Appendix D Noise and Vibration

D.1 Noise Survey

Survey Methodology

D.1.1 An environmental noise and vibration survey was carried out by Temple between 4th October 2024 and 11th October 2024 to establish baseline noise levels across the Site.

D.1.2 The survey comprised of both unattended noise and attended vibration measurements to obtain representative baseline daytime and night time noise levels during a typical week.

D.1.3 Unattended measurements were carried out at three locations between 4th October 2024 and 11th October 2024:

- U1 was located on the northeastern boundary of the Site, parallel to the railway line that runs between Oxted and Woldingham Stations. The purpose of this location was to collect noise data from trains passing the Site.
- U2 was located towards the centre of the Site. The purpose of this location was to collect background noise data for the quieter locations within the Proposed Development
- U3 was located towards the northwestern boundary of the Site, near Barrow Green Road. The purpose of this location was to collect noise data from traffic on Barrow Green Road.

D.1.4 At each unattended monitoring location, the sound level meter was secured inside a pelicase with a waterproof microphone cover such that the microphone was at a height of around 1.5 m above local ground level. The meter was set to record L_{Aeq}, L_{AFmax}, L_{A10} and L_{A90} sound pressure levels in 15-minute periods.

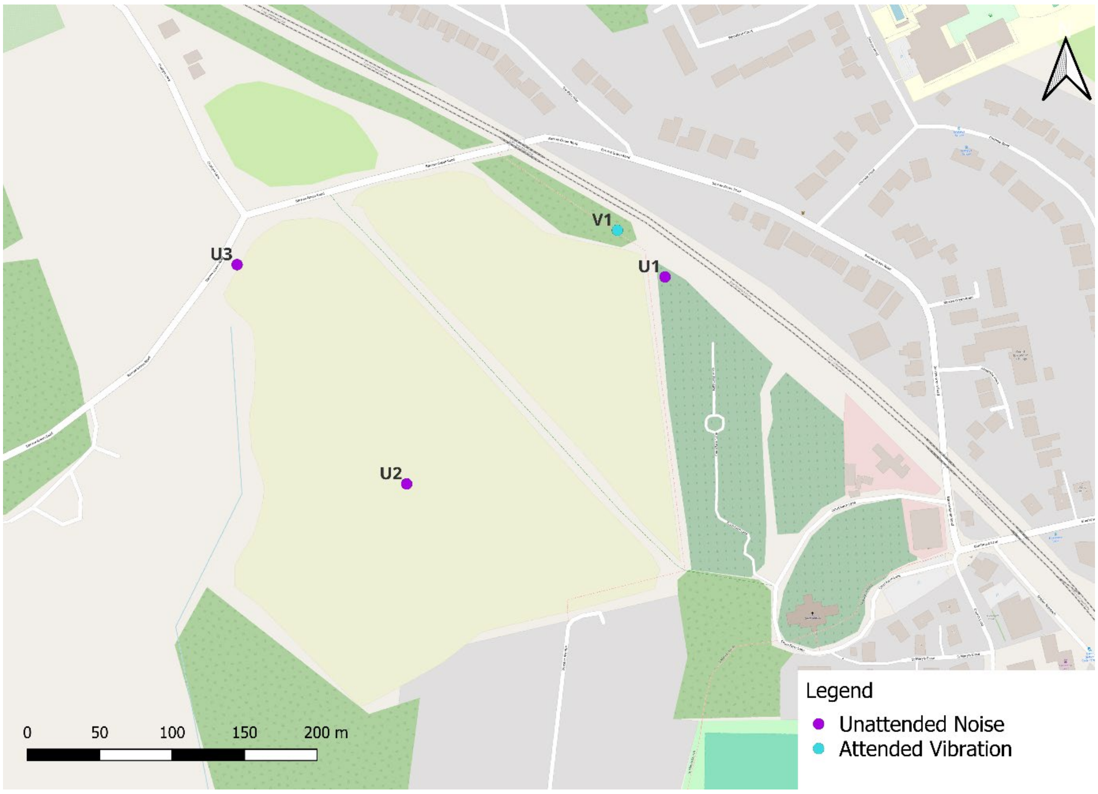
D.1.5 An attended vibration survey was also carried out at one location on 11th October 2024 south of the Oxted rail line.

