



St Edwards Homes

Green Park Village, Reading Phase 6A

Noise and Vibration Assessment Report

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RSK GENERAL NOTES

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This work has been undertaken in accordance with the quality management system of RSK Environment.

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1 INTRODUCTION

1.1 Instruction

RSK Environment Ltd. has been instructed by St Edwards Homes to undertake a noise assessment for a proposed residential development to the west of Longwater Avenue, Reading. The assessment would accompany a detailed planning application for a residential led, mixed use development.

1.2 Objectives

The aim of the noise assessment is to:

- Identify sources of noise that may impact upon future residents of the proposed development;
- Quantify and report the noise environment across the site to determine the suitability of the site for the proposed residential development; and
- Specify where noise mitigation would be required to reduce the potential to cause disturbance to sensitive receptors if required.

1.3 Regulatory Framework

The noise impact assessment will be considered with reference to the following documents:

1.3.1 National Planning Policy Framework (NPPF): 2012

The National Planning Policy Framework (NPPF) (published March 2012) is the means by which noise is considered within the planning regime. The NPPF does not contain assessment criteria, instead providing a series of policies, giving local authorities the flexibility in meeting the needs of local communities. The NPPF states:

- The planning system should contribute to and enhance the natural and local environment by [...] preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of [...] noise pollution;
- Planning policies and decisions should aim to [...] 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;
- Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and

- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

1.3.2 BS 7455 ‘Description and measurement of environmental noise - Part 1: Guide to quantities and procedures’

BS 7445 provides the framework within which environmental noise should be quantified and procedures to be followed. The standard also refers to BS EN 61672, which prescribes the equipment necessary for such measurements.

1.3.3 BS 8233: 2014 ‘Guidance on sound insulation and noise reduction for buildings’

BS 8233 has established internal ambient noise levels for dwellings based upon occupancy patterns and derived from World Health Organisation guidelines for community noise. These are summarized below:

Table 1-1 Summary of Internal ambient noise levels

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16h}$	---
Dining	Dining room/area	40 dB $L_{Aeq,16h}$	---
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$

BS8233 also provides design criteria for external noise and section 7.7.3.2 states

“For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.”

1.3.4 Calculation of Road Traffic Noise (CRTN) & Design Manual for Roads and Bridges (DMRB)

The ‘Calculation of Road Traffic Noise’ (CRTN) produced by the Department of Transport / Welsh Office provides a method for the prediction of noise from road traffic. The Highways Agency Design Manual for Roads and Bridges, Volume 11, Section 3, Part 7 Had 213/11 Noise and Vibration, provides guidance on the assessment of noise impacts from roads and contains guidance for assessing the likely impact of noise generated by road traffic. The criteria from DMRB for short-term effects (effect at year of opening) are presented in Table 1.2.

Table 1-2 DMRB criteria for determining magnitude of impact in the short-term

DMRB criteria for determining magnitude of impact in the short-term	
Change in noise level $L_{A10,18hr}$	Magnitude of impact
0 dB	No change
0.1 – 0.9 dB	Negligible
1 – 2.9 dB	Minor
3 – 4.9 dB	Moderate
5 dB or more	Major

The criteria from DMRB for long-term effects (future year) are presented in Table 1.3.

Table 1-3 DMRB criteria for determining magnitude of impact in the long-term

DMRB criteria for determining magnitude of impact in the long-term	
Change in noise level $L_{A10,18hr}$	Magnitude of impact
0 dB	No change
0.1 – 2.9 dB	Negligible
3 – 4.9dB	Minor
5 – 9.9 dB	Moderate
10 dB or more	Major

1.3.5 BS 4142: 2014 ‘Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas’

The British Standard, BS 4142, provides a methodology for assessing industrial noise against ambient background noise levels. A comparison of the difference between the background and rating levels (the noise from the identified industrial source), with additional corrections for tonality, intermittency and impulsiveness, as predicted at the nearest residential receptor (using methodology provided within ISO 9613) indicates the likelihood of adverse impact. Typically, the greater this difference, the greater the magnitude of the impact:

- A difference of around +10 dB or more indicates that significant adverse impacts are likely
- A difference of around +5 dB is likely to be an indication of an adverse impact
- Where the rating level does not exceed the background sound level (a difference of 0dB or less), this is an indication of the specific sound source having a low impact.

The consideration of context in BS4142 allows for a degree of flexibility within the above assessment criteria based on a number of factors which could make assessed receptors more or less sensitive to noise impacts. Such factors could include the

existing noise environment (for example, is the assessed noise a type which is completely new and distinct from the existing noise environment), or the absolute noise level (for example, even though the train noise exceeds the background level by 10 dB this might still be considered a very low level).

