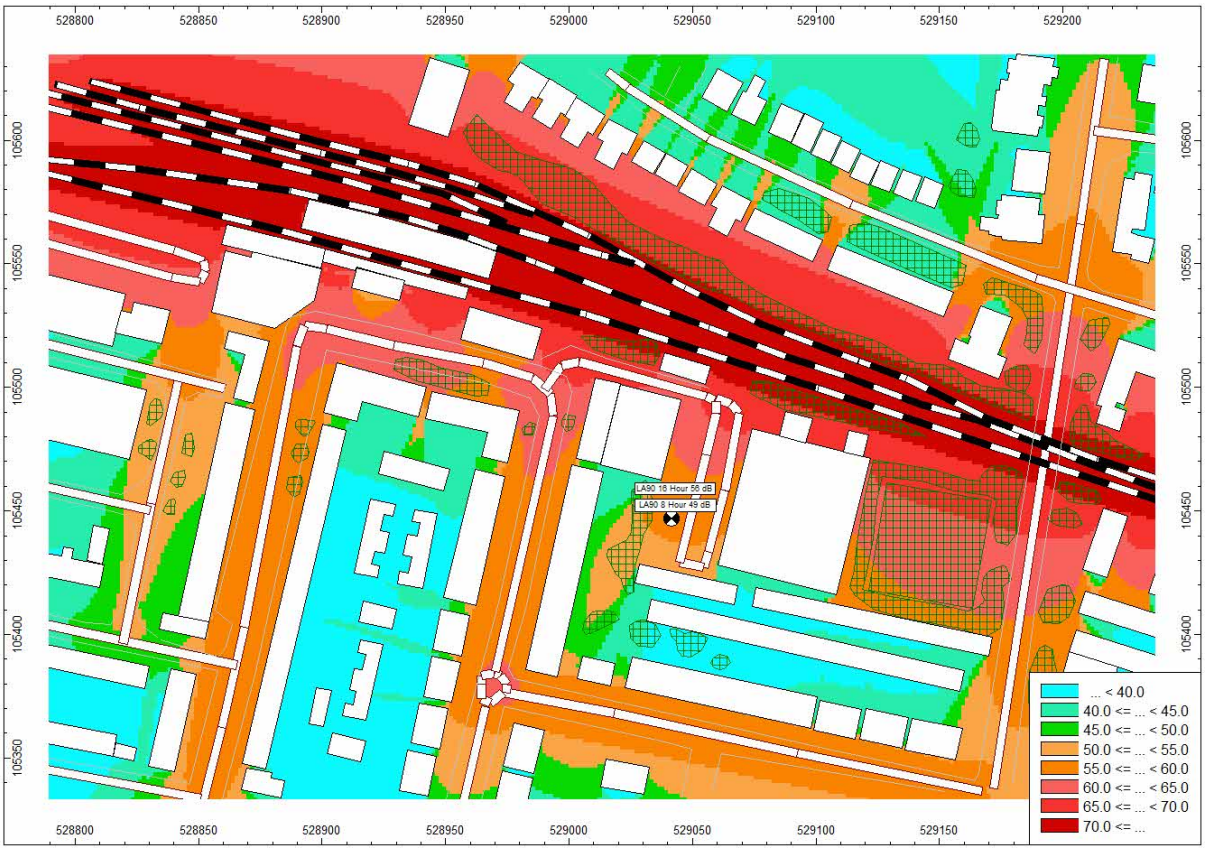
3.3.1 Background Noise Profile

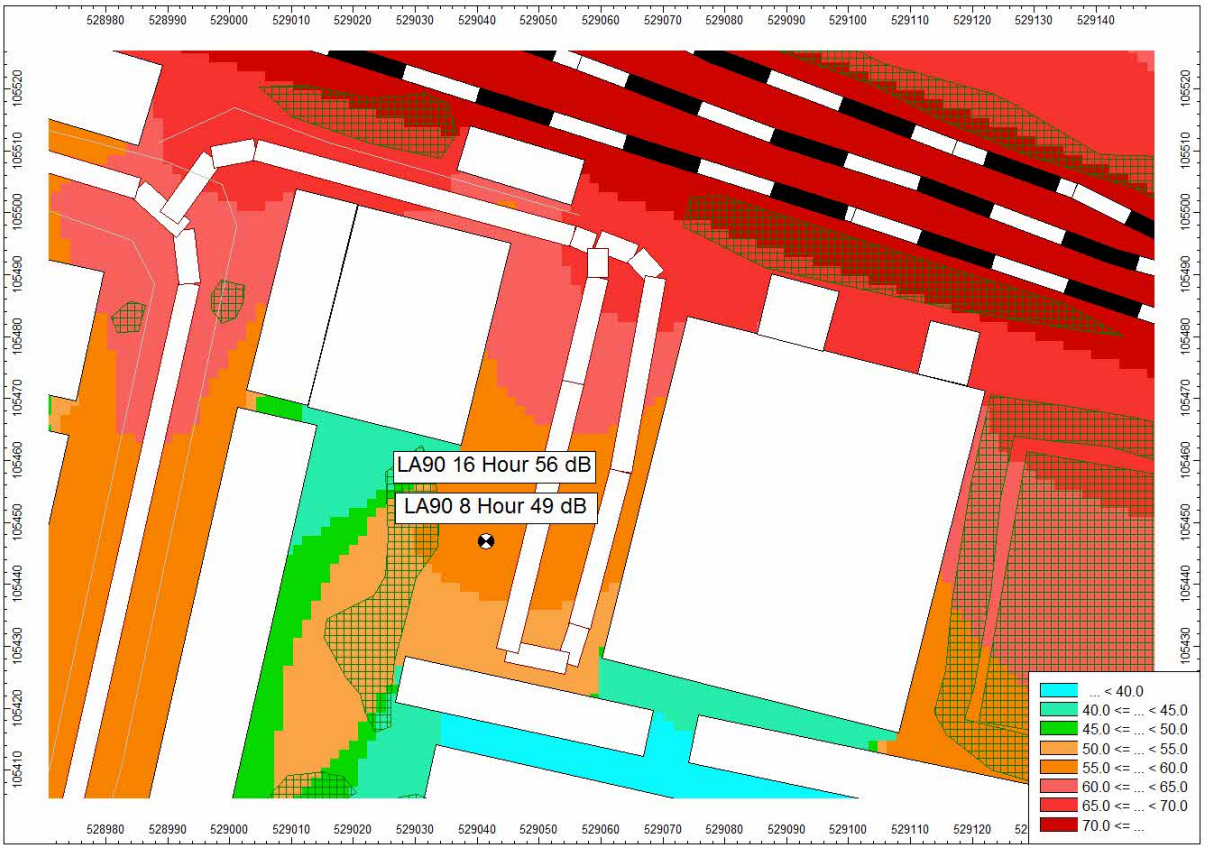


Day Time (07:00 to 19:00)			Evening Time (19:00 to 23:00)			Night Time (23:00 to 07:00)		
$L_{AMax, 1h}$	$L_{Aeq, 1h}$	$L_{A90, 1h}$	$L_{AMax, 1h}$	$L_{Aeq, 1h}$	$L_{A90, 1h}$	$L_{AMax15\ min}$	$L_{Aeq15\ min}$	$L_{A9015\ min}$
41 - 52	46 - 65	44 - 54	39 - 46	43 - 54	41 - 48	37 - 49	41 - 57	39 - 51