D.1.6 Vibration measurements were carried out using a vibration monitor and a triaxial accelerometer. VDV and PPV measurements were taken in all three axes (X, Y, Z) with the X-axis parallel to the railway, Y-axis perpendicular to the railway and Z as the vertical axis.

D.1.7 At V1, the accelerometer was mounted on a DIN plate and placed on a flat block-paved surface within the application site approximately 10 m away from the Oxted line to the north-east of the site to determine the vibration levels caused by passing trains.

D.1.8 **Figure 1** shows the locations of the unattended noise and attended vibration measurements from the 2024 survey.

Figure 1 - Unattended Noise and Attended Vibration Survey Measurement Locations from 2024 Survey



D.1.9 **Figure 2 to Figure 4** show photos at each unattended noise measurement positions from the 2024 surveys.

Figure 2 – U1 from 2024 Survey

Figure 3 – U2 from 2024 Survey

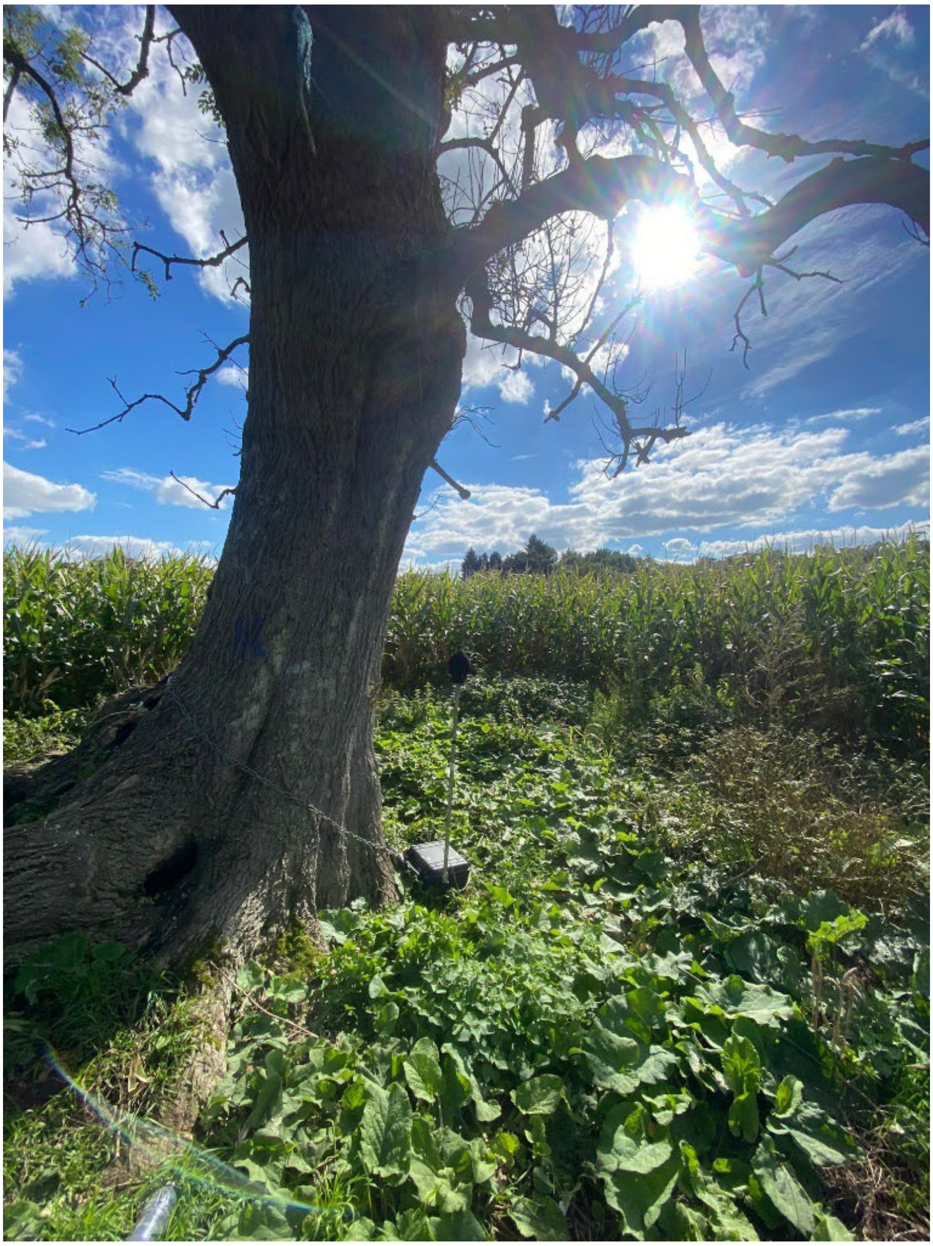


Figure 4 – U3 from 2024 Survey

Equipment and Weather Conditions

D.1.10 **Table 1** below details the noise monitoring equipment used during the 2024 surveys. The noise monitoring equipment was calibrated prior to, and post measurement and no significant drift occurred. The sound level meter and calibrator are laboratory calibrated biannually and annually respectively to traceable national standards. Calibration certificates are available on request.

Table 1 – 2024 Survey Equipment

Manufacturer	Item	Type	Serial Number
RION	Sound Level Meter	NL-52	00410086
RION	Sound Level Meter	NL-52	00510141
RION	Sound Level Meter	NA-28	00680885
