

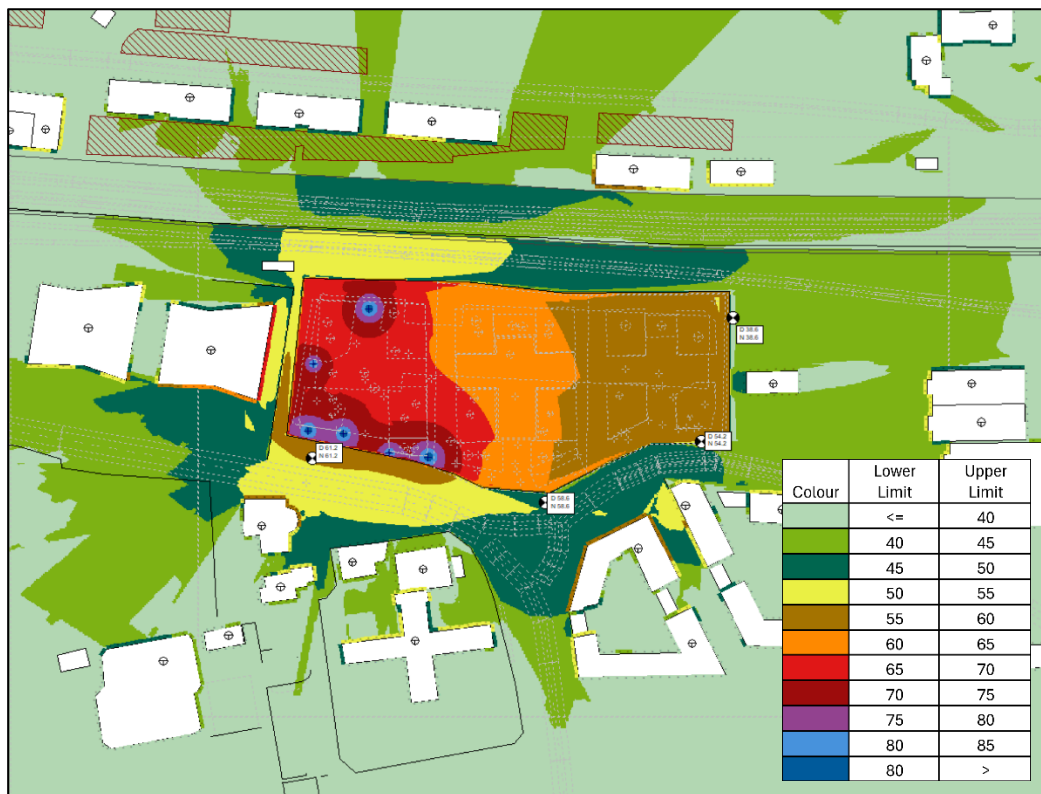


Figure 8.7: Superstructure Phase 1 – Construction Noise Level ($L_{Aeq,10h}$ dB)

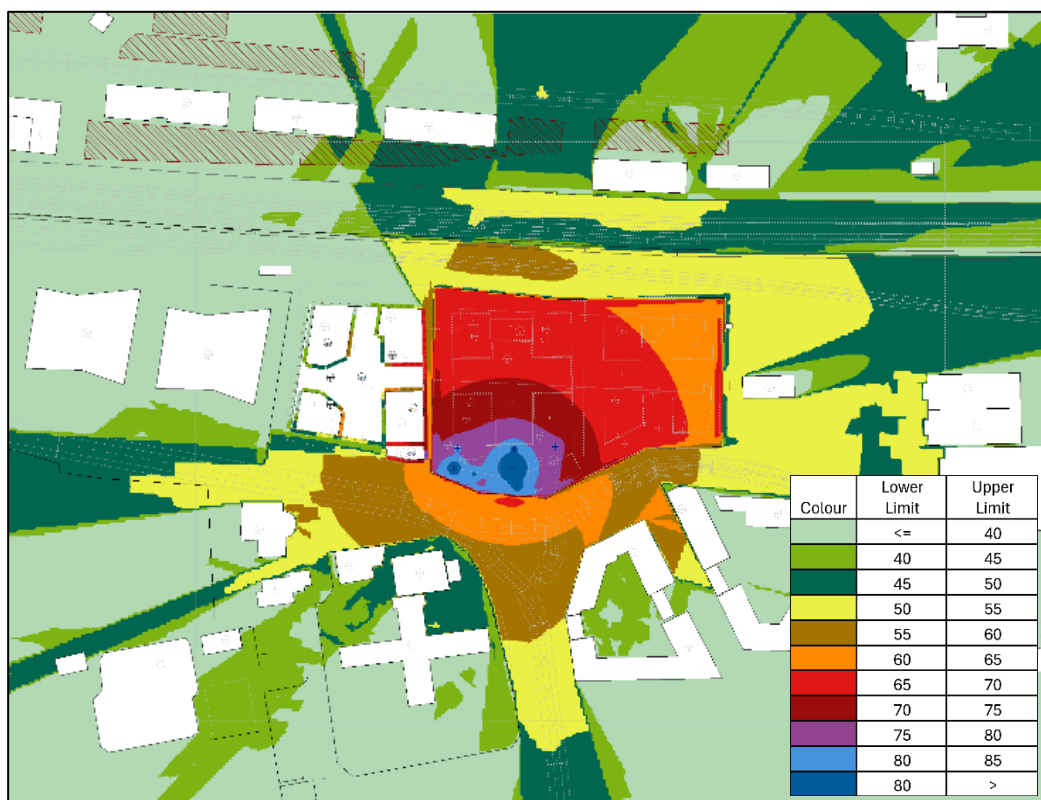


Figure 8.8: Substructure Phase 2 – Construction Noise Level ($L_{Aeq,10h}$ dB)