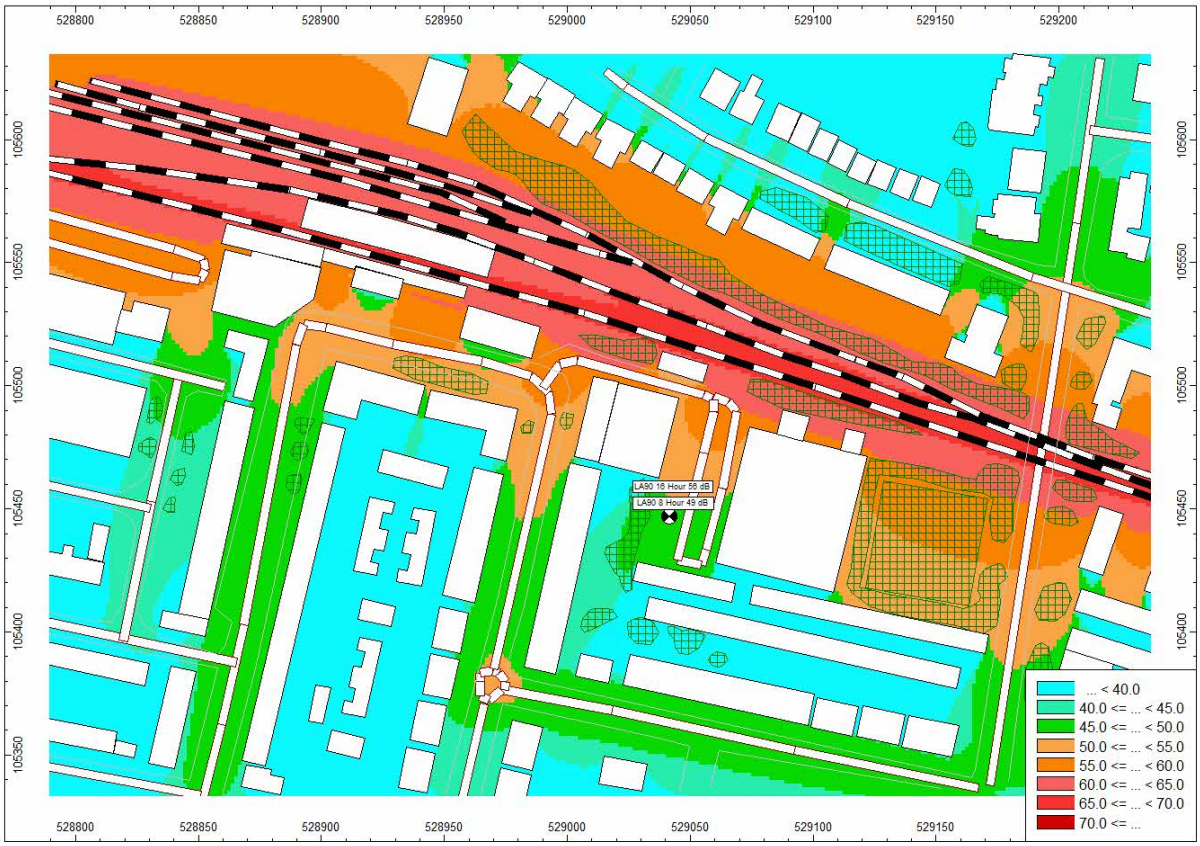
3.4 3D Background Noise Maps

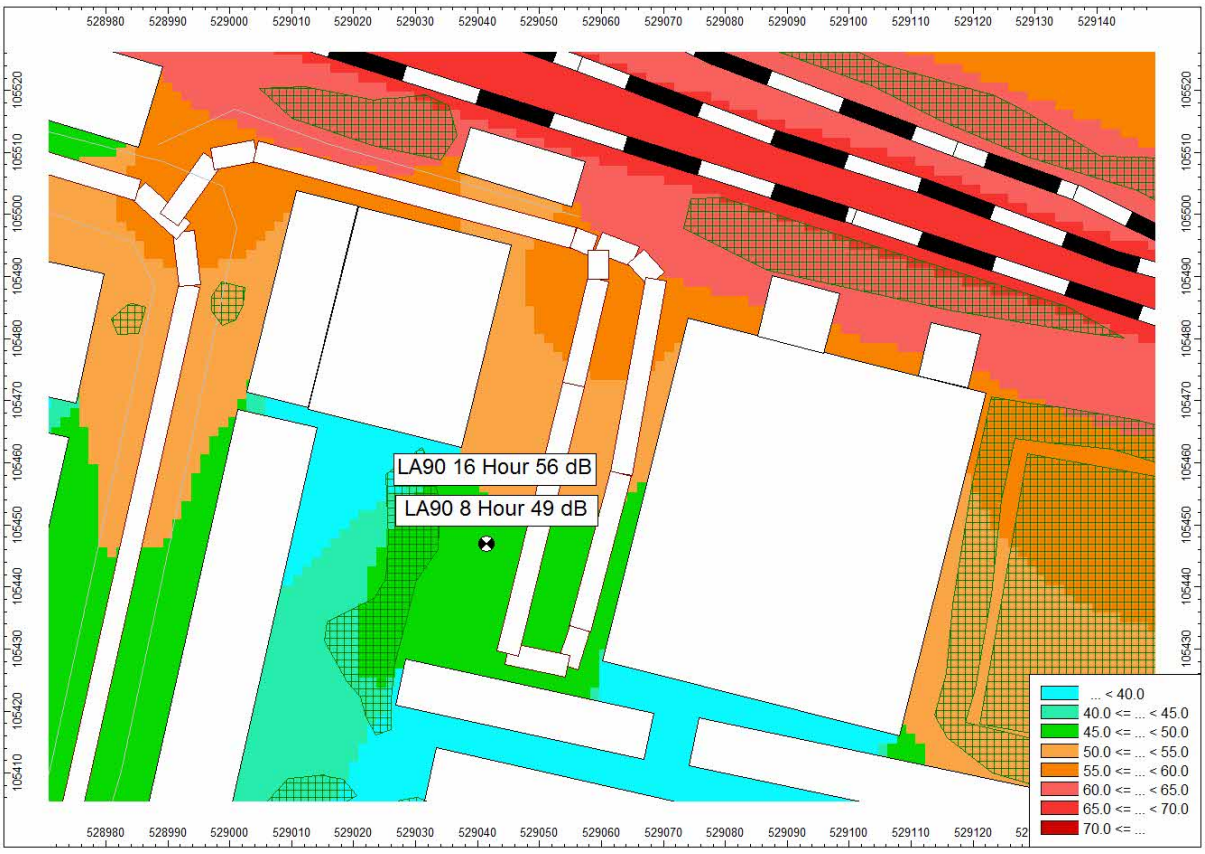
3.4.1 Day Time (07:00 – 23:00)





3.4.2 Night Time (07:00 – 23:00)





4 Methodology and Criterion…

4.1 British Standard 8233: 2014 ("BS8233")

British Standard 8233:2014 provides guidance on the sound insulation and the reduction of noise in and around buildings and replaced the original 1999 standard in February 2014.