Svantek	Vibration Meter	SV109	46325
RION	Calibrator	NC-74	34936353

D.1.11 The weather conditions during the survey were mild with light winds. Wind speeds were below the recommended maximum limit of 5 m/s for the monitoring period.

Survey Data

D.1.12 The daytime and night-time $L_{Aeq, T}$ has been calculated logarithmically for each day, and the typical $L_{Aeq, T}$ is the arithmetic average of all the daytime and night-time values. The typical L_{AFmax} has been based on the tenth highest occurring L_{AFmax}. The typical L_{AF90} (background sound level) has been calculated by undertaking a statistical analysis of how often the levels occur during the day/night period in accordance with methods presented in BS 4142.

Table 2 – Noise Survey Data from Unattended Surveys

Measurement Position	$L_{Aeq, T}$ dB		Typical 10th Highest L_{Amax} dB		Typical Average $L_{A90, 15mins}$ dB	
	Day 07:00-23:00	Night 23:00-07:00	Day 07:00-23:00	Night 23:00-07:00	Day 07:00-23:00	Night 23:00-07:00
U1	58	52	82	64	37	32
U2	51	44	70	59	40	31
U3	63	53	81	76	41	35

D.2 Assumptions and Limitations of Noise Calculations

Construction Noise

D.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 provided by the Applicant and is presented in **Volume 2, Chapter 5: The Proposed Development and Construction Overview.**

D.2.2 The assessment includes assumed likely percentage on times from similar schemes for the construction plant and assumes screening provided by site hoarding where required.

D.2.3 **Table 3** below shows noise data used regarding the plant for the construction activities presented.