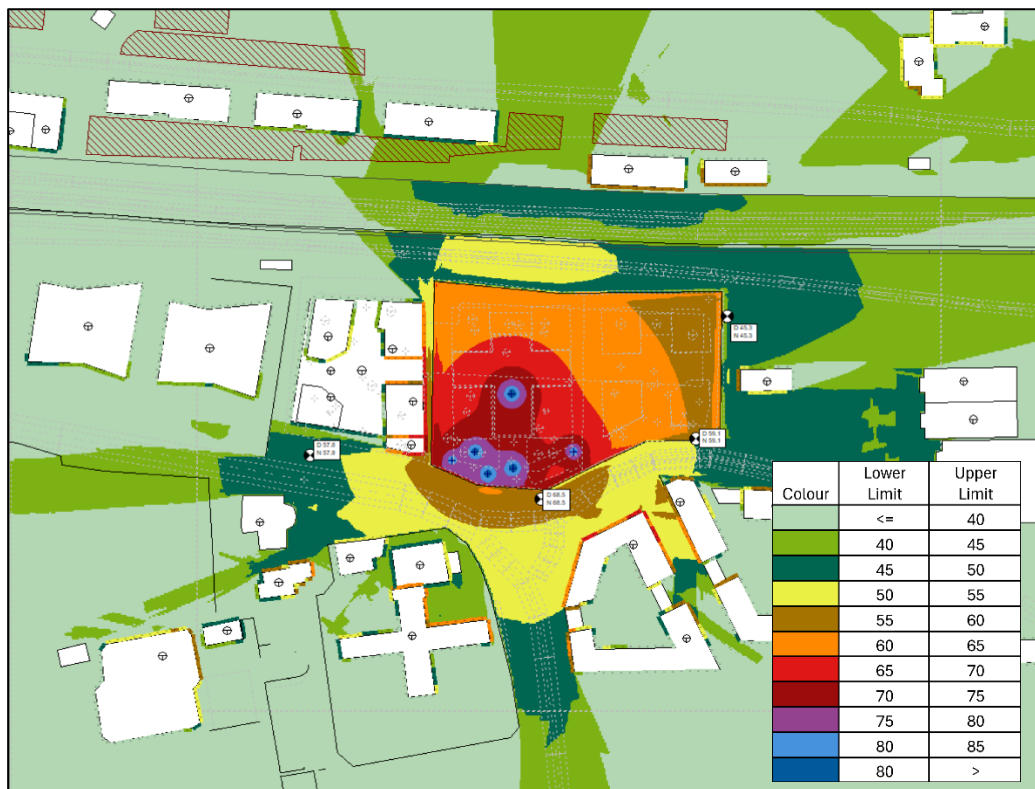


Figure 8.9: Superstructure Phase 2 – Construction Noise Level ($L_{Aeq,10h}$ dB)

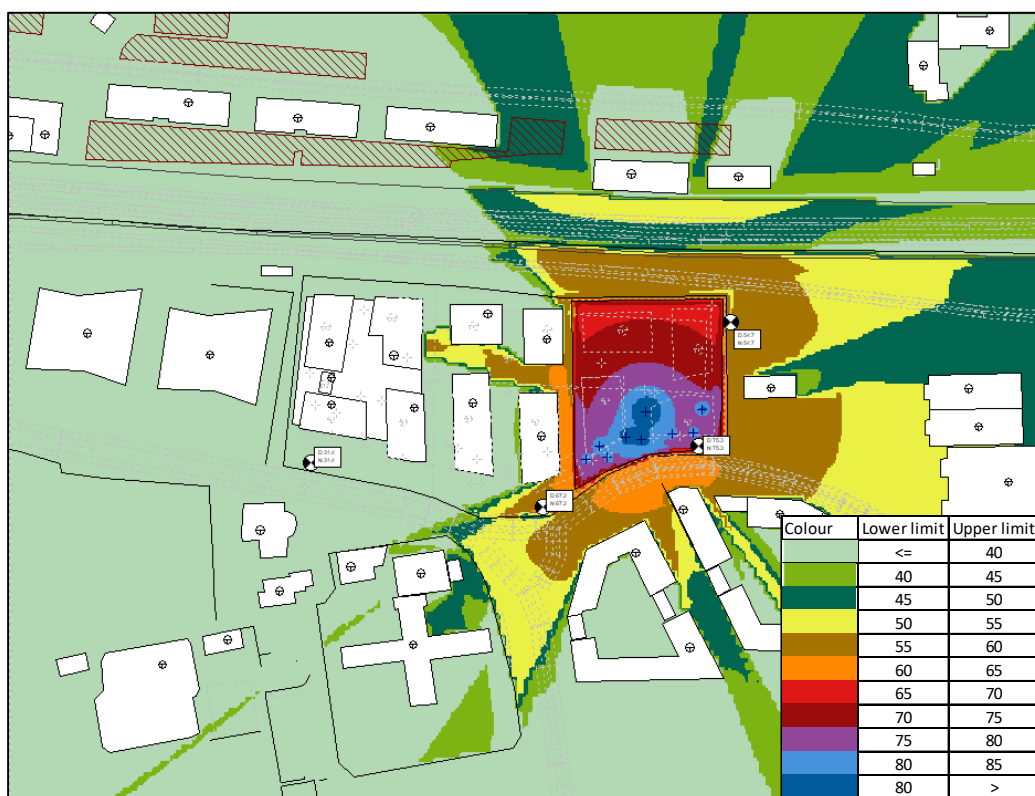


Figure 8.10: Substructure Phase 3 – Construction Noise Level ($L_{Aeq,10h}$ dB)

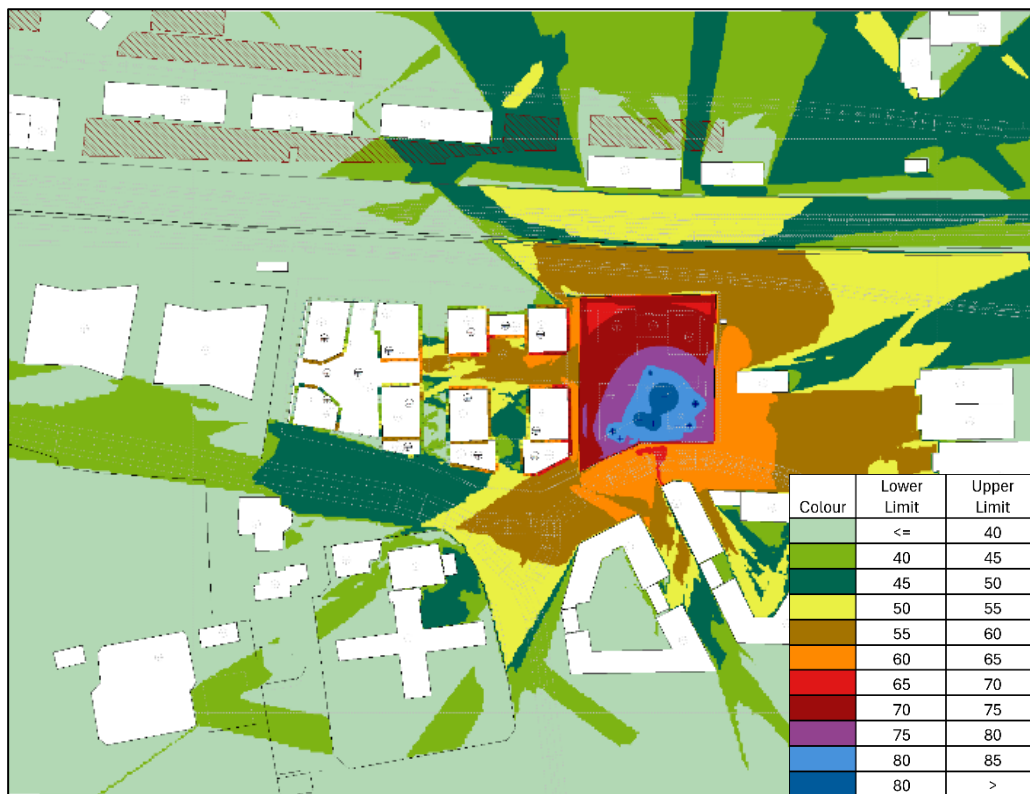


Figure 8.11: Superstructure Phase 3 – Construction Noise Level ($L_{Aeq,10h}$ dB)