> "This British Standard provides guidance for the control of noise in and around buildings. It is applicable to the design of new buildings….."

The standard goes onto to provide details of the approach to be taken when assessing the design in terms of planning:

> "a) Assess the site, identify significant existing and potential noise sources, measure or estimate noise levels and evaluate layout options.
> b) Determine design noise levels for spaces in and around the building (s).
> c) Determine sound insulation of the building envelope, including the ventilation strategy.
> d) Identify internal sound insulation requirements.
> e) Identify and design appropriate noise control measures.
> f) Establish quality control and ensure good workmanship."

4.1.1 Internal Ambient Noise Levels for dwellings

British Standard 8233:2014 provides desirable internal ambient noise levels within different rooms and at different times for external noise sources that are considered steady within section 7.7.2.:

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	$L_{Aeq,\ 16\ hour}$ 35 dB	--
Dining	Dining Room	$L_{Aeq,\ 16\ hour}$ 40 dB	--
Sleeping (Daytime Resting)	Bedroom	$L_{Aeq,\ 16\ hour}$ 35 dB	$L_{Aeq,\ 8\ hour}$ 30 dB

4.1.2 Maximum Noise Levels

Unlike the previous version, BS 8233:2014 doesn't provide recommendations in relation to maximum noise levels in residential bedrooms at night from individual noise events such as vehicle pass-bys or aircraft movements. Instead, it advises that: "regular individual noise events…can cause sleep disturbance. A guideline value may be set in terms of SEL (Sound Exposure Level) or LAmax,F depending on the character and number of events per night. Sporadic noise events could require separate values".

4.2 National Planning Policy Framework: 2012("NPPF")

4.2.1 Scope of Document

The National Planning Policy Framework ("NPPF") published in March 2012 sets out the Government's National Planning Policies for England and how these can be applied by local communities when developing their local plans or deciding planning application to best reflect the needs and priorities of the local communities. Current planning law requires Local Authorities to grant planning applications in accordance with the local development plan unless there are material considerations which require them to reach a different decision for sustainable developments.

4.2.2 Paragraph 14 -Requirement of Grant Planning Permission

This report therefore will determine if there is a significant adverse impact in terms of noise from the development and then allow the Local Authority to grant planning permission unless they can demonstrate that the significant adverse impact would outweigh the benefits of the development "At the heart of the National Planning Policy Framework is a presumption in favour of sustainable development, which should be seen as a golden thread running through both plan making and decision taking:

> For decision-taking this means:
> Approving development proposals that accord with the development plan without delay; and
> Where the development plan is absent, silent or relevant policies are out-of-date, granting planning permission unless:
>
> Any adverse impact of doing so would significantly and demonstrably outweigh the benefits, when assessed against policies in this Framework taken as a whole."

4.2.3 Paragraph 123 -Aim of Planning Decisions with respect to Noise

Paragraph 123 of the NPPF provides the overall aims in terms of noise when determining planning applications.

> "Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
>
> mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions..."

5 Assessments...

5.1 Calculation Procedure

The calculation on the internal noise level within the proposed residential properties is based on the transmission loss or the difference between the sound power levels radiating onto the external surface of the façade and the sound power level radiating into the façade. The calculation formula is defined within equation G.1. of British Standard 8233: 2014 and is based on the calculation methodology of British Standard 12354 – Part 3: 2000 entitled "Building acoustics – Estimation of acoustic performance of building from the performance of elements – Part 3: Airborne sound insulation against outdoor sound."

$$L_{f,2} \approx L_{f,1g} + 10.\log_{10}\left(\frac{A_0}{T}.10^{\frac{-D_{n,e}}{10}} + \frac{T_{w,i}}{T}.10^{\frac{-R_{w,i}}{10}} + \frac{T_{f,w}}{T}.10^{\frac{-R_{e,w}}{10}} + \frac{T_{s,s}}{T}.10^{\frac{-R_{r,r}}{10}} +\right) + 10.\log_{10}\left(\frac{T}{A}\right) + 3$$

$L_{f,2}$ = Equivalent sound pressure level internally within the room (dB) – reference 2 x 10^{-5}Nm^{-2}.

$L_{f,1g}$ = Equivalent sound pressure level externally outside the room under consideration (dB) – reference 2 x 10^{-5}Nm^{-2}.

A_0 = Reference absorption area within room of 10m^2 and independent of frequency.

T_g = Total façade area of room in question (m^2).

$T_{w,i}$ = Area of windows or glazing within the room (m^2).

$T_{f,w}$ = Area of external wall within the room (m^2).

$T_{s,s}$ = Area of the ceiling within the room (m^2).