Table 3 Construction Noise calculations input information

CMP Plant Category	BS5228 Description	BS5228 Reference	BS5228 L_{eq}@10m	Assumed Quantity	% On-Time
Excavator	Tracked Excavator	C2.2	77	1	25
Generator for Tower Crane Supply	Diesel Generator	C.4.78	66	1	80
Dumper	Dumper	C.4.3	76	1	25
Generator for Lighting Tower	Diesel Generator	C.4.79	64	1	80
Compaction Plate	Waste Compactor	C.8.1	80	1	25
Compressor	Compressor for mini piling	C.3.19	75	1	50
Crawler Cranes	Tracked Mobile Crane	C.3.28	67	2	50

CMP Plant Category	BS5228 Description	BS5228 Reference	BS5228 L_{eq}@10m	Assumed Quantity	% On-Time
Concrete pumps	Concrete Pump	C.3.26	75	2	20
Bulldozers	Dozer	C.5.12	77	2	50
Forklifts	Mini Tracked Excavator	C.4.68	62	2	25
Tipper Wagons	Tipper Lorry	C.8.20	79	2	25
Truck Mixer	Cement Mixer	C.4.19	71	1	25
Roller	Vibratory Roller	C.5.27	67	1	25
Backhoe Loader	Wheeled Backhoe Loader	C.4.66	69	1	25

D.2.4 **Table 4** below shows the BS5228 Part 1 construction noise assessment at the closest residential receptor at 35 m

Table 4 - BS5228 Part 1 Construction Noise Assessment for the closest residential receptor

Phase	Plant	Sound Power (L_{WA})	Ground Attenuation dB	Distance attenuation dB	Screening Attenuation dB	Ground or barrier attenuation dB	Façade Correction dB	Traverse Length m	Distance Ratio	Correction Factor	On Time (%)	L_{Aeq} at Receptor dB	Activity L_{Aeq} level at
Enabling, Site Preparation	Concrete Crusher	110	0.4	38.9	5	5.0	3	40	1.14	0.06	25	50.9	61.0
	Excavator	108	0.4	38.9	5	5.0	3	40	1.14	0.06	40	50.9	
	Excavator with Breaker	99	0.4	38.9	5	5.0	3	40	1.14	0.06	30	40.7	
	Articulated Dump Truck	112	0.4	38.9	5	5.0	3	40	1.14	0.06	60	56.7	
	Concrete Muncher/ Muncher attachment	108	0.4	38.9	5	5.0	3	40	1.14	0.06	30	49.7	
	Loading Shovel	111	0.4	38.9	5	5.0	3	40	1.14	0.06	40	53.9	
	Dozer	103	0.4	38.9	5	5.0	3	40	1.14	0.06	60	47.7	
	Compacter / Roller	108	0.4	38.9	6	6.0	3	40	1.14	0.06	40	50.9	
Substructure	Excavator	108	0.4	38.9	5	5.0	3	N/A	N/A	N/A	25	61.1	64.8
	Tower / Mobile Crane	98	0.4	38.9	5	5.0	3	N/A	N/A	N/A	70	55.6	
	Excavator with Breaker	99	0.4	38.9	5	5.0	3	40	1.14	0.06	30	52.9	
	Compacter / Roller	108	0.4	38.9	5	5.0	3	40	1.14	0.06	60	52.7	
	Concrete Pump	103	0.4	38.9	5	5.0	3	N/A	N/A	N/A	60	59.9	
Superstructure	Generator	92	0.4	38.9	5	5.0	3	N/A	N/A	N/A	60	48.9	57.0
	Tower / Mobile Crane	98	0.4	38.9	5	5.0	3	40	1.14	0.06	50	41.9	
	Concrete Pump	103	0.4	38.9	5	5.0	3	N/A	N/A	N/A	25	56.1	
Envelope	Tower / Mobile Crane	98	0.4	38.9	5	5.0	3	40	1.14	0.06	40	40.9	49.7
	Generator for lighting	92	0.4	38.9	5	5.0	3	N/A	N/A	N/A	60	48.9	
	Forklifts	93	0.4	38.9	5	5.0	3	40	1.14	0.06	40	35.9	
Fit Out	Tower / Mobile Crane	98	0.4	38.9	5	5.0	3	40	1.14	0.06	40	40.9	64.3
	Generator for lighting	92	0.4	38.9	5	5.0	3	N/A	N/A	N/A	60	48.9	
	Forklifts	93	0.4	38.9	5	5.0	3	40	1.14	0.06	40	35.9	

	Drills / Cutters	115	0.4	38.9	5	5.0	3	N/A	N/A	N/A	10	64.1	

D.2.5 Table 5 to Table 9 shows construction noise impact assessment at R1, R2, R3, R4 and R5.

