VOLUME 4, APPENDIX C: NOISE AND VIBRATION

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1.0 APPENDIX E: NOISE AND VIBRATION

1.1 NOISE SURVEY

Introduction

1.1.1 Temple Group Ltd (Temple) have been instructed by Fairfax Acquisitions Limited to provide the noise and vibration chapter for the Proposed Development at Reading Golf Course, Caversham.

1.1.2 Continuous noise monitoring has been conducted over several days at several locations' representative of new noise sensitive receptors. In addition to the unattended monitoring, attended measurements have been undertaken several other locations across the Site.

The Proposed Development

1.1.3 The Proposed Development is exposed to noise from the following sources:

- Road Traffic Noise on Kidmore End Road, Grove Road, Brooklyn Drive, Eric Avenue, Goreslands and Highdown Hill Road.
- Outdoor activity noise associated with Emmer Green Primary School.

Relevant Guidance and Standards

British Standard 7445: 'Description and Measurement of Environmental Noise'

Part 1: Guidance to quantities and procedures[1]

1.1.4 This part of BS 7445 defines the basic quantities to be used for the description of noise in community environments and basic procedures for the determination of the quantities. The methods and procedures described are intended to be applicable to sounds from all sources, individually and in combination that contribute to the total noise at a site.

Part 2: Guide to the acquisition of data pertinent to land use[2]

1.1.5 This part of BS 7445 describes methods for the acquisition of data which provide descriptors that enable:

a) A description of the environmental noise in a specified area of land to be made in a uniform way

b) The compatibility of any land use activity or projected activity to be assessed with respect to existing or predicted noise

1.1.6 Using the data as a basis, authorities may establish a system for selecting the appropriate land use, as far as noise levels are concerned, for a specific area, or the sources of noise (existing or planned) which are respectable to land use (existing or planned).

[1] British Standard 7445-1: 2003 Description and measurement of environmental noise. Part1: Guidance to quantities and procedures

[2] British Standard 7445-2: 1991 Description and measurement of environmental noise, Part 2: Guide to the acquisition of data pertinent to land use, BSI, London.

Calculation of Road Traffic Noise (CRTN)

1.1.7 Department of Transport/Welsh Office Memorandum 'Calculation of Road Traffic Noise'[3] (CRTN) describes procedures for traffic noise calculation, it is suitable for environmental assessments of schemes where road traffic noise may have an impact.

ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise New Residential Development

1.1.8 Professional Practice Guidance on Planning and Noise for new residential development[4] (ProPG) provides guidance on producing an initial site noise risk assessment pre-mitigation based on the prevailing daytime and night-time noise levels across a site, from which a site (or areas thereof) can be zoned. The assessment requires consideration of four key elements to be undertaken in parallel:

- Good Acoustic Design Process;
- Internal Noise Level Guidelines;
- External Amenity Area Noise Assessment; and
- Assessment of Other Relevant Issues.

1.1.9 Table 1 shows the initial noise risk assessment criteria taken from Figure 1 of ProPG:

Table 1 Initial Site Risk Assessment (measured/predicted, empty site, pre mitigation)

Risk	Day dB $L_{Aeq, 16h}$ (07:00-23:00)	Night dB $L_{Aeq, 8h}$ (23:00-07:00)
Negligible	<50	<40
Low	55	45
Medium	65	55
High	>70	>60

British Standard 8233:2014: 'Guidance on sound insulation and noise reduction in buildings'

1.1.10 British Standard 8233: 2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'[5] provides criteria for the assessment of internal noise levels for various uses including dwellings and commercial properties.

World Health Organisation

1.1.11 The World Health Organisation "Guidelines for Community Noise 1999[6]" states "*For a good sleep, it is believed that indoor sound pressure levels should not exceed 45 dB L_{Amax} more than 10-15 times per night (Vallet and Vernet 1991)"*.