T = Total area of elements through which sound enters the room (m^2). i.e. $T = T_g + T_{s,s}$

$D_{n,f}$ = Sound insulation of the trickle vent measured to British Standard 20140 – Part 10: 1992 (Withdrawn)

$S_{w,i}$ = Sound reduction index of the window (dB)

$S_{f,w}$ = Sound reduction index of the external wall (dB)

$S_{s,s}$ = Sound reduction index of the ceiling (dB)

A = Equivalent absorption of the room under consideration (m)

5.2 Transmission Loss Data

5.2.1 Ventilation (D_{ne})

Octave Band Frequency	63	125	250	500	1000	2000	4000
Acoustic Trickle Vents	27	31	35	43	45	44	44

5.2.2 Glazing (R_{wi})

Octave Band Frequency	63	125	250	500	1000	2000	4000
4mm Outer–12mm–4mm Inner	17	19	19	34	38	41	40

5.2.3 Walls (R_{ew})

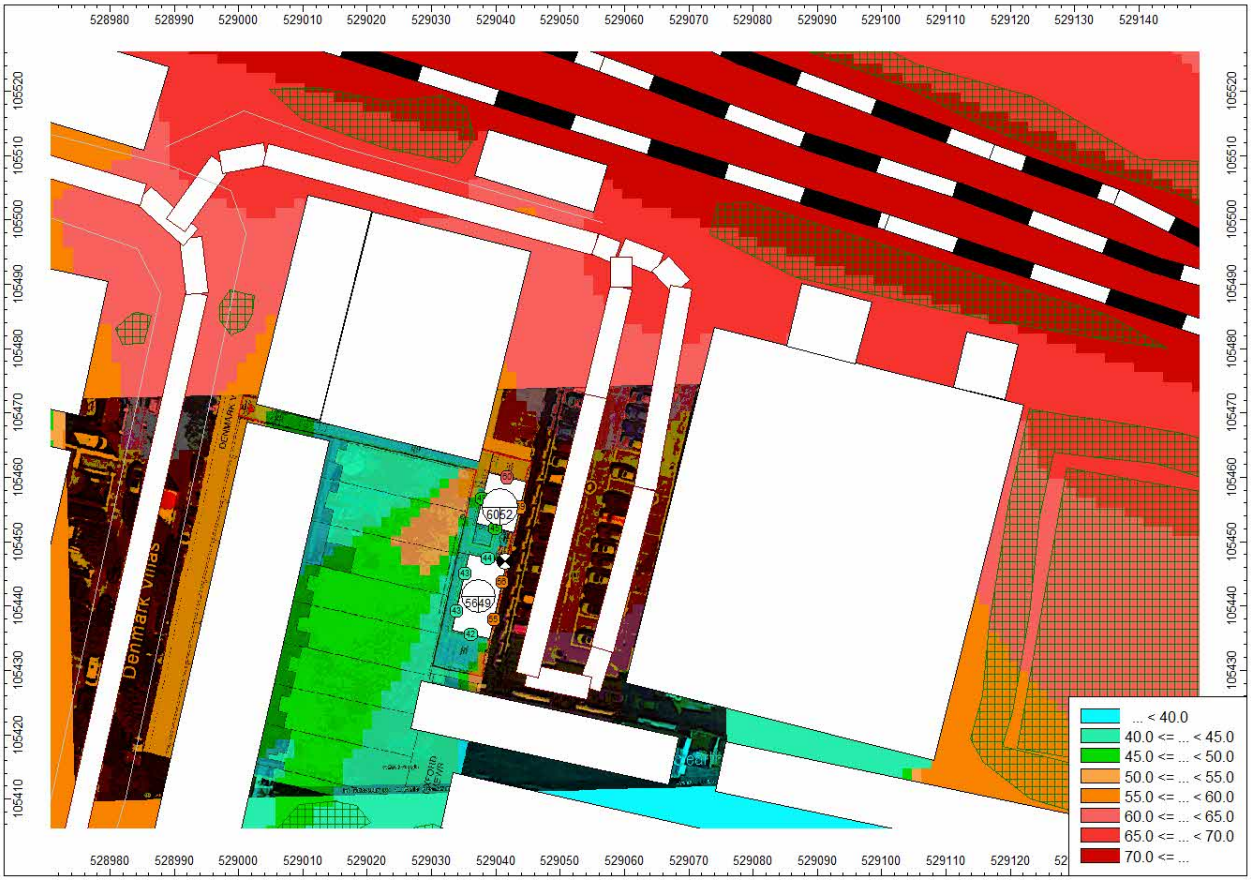
Octave Band Frequency	63	125	250	500	1000	2000	4000
Brick and Concrete Block	40	43	42	45	53	55	55

5.2.4 Ceiling (R_{rr})

Octave Band Frequency	63	125	250	500	1000	2000	4000
1 x mm Plasterboard	26	28	34	40	45	49	49