Table 5 Construction Noise Impact Assessment at R1

Activities	Construction Noise Level at 35m (dB)	Ambient Noise Level (dB) (façade level)	Construction noise assessment Level (dB)	Impact?	Assessment category	Total noise level (dB)	Change (dB)	Impact Category
Enabling and Site Preparation	61	50	65	NO	A	61	11	Minor Adverse
Substructure	65	50	65	NO	A	65	15	Minor Adverse
Superstructure	57	50	65	NO	A	58	8	Minor Adverse
Envelope	50	50	65	NO	A	53	3	Minor Adverse
Fit Out	64	50	65	NO	A	64	14	Minor Adverse

Table 6 Construction Noise Impact Assessment at R5

Activities	Construction Noise Level at 50m (dB)	Ambient Noise Level (dB) (façade level)	Construction noise assessment Level (dB)	Impact?	Assessment category	Total noise level (dB)	Change (dB)	Impact Category
Enabling and Site Preparation	58	67	70	NO	B	67	0	Negligible
Substructure	62	67	70	NO	B	68	1	Minor Adverse
Superstructure	54	67	70	NO	B	67	0	Negligible
Envelope	47	67	70	NO	B	67	0	Negligible
Fit Out	61	67	70	NO	B	68	1	Minor Adverse

Table 7 Construction Noise Impact Assessment at R4

Activities	Construction Noise Level at 70m (dB)	Ambient Noise Level (dB) (façade level)	Construction noise assessment Level (dB)	Impact?	Assessment category	Total noise level (dB)	Change (dB)	Impact Category
Enabling and Site Preparation	55	64	70	NO	B	65	1	Minor Adverse

Activities	Construction Noise Level at 70m (dB)	Ambient Noise Level (dB) (façade level)	Construction noise assessment Level (dB)	Impact?	Assessment category	Total noise level (dB)	Change (dB)	Impact Category
Substructure	59	64	70	NO	B	65	1	Minor Adverse
Superstructure	51	64	70	NO	B	64	0	Negligible
Envelope	44	64	70	NO	B	64	0	Negligible
Fit Out	58	64	70	NO	B	65	1	Minor Adverse

Table 8 Construction Noise Impact Assessment at R3

Activities	Construction Noise Level at 85m (dB)	Ambient Noise Level (dB) (façade level)	Construction noise assessment Level (dB)	Impact?	Assessment category	Total noise level (dB)	Change (dB)	Impact Category
Enabling and Site Preparation	53	58	65	NO	A	59	1	Minor Adverse
Substructure	57	58	65	NO	A	61	3	Minor Adverse

Activities	Construction Noise Level at 85m (dB)	Ambient Noise Level (dB) (façade level)	Construction noise assessment Level (dB)	Impact?	Assessment category	Total noise level (dB)	Change (dB)	Impact Category
Superstructure	49	58	65	NO	A	59	1	Minor Adverse
Envelope	42	58	65	NO	A	58	0	Negligible
Fit Out	57	58	65	NO	A	60	2	Minor Adverse

Table 9 Construction Noise Impact Assessment at R2

Activities	Construction Noise Level at 100m (dB)	Ambient Noise Level (dB) (façade level)	Construction noise assessment Level (dB)	Impact?	Assessment category	Total noise level (dB)	Change (dB)	Impact Category
Enabling and Site Preparation	52	55	65	NO	A	57	2	Minor Adverse
Substructure	56	55	65	NO	A	58	3	Minor Adverse
Superstructure	48	55	65	NO	A	56	1	Minor Adverse
Envelope	41	55	65	NO	A	55	0	Negligible

Activities	Construction Noise Level at 100m (dB)	Ambient Noise Level (dB) (façade level)	Construction noise assessment Level (dB)	Impact?	Assessment category	Total noise level (dB)	Change (dB)	Impact Category
Fit Out	55	55	65	NO	A	58	3	Minor Adverse

Construction Vibration

D.2.6 Free-field resultant PPVs have been calculated from the following equation for vibratory compaction (steady state) from Table E.1 of BS5228: Part 2.