Figure 8.12: Amplified Music from Proposed Development

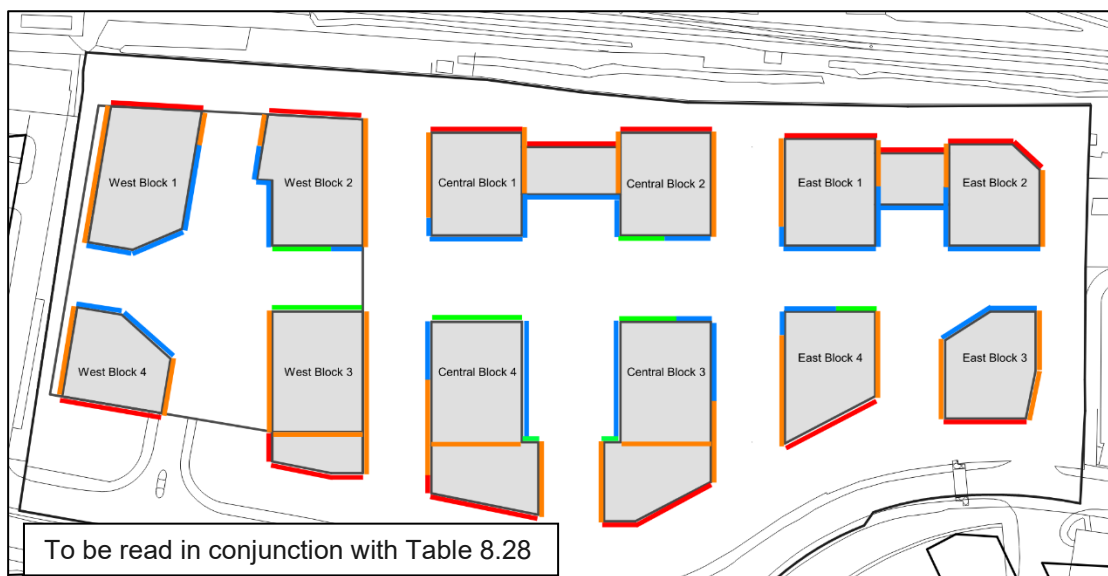


Figure 8.13: Façade location key



Figure 8.14: Assessment of External Noise Levels in Private Amenity



Figure 8.15: Assessment of External Noise Levels in Shared Amenity



Figure 8.16: Assessment of External Noise Levels in Public Realm

Appendix H.3 Environmental Noise & Vibration Survey Report

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

21348-R02-A

5 April 2023

Forbury Retail Park

Environmental noise and vibration report

London, Manchester, Edinburgh, Birmingham, Belfast

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SANDY BROWN

Consultants in Acoustics, Noise & Vibration

Version	Date	Comments	Author	Reviewer
A	5 Apr 23		John Sails Aleksis Apolskis	David Elliott

Disclaimer

This report has been prepared for the sole benefit and use of our client based on their instructions and requirements. Sandy Brown Ltd extends no liability in respect of the information contained in the report to any third party.

Summary

Sandy Brown has been commissioned by Ikon Consultancy, UK House, 180 Oxford Street, London, to provide acoustic advice in relation to the proposed development at Kings Meadow View (formerly Forbury Retail Park), Reading.

An environmental noise and vibration survey has been carried out at the site. The noise survey was carried out between 10 September 2021 and 15 September 2021. The vibration survey was undertaken on 10 September 2021.

The representative background sound levels measured during the survey were $L_{A90,15min}$ 48 dB during the daytime and $L_{A90,15min}$ 38 dB at night.

The average ambient noise levels measured at the unattended noise monitoring location were $L_{Aeq,16h}$ 53 dB during the daytime and $L_{Aeq,8h}$ 51 dB at night. Attended noise measurements were used to determine typical noise levels near to Forbury Road and Kenovan Drive.

A vibration survey was carried out to determine existing vibration levels at the site.

Data from the survey will be used to inform the design of the development with respect to atmospheric noise emissions from building services plant, environmental noise ingress through the building envelope and tactile and ground borne vibration levels within the residences.

Contents

1 Introduction 5

2 Site description 6

3 Survey method 7

4 Measurement results 11

5 Conclusion 16

Appendix A – Survey details 17

Appendix B – Results of unattended measurements at Location L 20

Appendix C – Measured LLSmax acceleration results at Location V 22

1 Introduction

Sandy Brown has been commissioned by Ikon Consultancy, to provide acoustic advice in relation to the proposed development at Forbury Retail Park, Reading.

Environmental noise and vibration surveys have been carried out to establish:

- background sound levels around the site and by nearby noise sensitive premises
- ambient and maximum noise levels at the site
- vibration levels affecting the site.

This report provides details of the noise and vibration surveys, including measurement results.

2 Site description

2.1 The site and its surroundings

The site location in relation to its surroundings is shown in Figure 1. Currently the site primarily comprises commercial units with associated carpark. On the southern boundary of the site there is a fast-food restaurant.

The nearest major road is Forbury Road, which leads to Kenovan Drive to the east of the roundabout. National rail lines serving Reading Station run across the northern perimeter of the site. The line is also used for freight.



Figure 1 Areal view of the site (courtesy of Google Earth Pro) showing site, survey measurement positions and surrounding premises

3 Survey method

3.1 Noise survey method

The survey included unattended and attended noise measurements.

3.1.1 *Unattended measurements*

Unattended noise monitoring was undertaken at the site over 5 days.

Details of the equipment used, and the noise indices measured are provided in Appendix A.

The unattended measurements were taken over 15-minute periods between 14:16 on 10 September 2021 and 11:16 on 15 September 2021. The equipment was installed by John Sails and collected by Gunes Dincer.

The measurement position used during the survey is indicated in Figure 1, denoted by the letter 'L'. A photograph showing the measurement location is provided in Figure 2. This location was chosen to be reasonably representative of noise levels at the site and outside the nearest noise sensitive premises.

The equipment was installed on the east-side within the property boundaries of Forbury Retail Park, at a 20 m distance from the railway.

The microphone was positioned on a tripod approximately 2 m above ground level at 2.5 m from the closest reflective surface. Measurement results are considered to be free field.

The location was chosen to be reasonably representative of noise levels at the site.