1.3.6 BS 6472-1: 2008 'Guide to evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting'

BS 6472-1 provides guidance on predicting human response to vibration within buildings. The vibration dose value (VDV) is used to estimate the 'probability of adverse comment' which might be expected from individuals experiencing vibration within buildings. Vibration magnitudes that would normally result in adverse comment can sometimes be tolerated, particularly for temporary disturbances or brief events.

The vibration tolerance of an individual varies, and can depend on whether they are at home or work. As well as individual sensitivity, social and cultural factors, psychological attitudes and the expected degree of intrusion can all have an effect on the likelihood of adverse comment.

According to BS 6472, perception thresholds for continuous whole body vibration vary widely, with roughly half the population being able to perceive a vertical weighted acceleration of 0.015ms^{-2} , with a quarter of the population being able to perceive a vibration of 0.01ms^{-2} , and the least sensitive quarter being able to detect a vibration of 0.02ms^{-2} peak or more.

The effect of building vibration is assessed by determining the appropriate VDV. The VDV defines a relationship which produces a constant assessment of continuous, intermittent and impulsive vibration. The VDV is given by the fourth root of the time integral of the fourth power of the acceleration after it has been frequency weighted.

Table 1-4 Vibration dose value ranges which might result in various probabilities of adverse comment within residential buildings

Time periods	Vibration Dose Value / $\text{ms}^{-1.75}$		
	Low Probability of Adverse Comment	Adverse Comment Possible	Adverse Comment Probable
16h day [0700 – 2300]	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
8h night [2300 – 0700]	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8
<i>Note – For offices and workshops, multiplying factors of 2 and 4 respectively should be applied to the above vibration dose value ranges for a 16h day</i>			

The levels presented in Table 1.4 are to be used as the basis of determining impacts from this study.

1.3.7 BS ISO 4866: 2010 'Mechanical vibration and shock. Vibration of fixed structures. Guidelines for the measurement of vibrations and evaluation of their effects on structures'

Along with BS 6472 as detailed above, this British Standard sets out the basic principles for environmental vibration monitoring, data processing and analysis. The standard covers instrument choice, mounting/coupling techniques and the collection of data. The measurements undertaken for this study have been undertaken in accordance and with reference to this standard.

1.3.8 BS 7385-2:1993 'Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground borne vibration'

This standard provides guidance and recommended threshold values for determining the potential impacts of vibration on building structures. Along with assessment thresholds, this standard also includes recommended methods for equipment and sensor positions, sensor mounting and general measurement procedures.

As mentioned in BS 6472, the way in which a structure is constructed and the materials it is constructed from play an important role in the transfer of ground borne vibration to a structure within the building. In a similar way these variables, including the condition of the building can affect the resilience of the building to ground borne vibration. Part 2 of this standard provides recommended thresholds for the onset of cosmetic damage; this is replicated in Table 1.5 and graphically in Figure 1.1. These are presented as Peak Particle Velocity values (PPV) and measured in mms⁻¹.

Table 1-5 Vibration dose value ranges which might result in various probabilities of adverse comment within residential buildings

Line (see Figure 3.1)	Type of building	Peak component particle velocity in frequency range of predominant pulse	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed Structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light Framed structures Residential or light Commercial type buildings	15 mm/s at 4 Hz Increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz Increasing to 50 mm/s at 40 Hz and above
NOTE 1 Values referred to are at the base of the building NOTE 2 For line 2, at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) should not be exceeded.			