British Standard 5228

1.1.12 British Standard 5228: 'Code of practice for noise and vibration control on construction and open sites'[7] (BS 5228) provides a 'best practice' guide for noise and vibration control. It

[3] Calculation of Road Traffic Noise, Department of Transport Welsh Office, HMSO, 1988

[4] ProPG Planning and Noise: Professional Practice Guidance on Planning & Noise May 2017, ANC, IOA, CIEH

[5] British Standard 8233: 2014 'Guidance on Sound Insulation and Noise Reduction for Buildings', BSI, London.

[6] World Health Organisation (1995), WHO Guidelines for Community Noise.

[7] British Standard 5228-1: 2009 + A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise

includes sound power level (SWL) data for individual plant as well as a calculation method for noise from construction activities. Part 1 of the standard relates to noise and part 2 relates to vibration.

Design Manual for Roads and Bridges

Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 7 Noise and Vibration

1.1.13 The Highways Agency 'Design Manual for Road and Bridges Volume 11 Section 3 Part 7 – Traffic Noise and Vibration'[8] (DMRB) provides guidance on the appropriate level of assessment to be used when assessing the noise and vibration impacts arising from all road projects, including new construction, improvements and maintenance.

British Standard 4142:2014+A1:2019

1.1.14 British Standard 4142:2014+A1:2019[9] (BS 4142) 'Methods for rating and assessing industrial and commercial sound' describes methods to assess the likely effect of sound of an industrial and/or commercial nature on people who might be inside or outside a dwelling or premises used for residential purposes upon which the sound is incident.

Local Planning Policy

1.1.15 Policy EN17 (Noise Generating Equipment) of the Reading Borough Local Plan[10] (2019) relates to noise from mechanical plant:

1.1.16 *"Where noise generating equipment is proposed, the noise source specific level (plant noise level) should be at least 10dBA below the existing background level as measured at the nearest noise sensitive receptor".*

1.1.17 In the absence of specific guidance on other noise sources and their assessment national guidance and standards listed above will be used.

Survey Methodology

Noise Survey

1.1.18 An environmental noise survey was carried out by Temple in February 2019 in order to establish baseline noise levels across the Site.

1.1.19 The survey comprised of unattended noise measurements at three locations within the Site to obtain representative ambient daytime and night-time noise levels during a typical week and at a weekend. Additional attended measurements were also made during the survey at two locations along the south and west boundaries of the Site to assess noise from a nearby School and road traffic.

Unattended noise monitoring

[8] Design Manual for Roads and Bridges, Volume 11, Environmental Assessment, Section 3, Environmental Assessment Techniques, Part 7, LA 111, Noise and Vibration, (formerly HD 213/11, IAN 185/15), The Highways Agency, November 2019

[9] British Standards Institution (June 2019), British Standard 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

[10] Reading Borough Council (November 2019). *Reading Borough Local Plan.*

1.1.20 Long term measurements were carried out at three locations within the Site between Tuesday 12th and Tuesday 19th February 2019. Unattended day and night noise measurements were carried out to obtain representative daytime and night-time ambient noise levels at the most exposed facades of the Proposed Development.

- MP1 (51.485336, -0.965487) Unattended monitoring position on the south eastern boundary of the Site along Kidmore End Road.
- MP2 (51.484209, -0.968358) Unattended monitoring position on the southern boundary of the Site near to Emmer Green Primary School.
- MP3 (51.486646, -0.970309) Unattended monitoring position on the north eastern boundary of the Site facing Brooklyn Drive.

1.1.21 The unattended monitors were set up to record L_{Aeq}, L_{AFmax}, L_{A10} and L_{A90} sound pressure levels in 15-minute periods. These values were used to calculate sixteen and eight-hour daytime (07:00-23:00) and night-time (23:00-07:00) values respectively.