Figure 2 Photograph of unattended measurement position

3.1.2 *Attended measurements*

Attended sample measurements were taken by Gunes Dincer at three locations around the site. Location's 1 and 2 are indicated in Figure 3. The attended measurements were carried out on 10 September 2021, over 15-minute periods.

At each position the microphone was mounted on a tripod approximately 1.5 m above the ground level and 4.0 m from Forbury Road. There were no reflective surfaces in proximity to the measurement locations and therefore the results are considered to be free field.

Details of the equipment used, and the noise indices measured are provided in Appendix A.

Dominant noise sources occurring during the measurements were noted.



Figure 3 Attended noise measurement locations 1 (left) and 2 (right)

3.2 Vibration survey method

Vibration measurements were taken at one location around the site in order to determine the vibration levels resulting from the passage of trains on the overground line adjacent to the site. The vibration measurement locations are indicated in Figure 1 as position “V”.

The measurements were taken on 10 September 2021 by John Sails between 12:15 and 15:13. Measurement periods containing multiple train events were obtained during the survey.

Vibration time histories were recorded using a tri-axial accelerometer and data recorder. The accelerometers were arranged on a mounting block that was connected to a ground-bearing concrete slab. A metal washer was fixed to the slab using a thin layer of epoxy adhesive, away from the boundaries of the room, with the mounting block attached to the washer.

The vibration measurements were conducted in three axes as follows:

- X axis - Horizontal vibration approximately parallel to the railway tracks
- Y axis - Horizontal vibration approximately perpendicular to the railway tracks
- Z axis - Vertical vibration.

Details of the equipment used and the noise indices measured are provided in Appendix A.

The vibration measurements taken at location V is considered to be reasonably representative of the vibration levels to be experienced by the proposed residential premises.



Figure 4 Vibration measurement location closest to rail tracks

3.3 Weather conditions

Weather conditions during the survey are described in Appendix A.

4 Measurement results

4.1 Observations

4.1.1 Noise

The dominant noise sources observed at the site during the survey was road traffic from the adjacent main road, rail noise from the near rail lines/station and helicopter noise. The traffic noise was a constant throughout the measurements, whereas the rail noise was only dominant when present as it was occasional. Helicopter noise was dominant when present, but not constant.

Less significant noise sources included pedestrian activity around the retail park, adjacent construction work, faint plant noise and the wind through the trees. The pedestrian noise was constant, construction noise occasional and both the plant noise and wind through the trees was only audible when no other sources were present.

4.1.2 Vibration

Subjectively there was no perceptual vibration however train events could be seen from the measurement location.

4.2 Noise measurement results

4.2.1 Unattended measurement results

A graph showing the results of the unattended measurements is provided in Appendix B.

Day and night-time ambient noise levels measured during the unattended survey are presented in Table 1. All measurements are considered to be free-field.

Table 1 Ambient noise levels measured during the unattended survey

Date	Daytime (07:00 – 23:00)	Night (23:00 – 07:00)
	$L_{Aeq,16h}$ (dB)	$L_{Aeq,8h}$ (dB)
Friday 10 September 2021	-	50
Saturday 11 September 2021	53	46
Sunday 12 September 2021	52	52
Monday 13 September 2021	55	53
Tuesday 14 September 2021	56	52
Average	54	51

Analysis of night-time maximum noise levels indicates that the night-time maximum noise level not normally exceeded 10 times a night is L_{AFmax} 74 dB.

In line with BS 4142:2014+A1:2019, representative background sound levels have been determined using statistical analysis of the continuous measurements.

Daytime and night-time statistical analysis of representative values for the site are given in Figure 5 and Figure 6.

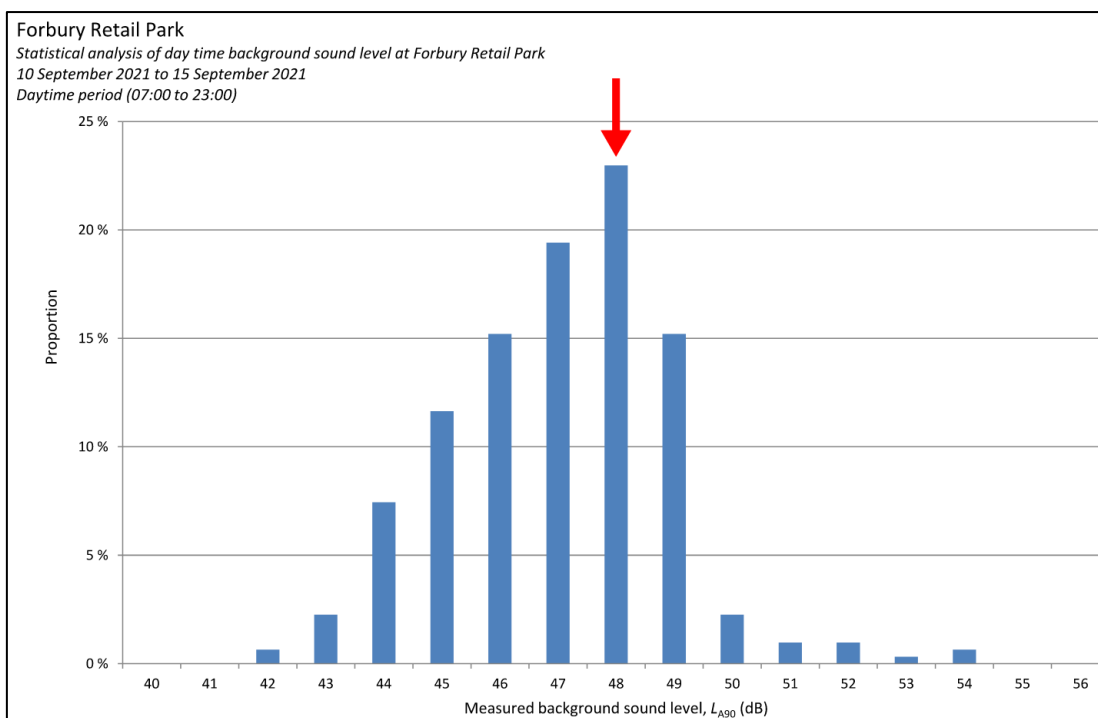


Figure 5 Measured representative background sound level for the daytime period (07:00-23:00)