Figure 1-1 Transient vibration guide values for cosmetic damage

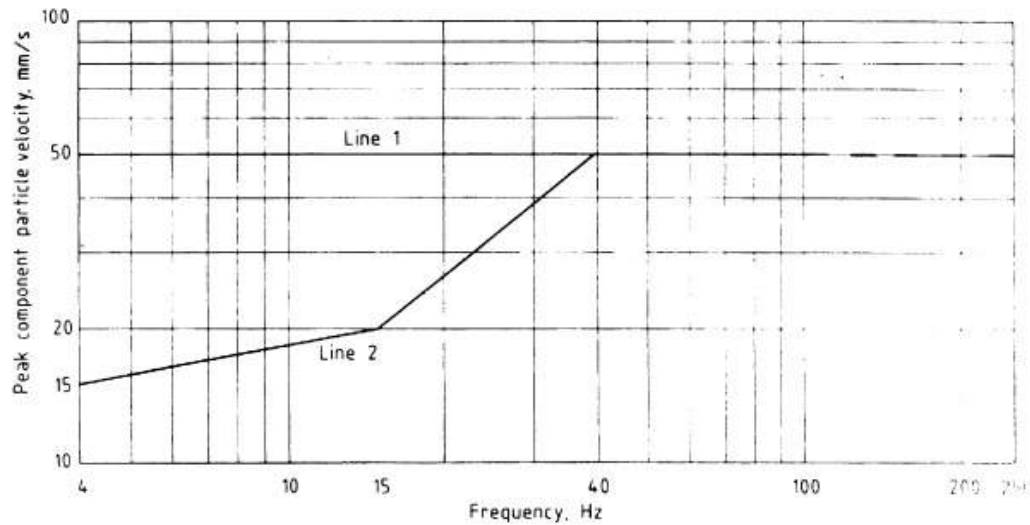


Figure 1 — Transient vibration guide values for cosmetic damage

In terms of frequency response, based on our experience from other projects and through review of literature, the dominant vibration from freight and passenger train movements is typically in the order of 30-60 Hz. Therefore given the above tables, the higher criteria for cosmetic damage would apply for this project.

1.4 Consultation & Local Guidance

The proposed method represented within this report was presented to the responsible Environmental Health Officer (EHO) at Reading Borough Council on the 16/03/17. The EHO agreed with the methodology and the monitoring locations for the noise survey.

2 SITE SURVEY AND RESULTS

2.1 Site Location and Description

The site is located west of Longwater Avenue and north of Kirtons Farm Road. To the west approximately 130 metres from the site is a railway line surrounded by fields. Also approximately 290 metres to the north-west of site lay industrial premises accessed from Cottage Lane. To the north of site approximately 40 metres is land assumed to be used for agriculture use that runs adjacent to Island Road. To the east of site approximately 500 metres is Green Park Business Park and the Madjeski Football Stadium approximately 1 km.

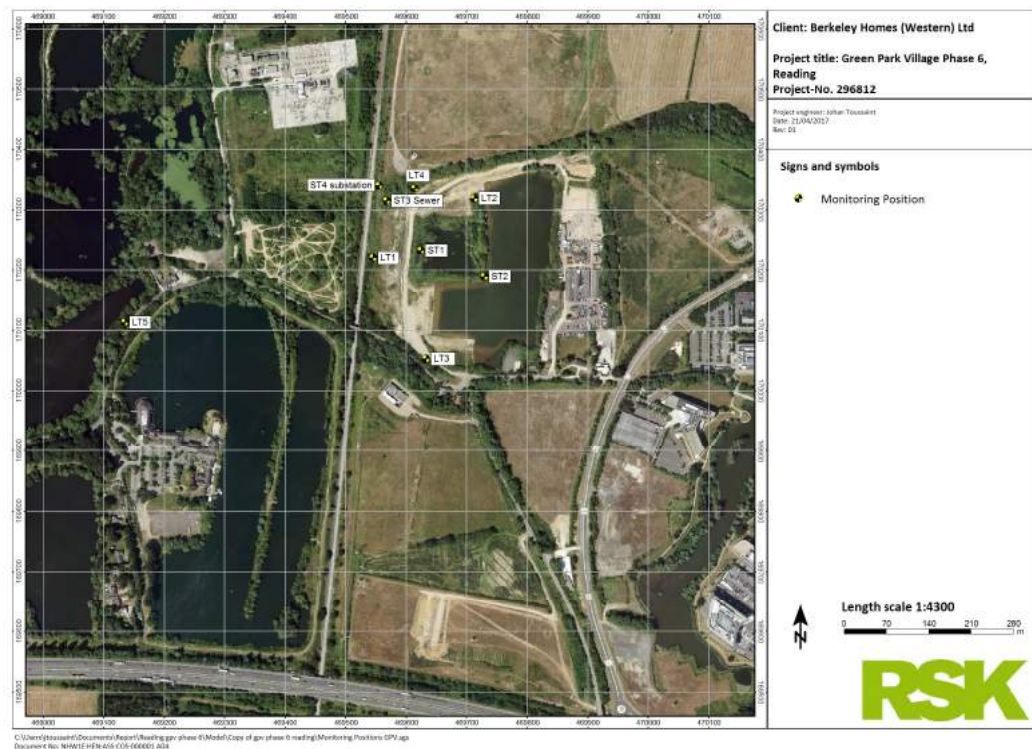
To the south of site, approximately 560 metres away, lies the M4 motorway. From aerial mapping it was anticipated that the noise environment would be dominated from the railway located at the west of the development as well as the road infrastructure in particular the M4 and Longwater Avenue and finally any noise from the business park (east) and the Madjeski Stadium.