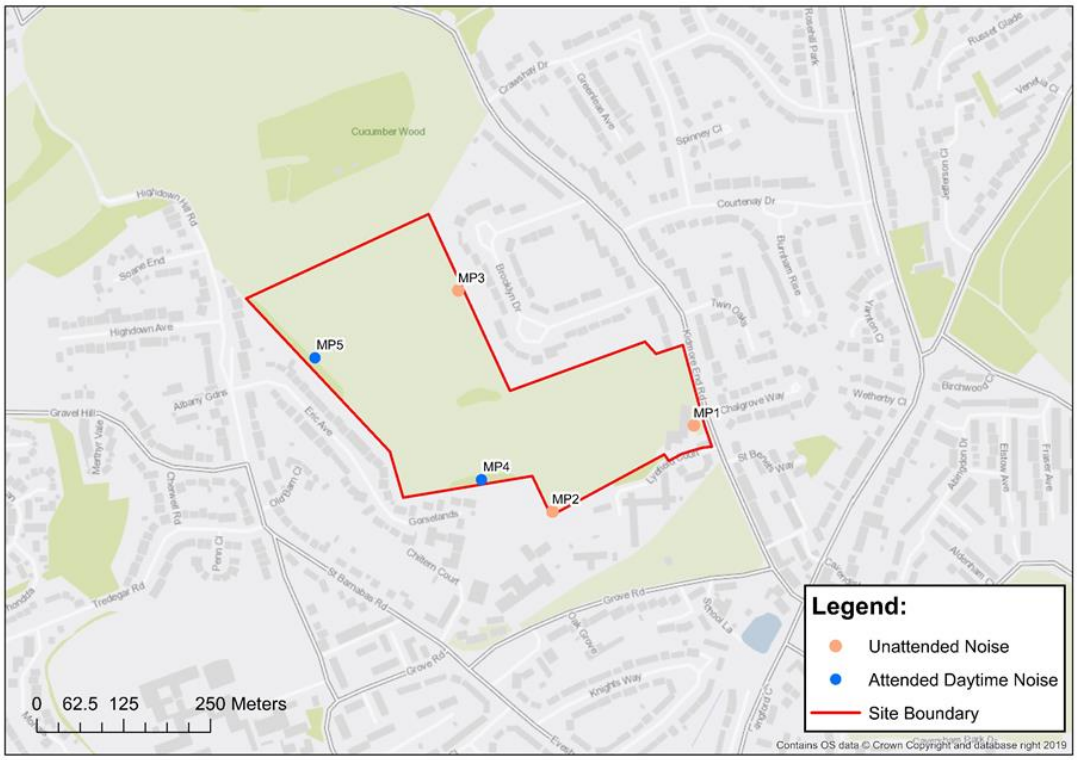
Attended noise monitoring

1.1.22 Attended daytime measurements were carried out at two further locations within the Site on the 12th and 19th February 2019.

- MP4 (51.484736, -0.969326) Attended monitoring position along southern boundary of the Site.
- MP5 (51.486231, -0.973358) Attended monitoring position on the western boundary of the Site facing Eric Avenue.

1.1.23 **Figure 1** shows the locations of the attended and unattended noise measurements.

Figure 1 Survey Locations



Equipment and weather conditions

1.1.1 **Table 2** below details the noise monitoring equipment used during survey. All noise monitoring equipment was calibrated prior to and post measurement, no significant drift occurred. The sound level meters and calibrator are laboratory calibrated biennially and annually respectively to traceable national standards, calibration certificates are available on request.

Table 2 Survey Equipment

Manufacture	Item	Type	Serial Number
RION	Sound Level Meter	NA-28	00191082
RION	Sound Level Meter	NA-28	00680855
RION	Sound Level Meter	NA-28	01260205
RION	Calibrator	NC-74	34936354

1.1.24 The weather conditions during the survey were predominantly dry with light winds. Wind speeds were below the recommended maximum limit of 5m/s during monitoring period.