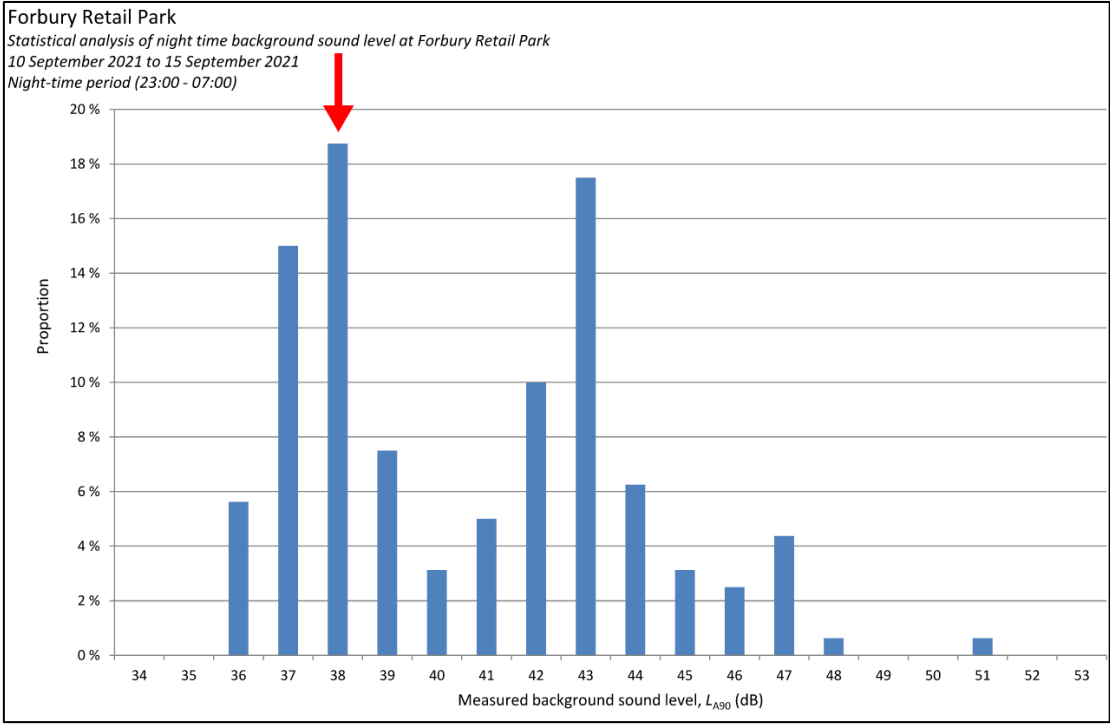


Figure 6 Measured representative background sound level for the night time period (23:00-07:00)

From this analysis, the representative background sound levels measured during the survey were $L_{A90,15min}$ 48 dB during the daytime and $L_{A90,15min}$ 38 dB at night.

4.2.2 Attended measurement results

Noise levels and key sources recorded during the attended measurements are summarised in Table 2.

Table 2 Noise levels and key noise sources from attended measurements

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,15min}$	$L_{AFmax,15min}$	$L_{A90,15min}$	
1	12:30	71	93	60	Max was caused by truck carrying scaffolding
1	13:47	70	84	59	Busy road almost 50 cars per minute (3 buses every min) Dominated by trucks
1	14:45	70	83	62	Road busy, 48 cars per minute. (2 buses every min). Trucks dominant.
2	13:01	68	85	63	Road Noise. Max happens when trucks pass by. Cars accelerate in the roundabout.
2	14:07	68	86	63	Similar to previous measurement
2	15:07	67	78	63	No trucks passed in this interval.
3	13:26	67	79	59	Busy road with cars and trucks. Distant construction.
3	14:26	66	77	57	Busy road with cars and trucks. Distant construction.
3	15:27	67	79	57	Busy road with cars and trucks. Distant construction.

4.3 Vibration measurement results

VDVs measured at location V are presented in Table 3. The maximum VDV's measured for each of the directions are highlighted in red.

Table 3 VDV's measured at location V

Event number	Start time (hh:mm)	Duration (mm:ss)	VDV ($\text{m/s}^{1.75}$)		
			X	Y	Z
1	12:03	01:09	0.002	0.001	0.003
2	12:05	00:34	0.002	0.002	0.005
3	12:11	00:31	0.001	0.001	0.003
4	12:20	01:00	0.001	0.001	0.003
5	12:30	00:39	0.001	0.001	0.003
6	12:33	01:17	0.002	0.001	0.004
7	12:38	00:24	0.002	0.002	0.004
8	12:51	00:27	0.002	0.001	0.003
9	13:00	00:53	0.003	0.001	0.001
10	13:03	00:14	0.003	0.003	0.003
11	13:11	01:48	0.004	0.003	0.005
12	13:15	00:23	0.003	0.002	0.003
13	13:20	00:14	0.003	0.002	0.003
14	13:27	00:43	0.003	0.002	0.003
15	13:32	00:42	0.003	0.004	0.006
16	13:38	01:02	0.005	0.001	0.004
17	13:42	00:26	0.002	0.001	0.003
18	13:59	00:17	0.001	0.002	0.003
19	14:03	01:42	0.003	0.001	0.005
20	14:21	00:31	0.002	0.001	0.003
21	14:28	00:19	0.001	0.001	0.002
22	14:38	00:28	0.001	0.001	0.003
23	14:52	00:54	0.002	0.002	0.003

[1] Measurements of RMS acceleration are presented in Appendix C.

5 Conclusion

A noise survey has been carried out at the site. Key noiser sources at the site were noted as traffic on Forbury Road and Kenavon Drive, and railway noise from the tracks leading to and from Reading Station to the north of the site.

The measured representative background sound levels were $L_{A90,15\text{min}}$ 48 dB during the day, and $L_{A90,15\text{min}}$ 38 dB during the night.

Measurements of tactile vibration and indicate maximum VDV's of:

- X-axis $0.005 \text{ m/s}^{1.75}$
- Y-axis $0.004 \text{ m/s}^{1.75}$
- Z-axis $0.006 \text{ m/s}^{1.75}$.

Appendix A – Survey details

Equipment

The unattended and attended noise measurements were both taken using a Rion NL-52 sound level meter.

Tri-axial acceleration measurements were carried out using a PV-87 accelerometer and recorded using a Rion DA-20 data recorder.

Calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Sound level meter	NL-52/00264550	Rion	29 Jul 22	TCRT20/1422
Microphone	UC-59/09698	Rion	29 Jul 22	TCRT20/1422
Pre-amp	NH-25/64675	Rion	29 Jul 22	TCRT20/1422
Calibrator	NC-74/34367631	Rion	29 Jul 22	TCRT20/1419
Sound level meter	NL-52/00264531	Rion	23 Jun 22	TCRT20/1331
Microphone	UC-59/09678	Rion	23 Jun 22	TCRT20/1331
Pre-amp	NH-25/64656	Rion	23 Jun 22	TCRT20/1331
Calibrator	NC-74/34367630	Rion	23 Jun 22	TCRT20/1328
Data Recorder	DA-20/10870889	Rion	11 Sep 21	TCRT19/1712
Accelerometer	PV-87/33827	Rion	10 Sep 21	TCRT19/1708
Accelerometer	PV-87/74274	Rion	9 Sep 21	TCRT19/1707
Accelerometer	PV-87/33829	Rion	9 Sep 21	TCRT19/1706
Vibration Calibrator	AT01/3015	AP Technology	10 Sep 21	TCRT19/1709

Calibration of the meters used for the measurements is traceable to national standards. Calibration certificates for the sound level meters used in this survey are available upon request.