5.3 Day Time (07:00 to 23:00) Internal Noise Levels

5.3.1 3D Noise Maps



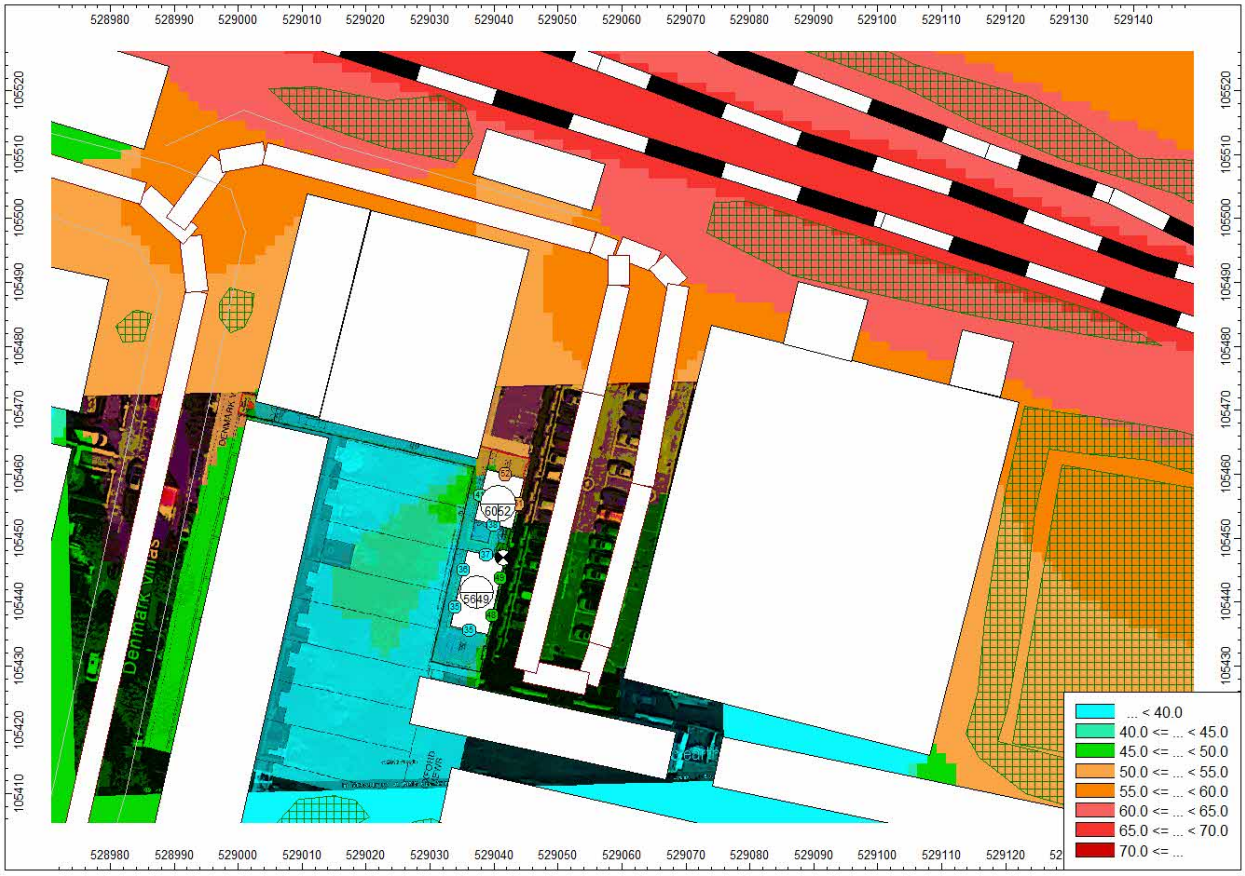
Octave Band Centre Frequency (Hz)

63	125	250	500	1000	2000	4000	SUM
63	63	59	56	54	54	51	60

Resultant Maximum Sound Pressure Level at Façade – $L_{eq,\ 16\ hours}$. (dB) Reference 2 x 10^{-5} Nm^{-2}