Survey Results

1.1.25 The existing noise climate at the most exposed facades of the Site were dominated by road traffic noise from surrounding roads.

1.1.26 Measurement Position 1 (MP1) was exposed to continuous road traffic noise from Kidmore End Road to the east and intermittent aircraft noise. Other noise sources incident on this location included birdsong and noise from the golf course car park.

1.1.27 Measurement Position 2 (MP2) was exposed to continuous distant road traffic from Grove Road and noise from outdoor activities at Emmer Green Primary School to the south. Other noise sources incident on this location included intermittent aircraft noise.

1.1.28 Measurement Position 3 (MP3) was exposed to continuous distant road traffic from Kidmore End Road and Brooklyn Drive to the east. Other noise sources incident on this location included intermittent aircraft noise and domestic noise from properties on Brooklyn Drive.

1.1.29 Measurement Position 4 (MP4) was exposed to similar noise sources as that of MP2.

1.1.30 Measurement Position 5 (MP5) was exposed to distant road traffic noise from Highdown Hill Road and Eric Avenue to the west. Other noise sources incident on this location included intermittent aircraft noise and occasional domestic noise form properties along Eric Avenue.

Unattended monitoring

1.1.31 The results of the measured daytime and night-time continuous noise measurements at the unattended monitoring locations are presented in **Table 3.**

Table 3 Summary of Unattended Noise Survey Results

Location	$L_{Aeq, T}$ dB		10th Highest L_{AFmax} dB		Lowest Average L_{A90} dB	
	Day	Night	Day	Night	Day	Night
	07:00-23:00	23:00-07:00	07:00-23:00	23:00-07:00	07:00-23:00	23:00-07:00
MP1	55	48	82	70	45	45
MP2	47	37	74	58	36	29
MP3	39	33	54	43	37	30

1.1.32 The results from the attended daytime survey are presented in **Table 4.**

Table 4 Summary of Attended Daytime Noise Survey Results

Location	Start Time	$L_{Aeq,10min}$ dB	$L_{A90,10min}$ dB	$L_{AFmax,10min}$ dB	School Playground
MP4	12/02/2019 12:10	52	47	67	In use
MP4	12/02/2019 12:40	55	50	67	In use
MP4	19/02/2019 11:38	42	34	57	-
MP5	12/02/2019 12:27	45	38	59	n/a
MP5	12/02/2019 12:54	45	38	64	n/a

1.2 ASSUMPTIONS AND LIMITATIONS OF NOISE CALCULATIONS

Construction Noise

1.2.1 Calculations of construction noise have been carried out in accordance with BS 5228 Part 1 in order to calculate the likely noise levels at varying receptor distances during the worst-case construction period. Construction plant has been based on indicative typical plant and equipment presented in Table 5 below.

1.2.2 The assessment includes assumed likely percentage on times for the construction plant and assumes screening provided by site hoarding where required.

Table 5 An indication of typical types of plant and equipment associated with the construction

Plant and Equipment	Stage of Works					
	Enabling and Site Preparation	Construction	Services Installation	Fit-out	Landscaping	Construction Traffic
Excavator	x	x			x	
Cranes	x	x				
Floodlights	x	x				
Articulated Dump Truck	x	x			x	
Drills / Cutters		x	x	x		
Concrete generation		x	x		x	
Generators	x	x				
Scaffolding		x		x	x	
Asphalt Plant	x	x			x	
Fork Lift Truck		x	x	x		
Skips and skip trucks	x	x		x	x	x
Lorries/vans	x	x	x	x	x	x