Calibration checks were carried out on the meters and their measurement chains at the beginning and end of the survey. No significant calibration deviation occurred.

Noise indices

Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period, T, with a fast time weighting.
- $L_{ASmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period, T, with a slow time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures*.

Vibration indices

For each measurement period a number of parameters were recorded. The most relevant of these are described below:

- The vibration dose value (VDV) in each of three axes with the appropriate frequency weightings (as defined in BS 6472-1:2008).
- The maximum RMS acceleration levels in each of three axes in one-third-octave bands, measured using the 'slow response' exponential time weighting.

Weather conditions

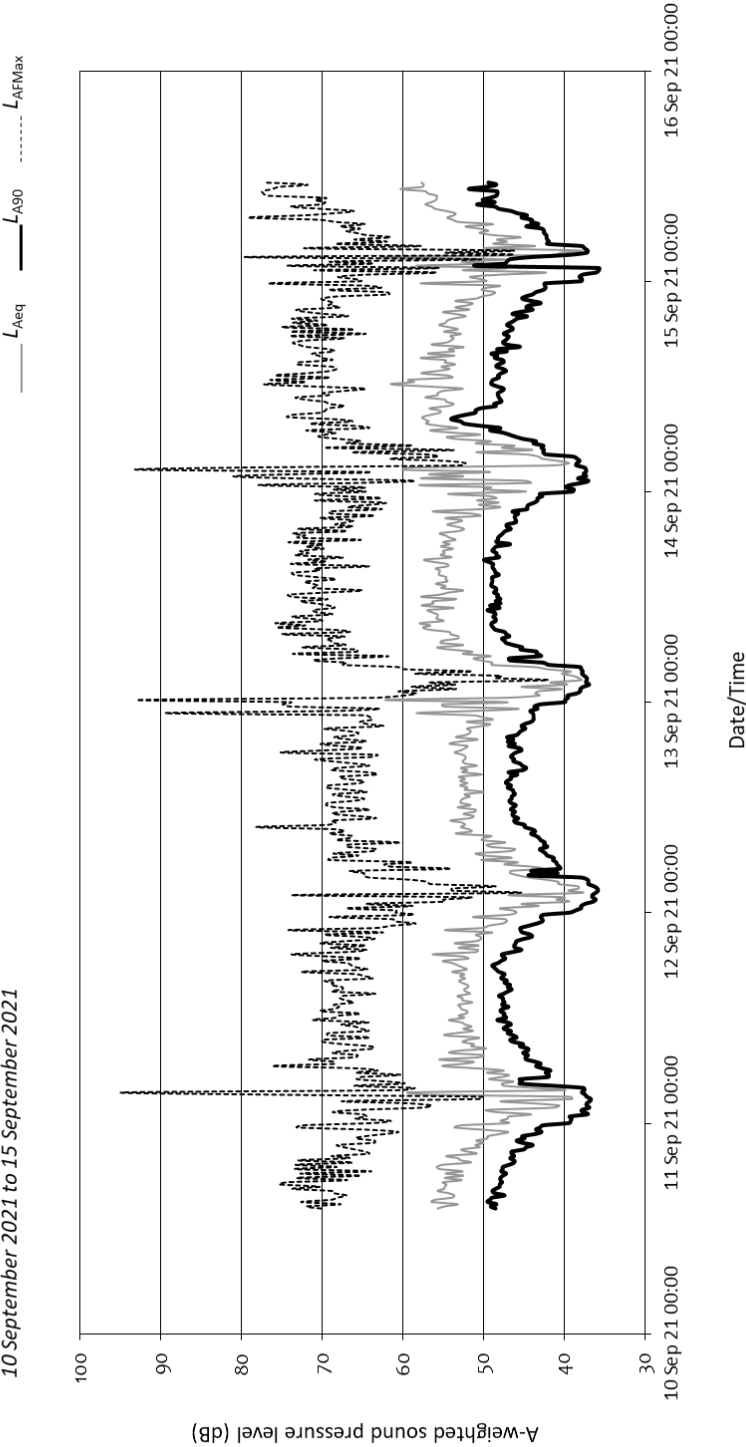
During the attended noise measurements, the weather was generally clear and dry and no rain occurred. Wind speeds were measured at each position and varied between 2 m/s and 4 m/s.

During the unattended noise measurements, weather reports for the area indicated that temperatures varied between 8°C at night and 22°C during the day, and the wind speed was less than 5 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B – Results of unattended measurements at Location L

Forbury Retail Park
Results of noise logging survey at Forbury Retail Park
10 September 2021 to 15 September 2021



Appendix C – Measured LLSmax acceleration results at Location V

Table C1 – Broadband LLSmax data

Event number	Start time (hh:mm)	Duration (mm:ss)	LLSmax (m/s ^{1.75})		
			X	Y	Z
1	12:03	01:09	72	70	68
2	12:05	00:34	77	75	72
3	12:11	00:31	73	771	68
4	12:20	01:00	76	79	74
5	12:30	00:39	75	76	73
6	12:33	01:17	74	73	71
7	12:38	00:24	75	72	70
8	12:51	00:27	74	71	68
9	13:00	00:53	77	68	71
10	13:03	00:14	79	73	76
11	13:11	01:48	77	74	76
12	13:15	00:23	77	72	71
13	13:20	00:14	74	74	68
14	13:27	00:43	75	72	70
15	13:32	00:42	78	75	74
16	13:38	01:02	75	73	70
17	13:42	00:26	72	71	70
18	13:59	00:17	74	74	73
19	14:03	01:42	76	74	72
20	14:21	00:31	73	73	70
21	14:28	00:19	72	71	67
22	14:38	00:28	73	71	68
23	14:52	00:54	72	70	68

Appendix H.4 Construction Plant Assumptions

H.4.1. Construction Plant Assumptions

Typical techniques and methodology has been assumed to assess the potential noise and vibration affects associated with the demolition and construction phases of the Proposed Development.

Further to this review four workstreams of the demolition and construction programme have been assessed in the noise and vibration chapter for the Environmental Statement, namely:

- Demolition and enabling
- Substructure - Phase 1
- Superstructure - Phase 1
- Substructure - Phase 2
- Superstructure - Phase 2
- Substructure - Phase 3
- Superstructure - Phase 3.

These workstreams represent the worst case for potential noise impacts on the nearby noise sensitive receptors. Details of the different construction plant, number, the percentage of time they will be operational and their associated sound pressure level, as set in BS 5228:2009, are provided.

Phase 1 blocks will be occupied during the construction of Phase 2. Phase 1 & 2 blocks will be occupied during the construction of Phase 3.

Demolition

The details included in the construction noise assessment of the demolition works are set out in Table 1.