2.2 Survey measurement details

Figure 2-1 Monitoring locations



Figure 2-2 Monitoring locations (Short (ST) and Long (LT) term)



2.3 Survey measurement equipment

Sound level measurements were made using the following equipment:

- Rion NL32, Type 1 Integrating Sound Level Meter (SLM) – Serial Number; 01182974;
- Rion NL52, Type 1 Integrating Sound Level Meter (SLM) – Serial Number; 00453835
- Rion NL52, Type 1 Integrating Sound Level Meter (SLM) – Serial Number; 00643029;
- Rion NL52, Type 1 Integrating Sound Level Meter (SLM) – Serial Number; 00453833;
- Rion NC74 acoustic calibrator (serial no. 34172702).

The calibration of the SLM was checked before and after the measurements, using the acoustic calibrator at 94 dB, at 1 kHz. No significant calibration drift was noted between the installation and collection days.

The sound level meters used, conform to the requirements of BS EN 61672-1: 2003 *Electroacoustics. Sound level meter, Specifications*. The calibrator used, conforms to the requirements of BS EN 60942: 2003 *Electroacoustics, Sound calibrators*. The equipment used, has a calibration history that is traceable to a certified calibration institution.

2.4 Survey weather conditions

Weather conditions during the attended measurements were relatively dry with periods of light precipitation that did not affect measurement noise levels. There was a light breeze from the south, but the average wind speed did not exceed 5m/s. Temperatures ranged between 16-21 °C.

During the unattended survey, using the closest weather station located on Hatford Road (source: www.wunderground.com; station ID: IREADING23) the temperature varied between 8.2-18.4 °C, wind speed of 0m/s and precipitation of 0mm.

The weather conditions were considered to have been suitable for environmental noise monitoring.

2.5 Unattended measurement results

The following tables show the results obtained from each of the measurement locations. The full data for the unattended measurements is presented in Appendix A.

Table 2-1 Noise Monitoring Results – Summary

Unattended measurement position	Daytime (07:00-23:00)						Night time (23:00-07:00)					
	Date	Time (hh:mm)	L _{Aeq, T} dB	L _{AFmax, T} dB	L _{A10, T} dB	L _{A90, T} dB	Date	Time (hh:mm)	L _{Aeq, T} dB	L _{AFmax, T} dB	L _{A10, T} dB	L _{A90, T} dB
	Day average						Night average					
LT1	06/04/2017	11:30-22:55	68.4	98.5	52.6	42.6	06/04/2017	23:01-06:56	65.9	95.2	48.8	41.3
	07/04/2017	07:00-22:55	67.3	95.5	52.5	42.0	07/04/2017	23:01-06:56	68.6	101.7	49.6	43.3
	08/04/2017	07:00-22:55	66.4	96.7	54.1	46.8	08/04/2017	23:01-06:56	51.0	86.9	48.9	43.6
	09/04/2017	07:00-22:55	61	92.1	52.0	47.5	09/04/2017	23:01-06:56	61.0	93.9	45.6	39.8
	10/04/2017	07:00-22:55	67.6	99.5	52.8	42.7	10/04/2017	23:01-06:56	65.4	95.3	47.8	40.2
	11/04/2017	07:00-22:55	67.4	97.5	55.2	46.8	11/04/2017	23:01-06:56	64.0	96.3	49.9	43.2
	12/04/2017	07:00-22:55	66.9	97.3	54.3	46.8	12/04/2017	23:01-06:56	65.7	93.9	48.1	40.5
	13/04/2017	07:00-10:00	64.5	93.3	52.2	43.9						
LT2	06/04/2017	10:28-22:58	57	89.7	54.6	47.4	06/04/2017	23:03-06:58	50	72.5	49.8	46.3
	07/04/2017	07:03-22:58	52.1	87.5	52.1	45.9	07/04/2017	23:03-06:58	49.6	68.9	50.3	46.9
	08/04/2017	07:03-22:58	52.8	91.8	52.7	48.2	08/04/2017	23:03-06:58	48.9	67.8	49.9	46.7
	09/04/2017	07:03-22:58	50.5	70.2	51.5	48.3	09/04/2017	23:03-06:58	49.1	73.1	48.9	44.9
	10/04/2017	07:03-22:58	55.6	93.9	52.4	45.4	10/04/2017	23:03-06:58	50	67.4	49	45.5
	11/04/2017	07:03-22:58	51.4	82.5	52.8	46.8	11/04/2017	23:03-06:58	50.2	72.5	50	46.3
	12/04/2017	07:03-22:58	51.7	77.1	52.8	47	12/04/2017	23:03-06:58	50.4	68.9	49.4	45.3
	13/04/2017	07:03-09:43	51.5	72.9	54	45.9						