Input Information

1.2.3 Table 6 below gives input information used regarding the plant for the construction activities presented.

Table 6 Construction Noise calculations input information

CMP plant category	BS5228 Description	BS5228 Reference	BS5228 Leq@10m	Assumed Quantity	% On-Time	Correction to $L_{Aeq,10h}$	Screening Attenuation	Activity $L_{Aeq(10h)}$
Excavator	Tracked excavator	C.4.65	71	2	25	-6	-5	63.0
Cranes	Tracked mobile crane (lifting)	C.4.50	71	2	25	-6	-5	63.0
Floodlights	Diesel generator (power for lighting)	C.4.86	65	2	50	-3	-10	55.0
Articulated Dump Truck	Articulated dump truck 25T	C.5.16	81	1	25	-6	-5	70.0
Drills / Cutters	Hand-held hammer	D.2.15	84	1	15	-8.2	-10	65.8
Concrete generation	Concrete pump + cement mixer truck (discharging)	C.4.24	67	1	20	-7	-5	55.0
Generators	Generator (power for site cabins)	C.8.24	59	2	100	0	-10	52.0
Scaffolding	Scaffold poles and clips (dismantling)	D.7.1	80	1	5	-13	-5	62.0
Asphalt Plant	Asphalt spreader, chip spreader, road roller, lorry	D.8.26	80	1	30	-5.2	-5	69.8
Fork Lift Truck	Telescopic handler	C.2.35	71	2	20	-7	-5	62.0
Skips and skip trucks	Skip wagon ж	C.8.21	78	2	20	-7	-5	69.0
Lorries/vans	Tipper lorry ж	C.8.20	79	1	20	-7	-5	67.0

1.2.4 `Table 7 below shows BS5228 Part 1 construction noise assessment.

Table 7 BS5228 Part 1 Construction Noise Assessment

Plant	Type	Source Noise (dB)		Distance	No. Vehicles/ hour	Average Speed	Ground cover	Ground Attenuation	Distance attenuation	Screening Attenuation	Ground or barrier attenuation	Façade Correction	Traverse Length	Minimum Distance	Distance Ratio	Correction Factor	Angle of View	On Time (%)	L_{Aeq} at Receptor
		L_{Aeq} at 10 m	Sound Power (L_{WA})	m		km/h		dB	dB	dB	dB	dB	m	m		F	degrees		dB
Enabling and Site Preparation																			
Tracked excavator	2		102	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.25	60.5
Tracked mobile crane (lifting)	2		102	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.25	60.5
Diesel generator (power for lighting)	1		96	15			0.5	-0.6	31.5	10	10.0	3						0.5	54.5
Articulated dump truck 25T	2		109	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.25	67.5
Generator (power for site cabins)	1		90	15			0.5	-0.6	31.5	10	10.0	3						1	51.5
Asphalt spreader, chip spreader, road roller, lorry	2		108	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.3	67.2
Skip wagon ж	2		109	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.2	66.5
Tipper lorry ж	2		107	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.2	64.5
																		Total	**73.2**
Construction																			
Tracked excavator	2		102	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.25	60.5
Tracked mobile crane (lifting)	2		102	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.25	60.5
Diesel generator (power for lighting)	1		96	15			0.5	-0.6	31.5	10	10.0	3						0.5	54.5
Articulated dump truck 25T	2		109	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.25	67.5
Hand-held hammer	2		112	15			0.5	-0.6	31.5	10	10.0	3	15	15	1	0.63		0.15	63.2
Concrete pump + cement mixer truck (discharging)	2		95	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.2	52.5
Generator (power for site cabins)	1		90	15			0.5	-0.6	31.5	10	10.0	3						1	51.5
Scaffold poles and clips (dismantling)	2		108	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.05	59.5
Asphalt spreader, chip spreader, road roller, lorry	2		108	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.3	67.2