Table 1 Demolition plant assumptions

Construction plant	Number	% activity	BS5228-1 reference	L_{Aeq} at 10 m (dB)
Tracked excavators with breakers	2	70	C.1-9	90
Bob cats/mini excavators	2	40	C.2-8	68
Concrete crushers	1	25	C.1-14	86

Substructure

The details included in the construction noise assessment of the substructure works are set out in Table 2.

Table 2 Substructure construction plant assumptions

Construction plant	Number	% activity	BS5228-1 reference	L_{Aeq} at 10 m (dB)
Bob cats/mini excavators	2	40	C.2-8	68
Mobile crane	2	50	C.4-50	71
Tracked excavators with breakers	1	20	C.1-9	90
CFA piling rig	2	50	C.3-21	79
Concrete pump and concrete mixer truck	2	40	C.4-28	75

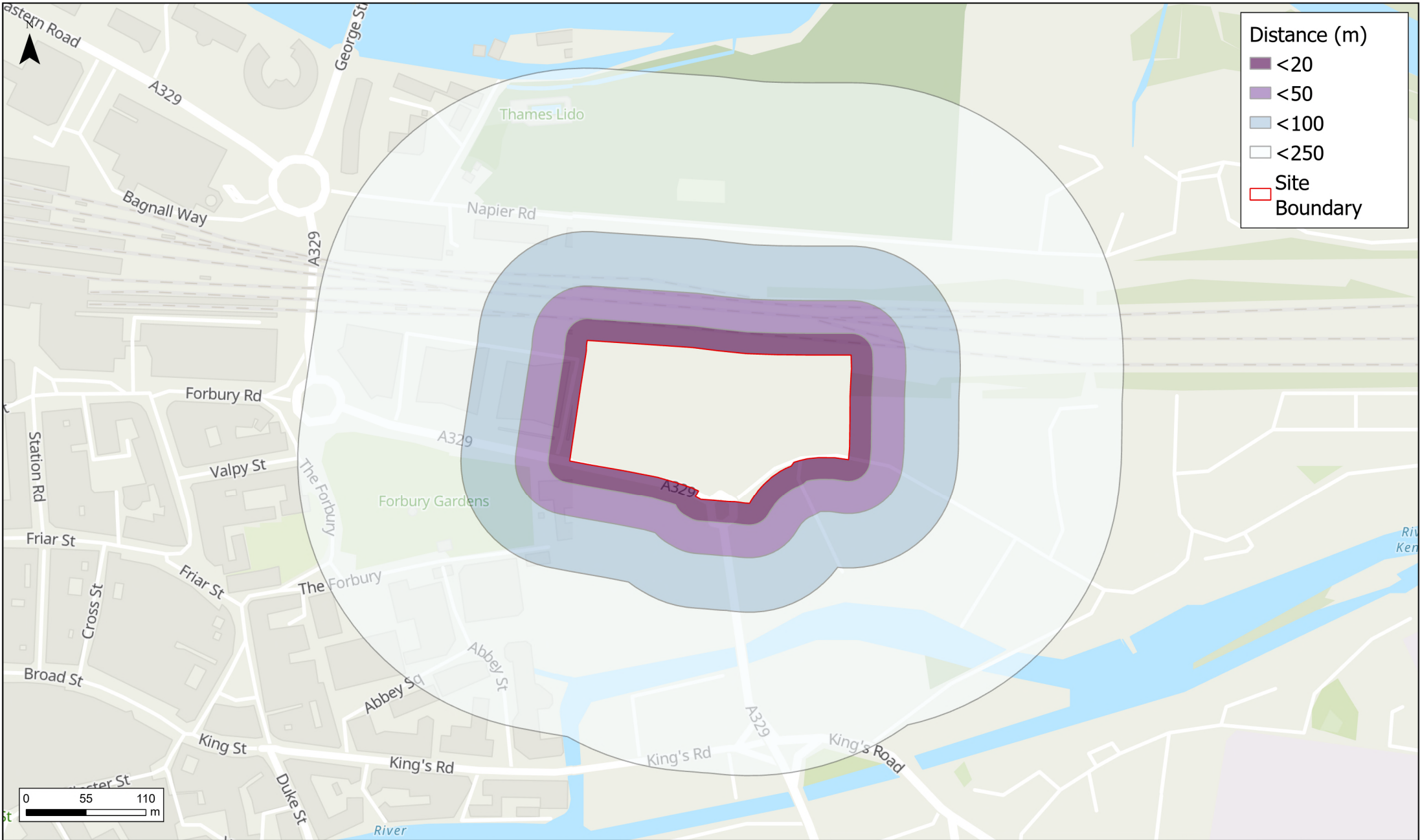
Superstructure

The details included in the construction noise assessment of the superstructure works are set out in Table 3.

Table 3 Superstructure construction plant assumptions

Construction plant	Number	% activity	BS5228-1 reference	L_{Aeq} at 10 m (dB)
Mobile crane	2	50	C.4-50	71
Concrete pump and concrete mixer truck	2	50	C.4-28	75
Tower Crane	2	50	C.4-47	76

Appendix I.1 Figures





Client



KINGS MEADOW VIEW

IAQM Demolition and Construction Dust
Distance Criteria from Likely Trackout Routes

GB Topographic: Contains OS data © Crown Copyright and database
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Contains data from OS Zoomstack

1:4,000 @ A4

Date: 01/10/2025

Drawn: WS

Checked: ER

Figure 1.2

Rev A



Client



KINGS MEADOW VIEW

Modelled Road Network and Proposed Sensitive Receptors

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Contains data from OS Zoomstack