Unattended measurement position	Daytime (07:00-23:00)						Night time (23:00-07:00)					
	Date	Time (hh:mm)	L _{Aeq, T} dB	L _{AFmax, T} dB	L _{A10, T} dB	L _{A90, T} dB	Date	Time (hh:mm)	L _{Aeq, T} dB	L _{AFmax, T} dB	L _{A10, T} dB	L _{A90, T} dB
	Day average						Night average					
LT3	06/04/2017	12:52-22:57	56.2	90.5	53.2	40.6	06/04/2017	23:02-06:57	50.9	76.0	47.0	39.8
	07/04/2017	07:02-22:57	54.5	88.1	52.9	40.7	07/04/2017	23:02-06:57	49.3	75.5	46.3	39.4
	08/04/2017	07:02-22:57	51.4	83.9	50.7	40.1	08/04/2017	23:02-06:57	45.4	77.5	42.7	37.9
	09/04/2017	07:02-22:57	47.4	72.4	48.5	41.5	09/04/2017	23:02-06:57	51.7	84.0	45.5	38.3
	10/04/2017	07:02-22:57	56.3	80.8	54.9	43.1	10/04/2017	23:02-06:57	51.3	85.4	47.1	39.6
	11/04/2017	07:02-22:57	53.2	79.7	53.2	42.4	11/04/2017	23:02-06:57	51.7	81.2	45.8	39.2
	12/04/2017	07:02-22:57	53.7	82.8	53.1	42.4	12/04/2017	23:02-06:57	49.9	80.4	44.8	38.0
	13/04/2017	07:02-10:27	55.6	89.5	55.3	42.8						
LT4	06/04/2017	09:51-22:56	53.3	84.5	53.6	43.5	06/04/2017	23:01-06:56	50.3	74.0	48.1	43.2
	07/04/2017	07:01-22:56	52.8	79.3	52.5	43.6	07/04/2017	23:01-06:56	50.7	73.8	49.1	44.4
	08/04/2017	07:01-22:56	53.2	82.9	53.0	47.0	08/04/2017	23:01-06:56	47.9	67.2	48.9	44.9
	09/04/2017	07:01-22:56	50.0	74.7	50.4	46.8	09/04/2017	23:01-06:56	46.3	70.0	45.1	40.7
	10/04/2017	07:01-22:56	53.0	83.7	52.7	43.0	10/04/2017	23:01-06:56	49.5	77.1	46.8	41.2
	11/04/2017	07:01-22:56	52.2	80.2	52.4	44.3	11/04/2017	23:01-06:56	48.7	73.9	47.6	42.9
	12/04/2017	07:01-22:56	52.2	80.9	52.4	44.8	12/04/2017	23:01-06:56	50.5	83.2	47.0	41.6
	13/04/2017	07:01-10:16	52.1	82.2	53.0	43.6						

Location 1 was located nearby the train station; as a result there will be several short high burst of noise levels; which will explain why the L_{Aeq} measured at this location is higher than the L_{A10}.

Unattended measurement position	Daytime (07:00-23:00)						Night time (23:00-07:00)					
	Date	Time (hh:mm)	L _{Aeq, T} dB	L _{AFmax, T} dB	L _{A10, T} dB	L _{A90, T} dB	Date	Time (hh:mm)	L _{Aeq, T} dB	L _{AFmax, T} dB	L _{A10, T} dB	L _{A90, T} dB
	Day average						Night average					
LT5	06/04/2017	19:34-22:59	50.8	81.4	50.1	45.5	06/04/2017	23:04-06:59	49	77	47.3	41
	07/04/2017	07:04-22:59	52.9	84.8	53	43.3	07/04/2017	23:04-06:59	50.4	75.2	47.5	41.4
	08/04/2017	07:04-22:59	54.7	89.2	53.2	46.8	08/04/2017	23:04-06:59	46.8	69.4	47.3	41.6
	09/04/2017	07:04-22:59	52.9	78	53.6	48.8	09/04/2017	23:04-06:59	48.6	72.7	47.9	42.7
	10/04/2017	07:04-22:59	53.1	87.8	52.7	44.6	10/04/2017	23:04-06:59	49.8	72.2	48.1	43.2
	11/04/2017	07:04-22:59	53.9	85.5	54.6	48.5	11/04/2017	23:04-06:59	50.5	79.8	50.2	45.8
	12/04/2017	07:04-22:59	55	90.2	55.2	49.7	12/04/2017	23:04-06:59	49.3	72.2	48.1	43
	13/04/2017	07:04-10:59	55	89.7	55.2	47.5						

Table 2-2 Noise Monitoring Results – Average

Unattended measurement position	Time period	L _{Aeq, T} dB	L _{AFmax, T} dB	L _{A10, T} dB	L _{A90, T} dB
LT1	Daytime	67	97	53	45
	Night time	65	96	49	42
LT2	Daytime	53	89	53	47
	Night time	50	71	50	46
LT3	Daytime	54	86	53	42
	Night time	50	81	46	39
LT4	Daytime	52	82	53	45
	Night time	49	77	48	43
LT5	Daytime	54	90	53	47
	Night time	49	80	48	43

2.6 Attended measurements

Short term measurements taken at locations ST1, ST2, ST3 and ST4 are summarised in Table 2.3.