Plant	Type	Source Noise (dB)		Distance	No. Vehicles/ hour	Average Speed	Ground cover	Ground Attenuation	Distance attenuation	Screening Attenuation	Ground or barrier attenuation	Façade Correction	Traverse Length	Minimum Distance	Distance Ratio	Correction Factor	Angle of View	On Time (%)	L_{Aeq} at Receptor
		L_{Aeq} at 10 m	Sound Power (L_{WA})	m		km/h		dB	dB	dB	dB	dB	m	m		F	degrees		dB
Telescopic handler	2		102	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.2	59.5
Skip wagon ж	2		109	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.2	66.5
Tipper lorry ж	2		107	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.2	64.5
																		Total	**73.9**
Services Installation																			
Hand-held hammer	2		112	15			0.5	-0.6	31.5	10	10.0	3	15	15	1	0.63		0.15	63.2
Concrete pump + cement mixer truck (discharging)	2		95	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.2	52.5
Telescopic handler	2		102	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.2	59.5
Tipper lorry ж	2		107	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.2	64.5
																		Total	**67.8**
Fit-out																			
Hand-held hammer	2		112	15			0.5	-0.6	31.5	10	10.0	3	15	15	1	0.63		0.15	63.2
Scaffold poles and clips (dismantling)	2		108	15			0.5	-0.6	31.5	10	10.0	3	15	15	1	0.63		0.05	54.5
Telescopic handler	2		102	15			0.5	-0.6	31.5	10	10.0	3	15	15	1	0.63		0.2	54.5
Skip wagon ж	2		109	15			0.5	-0.6	31.5	10	10.0	3	15	15	1	0.63		0.2	61.5
Tipper lorry ж	2		107	15			0.5	-0.6	31.5	10	10.0	3	15	15	1	0.63		0.2	59.5
																		Total	**67.0**
Landscaping																			
Tracked excavator	2		102	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.25	60.5
Articulated dump truck 25T	2		109	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.25	67.5
Concrete pump + cement mixer truck (discharging)	2		95	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.2	52.5
Scaffold poles and clips (dismantling)	2		108	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.05	59.5
Asphalt spreader, chip spreader, road roller, lorry	2		108	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.3	67.2
Skip wagon ж	2		109	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.2	66.5
Tipper lorry ж	2		107	15			0.5	-0.6	31.5	5	5.0	3	15	15	1	0.63		0.2	64.5
																		Total	**73.1**

Plant	Type	Source Noise (dB)		Distance	No. Vehicles/ hour	Average Speed	Ground cover	Ground Attenuation	Distance attenuation	Screening Attenuation	Ground or barrier attenuation	Façade Correction	Traverse Length	Minimum Distance	Distance Ratio	Correction Factor	Angle of View	On Time (%)	L_{Aeq} at Receptor
		L_{Aeq} at 10 m	Sound Power (L_{WA})	m		km/h		dB	dB	dB	dB	dB	m	m		F	degrees		dB
Construction Traffic																			
Tipper lorry ж	3		107	5	5	25						3					180		63.0
Skip wagon ж	3		109	5	5	25						3					180		65.0
																		Total	**67.2**

1.2.5 Table 8 shows construction noise impact assessment at 15m distance.

Table 8 Construction Noise Impact Assessment at 15m distance

Activities	(@ 15m)*	Ambient Noise Level (façade level)	Construction noise assessment Level	Impact?	Assessment category	Total noise level	Change	Potential NI?	Potential TR?	NI or TR	Impact Category
Enabling and Site Preparation	73	42	65	YES	A	73	31	NO	NO	-	Moderate adverse
Construction	74	42	65	YES	A	74	32	NO	NO	-	Moderate adverse
Services Installation	68	42	65	YES	A	68	26	NO	NO	-	Negligible
Fit-out	67	42	65	YES	A	67	25	NO	NO	-	Negligible
Landscaping	73	42	65	YES	A	73	31	NO	NO	-	Moderate adverse
Construction Traffic	67	42	65	YES	A	67	25	NO	NO	-	Negligible