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

D.2.7 Plant used in the calculation is a typical vibratory roller plant, a double drum Bomag BW 135 AD vibratory roller.

Where:

V_{res} is the resultant Peak Particle Velocity
k_s is the scaling factor
n_d is the number of vibrating drums
A is the maximum amplitude of drum vibration
x is the ground distance measured along the ground distance, m
L_d is the vibrating roller drum width, m

Construction and Operational Traffic Assumptions

D.2.8 For traffic assessments, the traffic consultants provided 18-hour flows for light vehicles and HGVs for construction year 2028 and operational year 2030.

D.2.9 **Table 10** shows peak construction road traffic noise assessment against baseline for construction year 2028.

Table 10 Peak Construction Road Traffic Noise Assessment

Road Name	AAWT (18hr) V base	AAWT (18hr) Q Base	AAWT (18hr) F Base	AAWT (18hr) V Future	AAWT (18hr) Q Future	AAWT (18hr) F Future	Base Basic noise level corrected $L_{A10,dB\ 18hr}$	Future Basic noise level corrected $LA_{10,dB\ 18hr}$	Change in Traffic Noise Level dB
Barrow Green Lane (to the west of proposed site access)	58	1938	13	58	2014	29	59.7	60.2	0.5
A25 Godstone Road (West of Church Ln)	51	15250	621	51	15326	637	69.7	69.8	0.1

D.2.10 **Table 11** shows operational road traffic noise assessment in the operational year 2030 against 2030 baseline without scheme.

Table 11 Operational Road Traffic Noise Assessment

Road Name	AAWT (18hr) V base	AAWT (18hr) Q Base	AAWT (18hr) F Base	AAWT (18hr) V Future	AAWT (18hr) Q Future	AAWT (18hr) F Future	Base Basic noise level corrected $L_{A10,dB\ 18hr}$	Future Basic noise level corrected $LA_{10,dB\ 18hr}$	Change in Traffic Noise Level dB
Barrow Green Lane (to the east of proposed site access)	58	2040	14	58	2631	18	60	61.4	1.4
Barrow Green Lane (to the west of proposed site access)	58	2040	14	58	2881	20	60	61.9	1.9
Wheeler Avenue	37	639	3	37	1114	7	51.8	54.0	2.2
Church Lane (East of Wheeler Avenue)	54	4474	22	54	4697	24	63.4	63.7	0.3
Church Lane (N/S Alignment, north of Station Rd W)	48	5300	28	48	5658	30	63.6	63.9	0.3
Church Lane (West of Wheeler Avenue)	54	4322	22	54	4574	24	63.3	63.5	0.2

Road Name	AAWT (18hr) V base	AAWT (18hr) Q Base	AAWT (18hr) F Base	AAWT (18hr) V Future	AAWT (18hr) Q Future	AAWT (18hr) F Future	Base Basic noise level corrected $L_{A10,dB\ 18hr}$	Future Basic noise level corrected $LA_{10,dB\ 18hr}$	Change in Traffic Noise Level dB
A25 Godstone Road (West of Church Ln)	51	16056	654	51	16524	659	69.9	70	0.1
A25 West Hill (East of Church Ln)	51	12259	500	51	12476	503	68.8	68.8	0.0
East Hill Road (N/S Alignment)	48	3568	33	48	3827	35	62	62.3	0.3
A25 East Hill Road (E/W Alignment)	64	13581	553	64	13960	557	70.5	70.6	0.1

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