Table 2-3 Attended Noise Monitoring Results

Location	Date	Time	Duration HH:MM:SS	$L_{Aeq, T}$ dB	$L_{AFmax, T}$ dB	$L_{A10, T}$ dB	$L_{A90, T}$ dB
ST1	06/04/17	17:43	01:15:00	51.7	62.6	56.6	42.5
ST2	06/04/17	17:11	01:56:00	52.1	61.0	57.5	43.9
ST3	06/04/17	19:01	00:00:10	65.0	67.2	65.6	64.5
ST4	06/04/17	19:02	00:00:15	44.5	45.7	44.9	43.8

** The noise source measured for ST3 and ST4 were constant in nature and as such a steady state method was utilised to determine the source noise level.*

2.7 Discussion

The measurements undertaken at monitoring location ST1 and ST2 were used to provide an indication of the baseline levels on the site without the construction works.

The measurement undertaken at monitoring location ST3 was related to the noise emitted by a sewer pipe, whereas the measurement undertaken at location ST4 was related to the noise emitted by the substation located at the north west of the site. The noise emitted by the substation was witnessed to be continuous and distinctive compared to the background noise.

The main noise sources around the site were the railway located at the west of the site and the motorway (M4) located at the south. Although at location LT3, construction noise could be heard the levels measured were similar to the substitute monitoring position (LT5). The highest levels were measured by the train line at location LT1.

3 NOISE ASSESSMENT

3.1 Noise Model

A computer noise model of the site has been constructed using SoundPLAN (v7.4) noise prediction software. A model has been set up to replicate the existing noise conditions on and around the site. The model has been set up with the following parameters.

Table 3-1 Modelling Parameters

Item	Setting
Ground Absorption	Assumed 0.6 coefficient (Average representation of the ground absorption in the area)
Met Conditions	10 degrees Celsius 70% humidity Wind from source to receiver
Façade Corrections	A 3 dB (A) correction has been applied to convert a free-field noise prediction to a façade level.
Receptor Height	Ground Floor 1.5m above ground First Floor 4.5 m above ground Second Floor 7.5m above ground
Building Height	1 storey 5m 2 (and 2.5) storey 8m 3 storey 11m
Source Modelling	Shortest distance from façade of noise sensitive receptor to site assumed Buildings and structures identified modelled as structures Average source emission height of 1.5m External noise sources have been treated as omni-directional point sources.
Traffic Information	Traffic flows are based on noise measurement data and site observation. Ward street was observed to have minimal flows of two cars an hour
Terrain	OS Vectormap contour terrain data has been modelled
Site Layout	Provided by Broadway Malyan

3.2 Noise Model Verification

The noise monitoring was used to verify the base model. This is shown below in Table 3.2

The modelled results show a reasonable correlation for long-term measurements close to the train line (+/- 1dB) and the road network. Similar results were obtained for short-term measurements of the industrial noise related to the substation as well as the noise from the sewer pipe. The substation noise has been included in the L_{Aeq} day and night-time levels in addition to a specific noise model for the substation noise only for the purposes of the BS4142 assessment.

The M4 has been modelled using traffic count data obtained from the Department for Transport. Whereas Longwater Avenue and South Oak Way have been modelled using traffic data provided by Glanville Group.

Table 3-2 Model Validation

Name	Period	Measured dB(A)	Modelled L_{Aeq} dB(A)	Difference
Railway (L1)	Day	67.0 $L_{eq,16h}$	67.1 $L_{eq,16h}$	+0.1
	Night	65.0 $L_{eq,8h}$	65.0 $L_{eq,8h}$	0
Roads (L3)	6-24h	52.8 L_{10}	53.3 L_{10}	+0.5
Roads (L5)	6-24h	53.2 L_{10}	53.0 L_{10}	-0.2
Sewer		65.0 L_{eq}	64.8 L_{eq}	-0.2
Substation		44.5 L_{eq}	44.8 L_{eq}	+0.3

3.3 Noise Level Predictions

Predictions have been carried out at sample façade locations (R1-11) indicated in Figure 3.1.

Figure 3-1 Residential receptors



The results of the predicted noise levels at the sample proposed residential dwellings have been compiled in Table 3.3 and external amenity receptors in Table 3.4.