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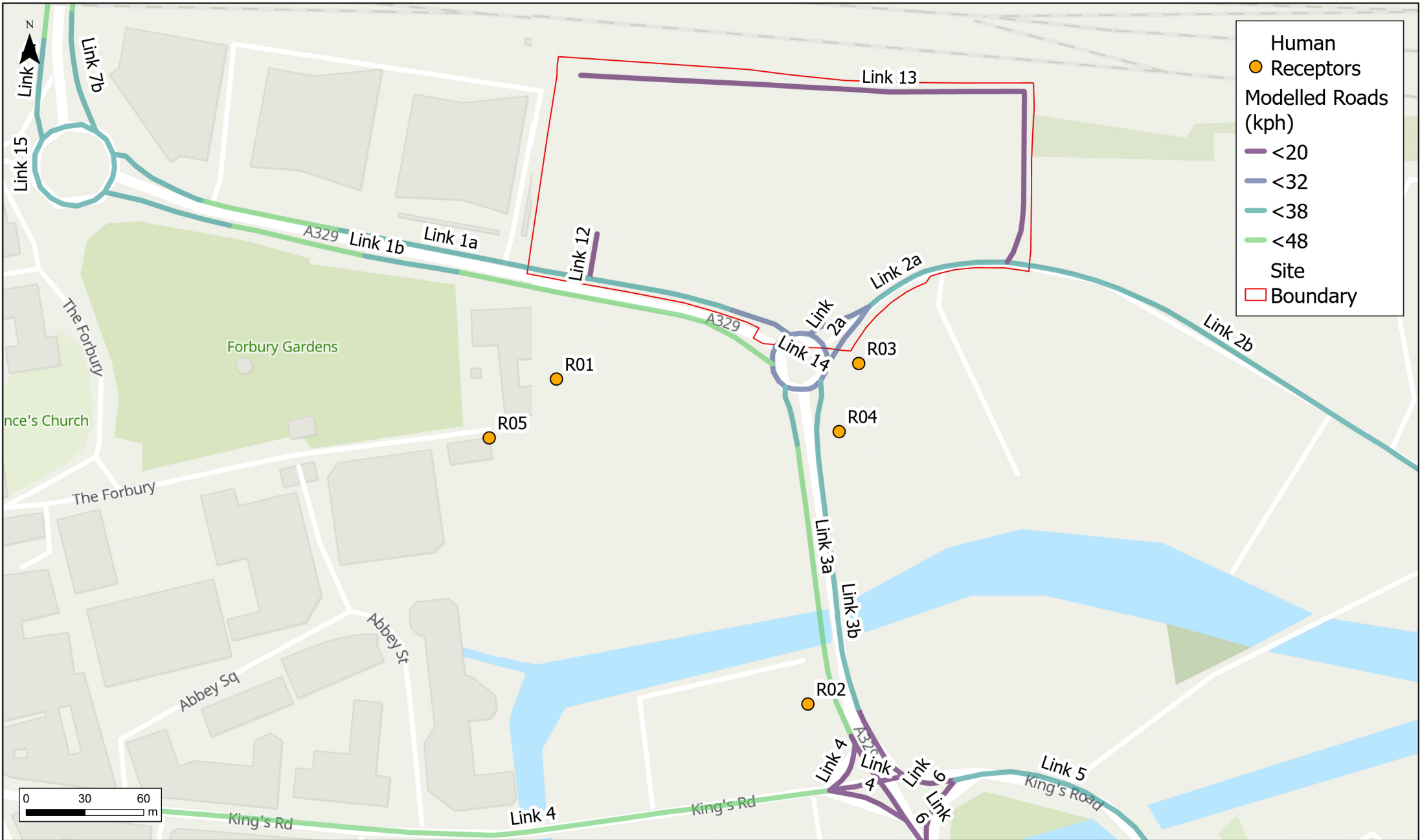
Date: 01/10/2025

Drawn: WS

Checked: ER

Figure I.3

Rev A



Client



KINGS MEADOW VIEW

Modelled Road Network and Existing
Human Sensitive Receptors

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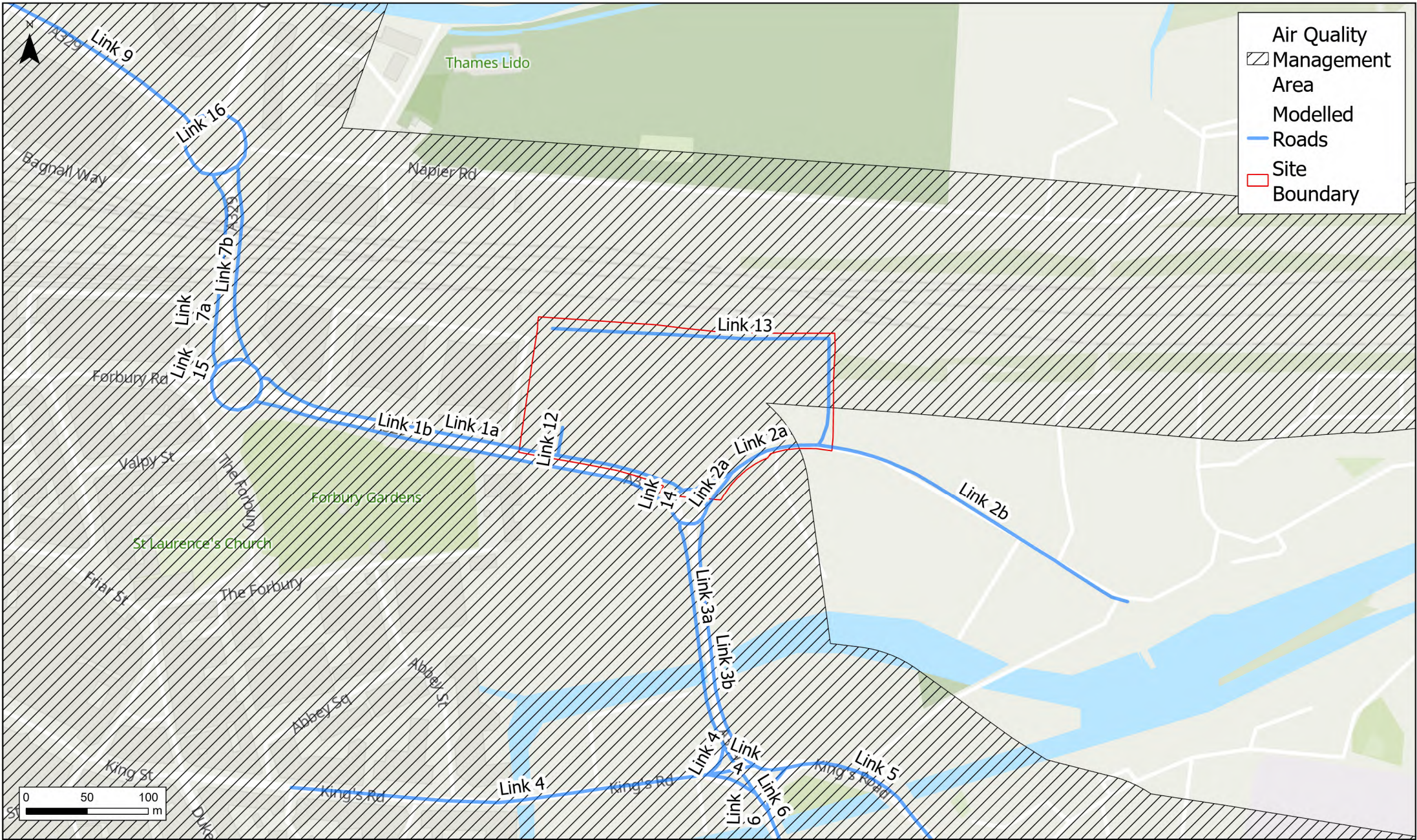
Date: 01/10/2025

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Figure I.4

Rev A



Client



KINGS MEADOW VIEW

Reading Borough Council's Air Quality Management Area

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Date: 01/10/2025

Drawn: WS

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Figure 1.5

Rev A