5.4 Night Time (23:00 to 07:00) Internal Noise Levels

5.4.1 3D Noise Maps



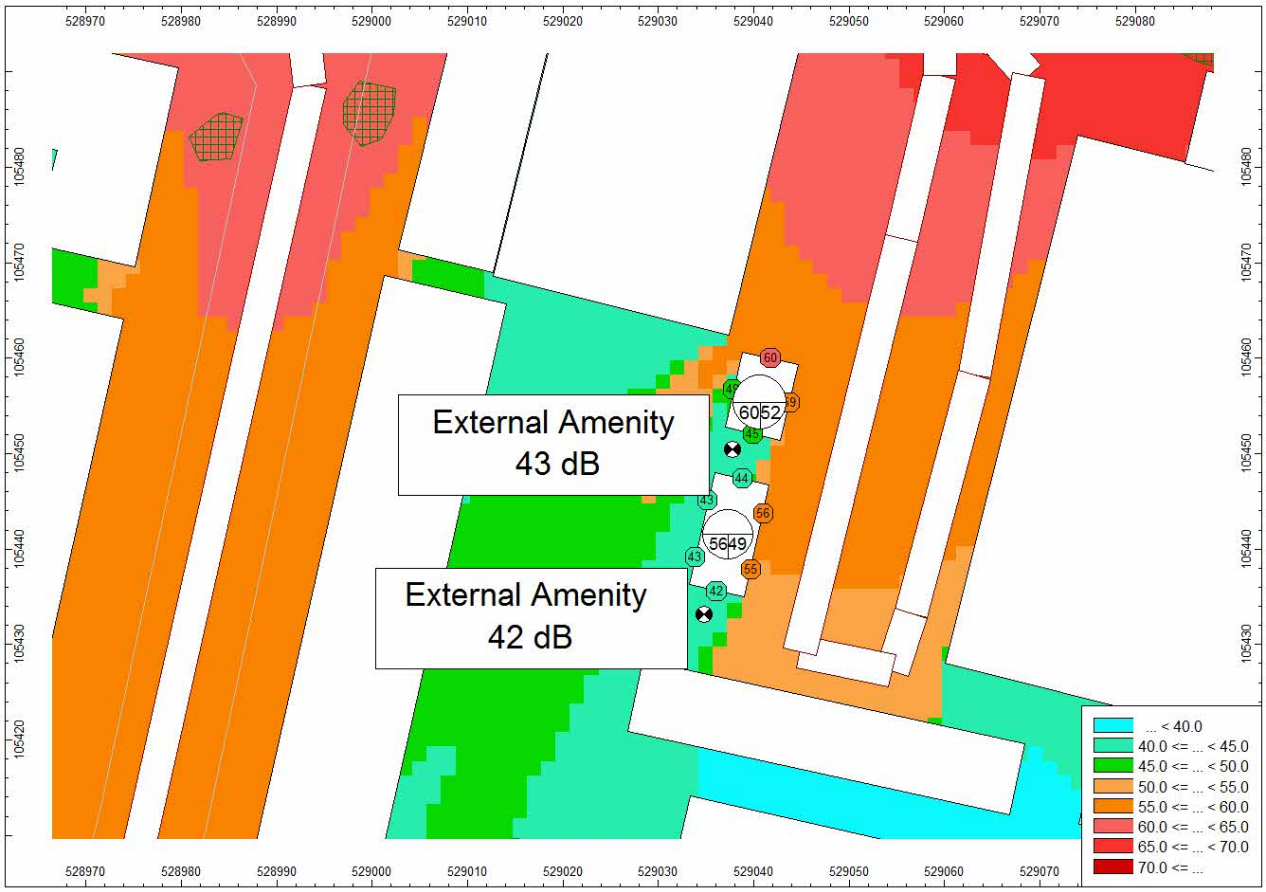
Octave Band Centre Frequency (Hz)

63	125	250	500	1000	2000	4000	SUM
55	55	51	48	46	46	43	52

Resultant Maximum Sound Pressure Level at Façade – $L_{eq,\ 16\ hours}$. (dB) Reference 2 x 10^{-5} Nm^{-2}

5.5 Amenity Space

5.5.1 Noise Map



Octave Band Centre Frequency (Hz)

63	125	250	500	1000	2000	4000	SUM
46	46	42	39	37	37	34	43

Resultant Maximum Sound Pressure Level at Façade – $L_{eq,\ 16\ hours}$. (dB) Reference 2 x 10^{-5} Nm^{-2}

British Standard 8233: 2014 Assessment

Day Time – 07:00 to 23:00 Hours

Internal Noise Level from External Noise Sources

Quietly confident

Location of Measurements	First Floor Residential façade						
Construction of Walls	Brick and Block Wall						
Construction of Ceiling	1 Layer of 12mm Plasterboard						
Construction of Windows	Standard Glazing (4 – 12 – 4)						
Construction of Trickle Vents	Acoustic Trickle Vents						
Octave Band Frequency	63	125	250	500	1000	2000	4000
A = L_{eqff} ($L_{eq,1}$ + 2 dB)	63	63	59	56	54	54	51
B = Ventilation (D_{ne})	27	31	35	43	45	44	44
	0.00114	0.00045	0.00018	0.00003	0.00002	0.00002	0.00002
C = Window (R_{wi})	17	19	19	34	38	41	40
	0.00228	0.00144	0.00144	0.00005	0.00002	0.00001	0.00001
D = Walls (R_{ew})	40	43	42	45	53	55	55
	0.00003	0.00002	0.00002	0.00001	0.00000	0.00000	0.00000
E = Ceiling (R_{rr})	26	28	34	40	45	49	49
	0.00144	0.00091	0.00023	0.00006	0.00002	0.00001	0.00001
F = 10.Log_{10} (B + C + D + E)	-23.1	-25.5	-27.3	-38.5	-42.5	-44.0	-43.7
Absorption (A)	7	11	14	16	16	15	15
G = 10.Log_{10} (S/A)	4.0	2.0	1.0	0.4	0.4	0.7	0.7
Resultant Level	46.9	42.5	35.7	20.9	14.9	13.7	10.9
A-Weighting	-26	-16	-9	-3	0	1	1
A-Weighted	21	27	27	18	15	15	12
Resultant Internal Noise Level	$L_{Aeq,16\ hours}$ 30 dB						
British Standard 8233:2014	Sleeping (Daytime Resting) $L_{Aeq,16\ hours}$ 35 dB – Levels Meet the Requirements						