Table 3-3 Predicted Levels at Worst-case Facade of Representative Receptors

Receiver	Floor	Facade	Daytime L _{Aeq,16hr} dB	Night Time L _{Aeq,8hr} dB
R1	GF	S	58.6	56.5
	F 1	S	59.1	57.0
	F 2	S	59.6	57.5
	F 3	S	60.0	57.9
	F 4	S	60.5	58.3
	F 5	S	60.7	58.5
R2	GF	W	59.8	57.7
	F 1	W	60.1	58.1
	F 2	W	60.5	58.5
	F 3	W	60.9	58.8
	F 4	W	61.2	59.2
	F 5	W	61.4	59.3
R3	GF	S	61.5	59.5
	F 1	S	61.8	59.8
	F 2	S	62.1	60.0
	F 3	S	62.3	60.3
	F 4	S	62.5	60.4
	F 5	S	62.6	60.5
	F 6	S	62.7	60.6
	F 7	S	62.7	60.5
	F 8	S	62.6	60.5
	F 9	S	62.6	60.5
	F 10	S	62.5	60.4
	F 11	S	62.5	60.3
R4	GF	NW	61.7	59.7
	F 1	NW	62.3	60.3
	F 2	NW	62.7	60.8
	F 3	NW	62.9	61.0
	F 4	NW	63.0	61.1
	F 5	NW	63.1	61.1
	F 6	NW	63.0	61.1
	F 7	NW	63.0	61.0
	F 8	NW	62.9	60.9
	F 9	NW	62.8	60.8
	F 10	NW	62.7	60.7
	F 11	NW	62.6	60.6

Receiver	Floor	Facade	Daytime L _{Aeq,16hr} dB	Night Time L _{Aeq,8hr} dB
R5	GF	N	55.2	53.3
	F 1	N	57.4	55.4
	F 2	N	58.4	56.4
	F 3	N	59.0	57.0
	F 4	N	59.5	57.5
	F 5	N	59.7	57.7
	F 6	N	59.7	57.7
	F 7	N	59.7	57.7
	F 8	N	59.7	57.8
R6	GF	W	54.9	53.0
	F 1	W	56.0	54.0
	F 2	W	56.6	54.7
	F 3	W	57.1	55.2
	F 4	W	57.5	55.5
	F 5	W	57.8	55.8
	F 6	W	58.3	56.3
R7	GF	W	56.2	54.3
	F 1	W	56.7	54.8
	F 2	W	57.1	55.2
	F 3	W	57.6	55.6
	F 4	W	57.8	55.9
	F 5	W	58.2	56.2
R8	GF	S	55.8	53.7
	F 1	S	56.5	54.4
	F 2	S	57.0	54.9
	F 3	S	57.5	55.4
	F 4	S	57.9	55.7
	F 5	S	58.2	56.0
R9	GF	S	53.2	51.2
	F 1	S	54.1	52.0
	F 2	S	54.8	52.7
	F 3	S	55.3	53.1
	F 4	S	55.9	53.7
	F 5	S	56.3	54.0
R10	GF	N	55.8	53.9
	F 1	N	56.2	54.2
	F 2	N	56.6	54.6
	F 3	N	57.3	55.3
	F 4	N	58.4	56.4
	F 5	N	59.2	57.2
	F 6	N	59.5	57.5

Receiver	Floor	Facade	Daytime L _{Aeq,16hr} dB	Night Time L _{Aeq,8hr} dB
	F 7	N	59.5	57.5
	F 8	N	59.5	57.4
	F 9	N	59.4	57.4
	F 10	N	59.3	57.3
	F 11	N	59.3	57.3
R11	GF	W	64.9	62.8
	F 1	W	65.0	63.0
	F 2	W	65.2	63.1
	F 3	W	65.3	63.2
	F 4	W	65.3	63.3
	F 5	W	65.2	63.2
	F 6	W	65.1	63.1
	F 7	W	65.0	62.9
	F 8	W	64.8	62.7
	F 9	W	64.6	62.5
	F 10	W	64.4	62.4
	F 11	W	64.2	62.2

The resulting noise contours (day and night time) for ground floor (1.5m), first floor (4.5m) and floor 11 (34.5m) are presented in Figure 3.2 to Figure 3.13.

All following figures are reduced in scale to be accommodated within the report. Each figure following in the text can be viewed at the correct scale on at A3 size as attached to this report.