** - construction traffic noise calculated at distance of 5m from the closest receptor*

1.2.6 Table 9 shows construction noise impact assessment at 25m distance.

Table 9 Construction Noise Impact Assessment at 25m distance

Activities	(@25m)	Ambient Noise Level (façade level)	Construction noise assessment Level	Impact?	Assessment category	Total noise level	Change	Potential NI?	Potential TR?	NI or TR	Impact Category
Enabling and Site Preparation	69	42	65	YES	A	69	27	NO	NO	-	Minor adverse
Construction	70	42	65	YES	A	70	28	NO	NO	-	Minor adverse
Services Installation	63	42	65	NO	A	63	21	NO	NO	-	Negligible
Fit-out	63	42	65	NO	A	63	21	NO	NO	-	Negligible
Landscaping	69	42	65	YES	A	69	27	NO	NO	-	Minor adverse
Construction Traffic	67	42	65	YES	A	67	25	NO	NO	-	Negligible

1.2.7 Table 10 shows construction noise impact assessment at 50m distance.

Table 10 Construction Noise Impact Assessment at 50m distance

Activities	(@50m)	Ambient Noise Level (façade level)	Construction noise assessment Level	Impact?	Assessment category	Total noise level	Change	Potential NI?	Potential TR?	NI or TR	Impact Category
Enabling and Site Preparation	65	42	65	NO	A	65	23	NO	NO	-	Negligible
Construction	65	42	65	YES	A	65	23	NO	NO	-	Negligible
Services Installation	59	42	65	NO	A	59	17	NO	NO	-	Negligible
Fit-out	59	42	65	NO	A	59	17	NO	NO	-	Negligible
Landscaping	65	42	65	NO	A	65	23	NO	NO	-	Negligible
Construction Traffic	67	42	65	YES	A	67	25	NO	NO	-	Negligible

1.2.8 Based on assumptions of a typical vibratory roller plant, a double drum Bomag BW 135 AD (TRL Report 429 'Ground borne vibration caused by mechanised construction works', Table A4) a free-field resultant PPVs have been calculated from the following equation:

$$V_{res} = K_s\sqrt{n_d}\left[\frac{A}{x + L_d}\right]^{1.5}$$

Where:
V_{res} is the resultant Peak Particle Velocity
K_s is the scaling factor: **assumed 143 (33.3%**)
n_d is the number of vibrating drums
A is the maximum amplitude of drum vibration, mm
x is the ground distance measured along the ground distance, m
L_d is the vibrating roller drum width, m

Table 11 Plant used for vibration assessment

Plant model	Plant type	Drum width (m)	Amplitude (mm)
Bomag BW 135 AD	Tandem roller	1.3	0.4

1.2.9 The calculated resultant peak particle velocities for steady state operation are show below in Table 12**.**

Table 12 Estimated Free-Field Vibratory Roller PPVs

Distance Between Receptor and vibratory roller, m	Resultant Peak Particle Velocity (mm/s)
15	0.78
25	0.38
50	0.14

Noise Model

1.2.10 Predictions of traffic noise exposure incident on the Site boundaries overlooking Kidmore End Road have been completed. Predictions of noise propagation and attenuation due to screening have been carried out using CadnaA, a computer-based 3D modelling program. The model uses the CRTN prediction methodology for road traffic noise.

1.2.11 For calculation of road traffic noise exposure on the Proposed Development, traffic source noise levels were calibrated and verified in CadnaA based on the long-term unattended survey measurements.

1.2.12 In addition to the road traffic noise levels calculated in the predictions, the model also considers the ground absorption, atmospheric absorption, acoustic reflections and acoustic screening. The model was then run to validate the assumptions and ensure that the model predicted noise levels were comparable with the measured level at survey positions.

1.2.13 The model shows good correlation during the day and night at MP1, however, at locations further into the site that were not dominated by continuous road traffic noise calculated

levels were underpredicting due to the introduction of other noise sources. In order to form a robust assessment, the predicted noise model results were only used to inform the ProPG site risk assessment along Kidmore End Road. The site suitability and external amenity area assessment have been based on measured survey data.