British Standard 8233: 2014 Assessment

Night Time – 23:00 to 07:00 Hours

Internal Noise Level from External Noise Sources

Quietly confident

Location of Measurements	First Floor Residential façade						
Construction of Walls	Brick and Block Wall						
Construction of Ceiling	1 Layer of 12mm Plasterboard						
Construction of Windows	Standard Glazing (4 – 12 – 4)						
Construction of Trickle Vents	Acoustic Trickle Vents						
Octave Band Frequency	63	125	250	500	1000	2000	4000
A = L_{eqff} ($L_{eq,1}$ + 2 dB)	55	55	51	48	46	46	43
B = Ventilation (D_{ne})	27	31	35	43	45	44	44
	0.00114	0.00045	0.00018	0.00003	0.00002	0.00002	0.00002
C = Window (R_{wi})	17	19	19	34	38	41	40
	0.00228	0.00144	0.00144	0.00005	0.00002	0.00001	0.00001
D = Walls (R_{ew})	40	43	42	45	53	55	55
	0.00003	0.00002	0.00002	0.00001	0.00000	0.00000	0.00000
E = Ceiling (R_{rr})	26	28	34	40	45	49	49
	0.00144	0.00091	0.00023	0.00006	0.00002	0.00001	0.00001
F = 10.Log_{10} (B + C + D + E)	-23.1	-25.5	-27.3	-38.5	-42.5	-44.0	-43.7
Absorption (A)	7	11	14	16	16	15	15
G = 10.Log_{10} (S/A)	4.0	2.0	1.0	0.4	0.4	0.7	0.7
Resultant Level	38.9	34.5	27.7	12.9	6.9	5.7	2.9
A-Weighting	-26	-16	-9	-3	0	1	1
A-Weighted	13	19	19	10	7	7	4
Resultant Internal Noise Level	$L_{Aeq,8\ hours}$ 22 dB						
British Standard 8233:2014	Sleeping (Daytime Resting) $L_{Aeq,8\ hours}$ 30 dB – Levels Meet the Requirements						

6 Conclusion

6.1 Summary of Criterion

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	$L_{Aeq,\ 16\ hour}$ 35 dB	--
Dining	Dining Room	$L_{Aeq,\ 16\ hour}$ 40 dB	--
Sleeping (Daytime Resting)	Bedroom	$L_{Aeq,\ 16\ hour}$ 35 dB	$L_{Aeq,\ 8\ hour}$ 30 dB

6.2 Measurements

Background noise measurements were undertaken between Tuesday 21st March 2017 to Thursday 23 March 2017 at a position to the east of the proposed development on a lamp post within the existing delivery centre.

Measurement Index	Day Time (07:00 to 23:00)	Night Time (23:00 to 07:00)
Position 1	$L_{Aeq,\ 16\ hour}$ 56 dB	$L_{Aeq,\ 8\ hours}$ 49 dB.

6.3 External Façade Levels

A 3D-Noisemap was created using the continuous background noise measurements and spot measurements taken around site to determine the free-field façade noise levels that are likely to impact on the residential façade.

Measurement Index	Day Time (07:00 to 23:00)	Night Time (23:00 to 07:00)
Average Levels (BS8233:2014)	$L_{Aeq,ff\ 16\ hour}$ 60 dB	$L_{Aeq,ff\ 8\ hour}$ 52 dB

6.4 Mitigation Measures

It has been recommended that in order to meet the criterion defined within British Standard 8233: 2014 consideration be given to the following mitigation measures.

Mitigation measures	Maximum Free Field Levels Impacting on a Residential Facade
Glazing	Standard Glazing (4 – 12 – 4)
Trickle Vents	Acoustic Trickle Vents
Upper Floor Ceiling	1 Layer of 12mm Plasterboard

6.5 Conclusions

6.5.1 British Standard 8233: 2014

The assessments undertaken in accordance with British Standard 8233:2014 indicate that if the proposed mitigation measures are adhered to then the required internal noise levels and external amenity noise levels will be met.

6.5.2 National Planning Policy Framework

The assessments indicate that the existing noise sources will not have a significant adverse impact on the internal or external living conditions of the residents of the proposed residential dwelling. It would therefore be recommended planning permission is discharged in accordance with paragraph 14 of the National Planning Policy Framework as the benefits of the development are likely to outweigh any significant adverse impact in terms of noise.

KR Associates (UK) Ltd

Quietly confident...