Figure 3-2 Noise map 1.5m height at the developed site (daytime)

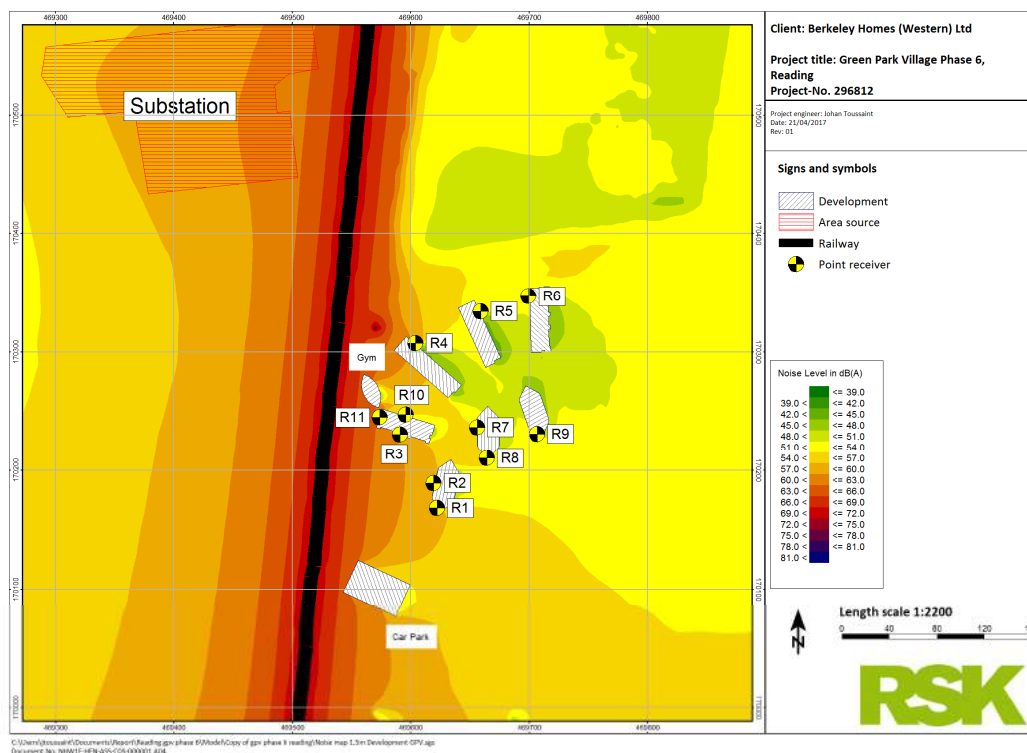


Figure 3-3 Noise map 1.5m height (wider context - daytime)

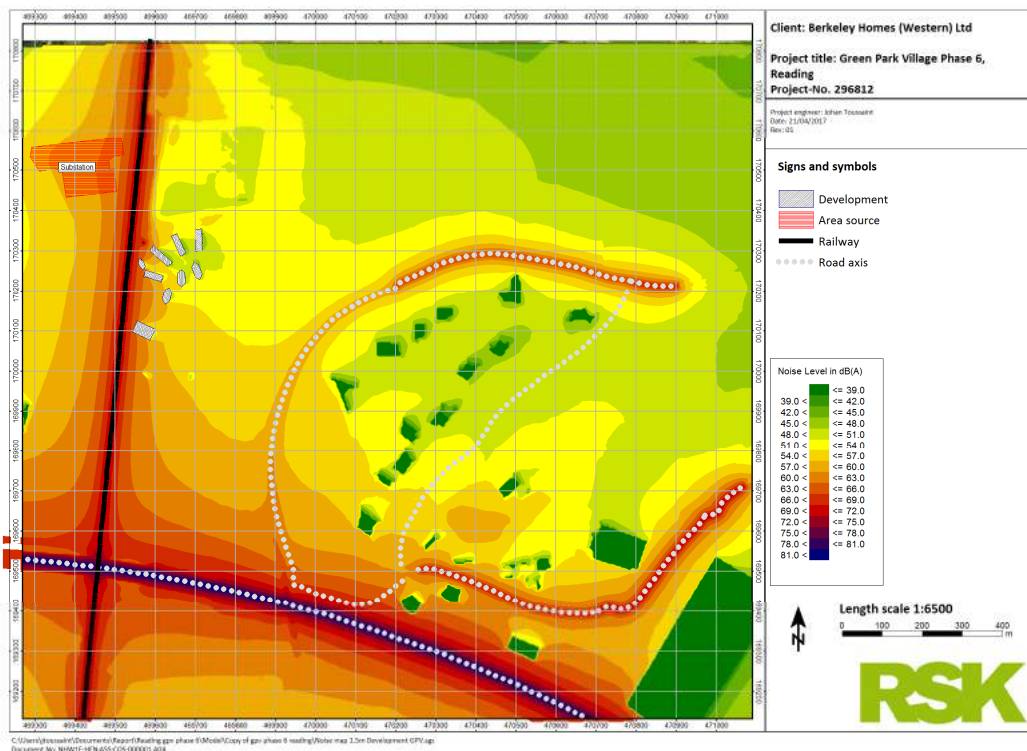


Figure 3-4 Noise map 4.5m height at the proposed site (daytime)

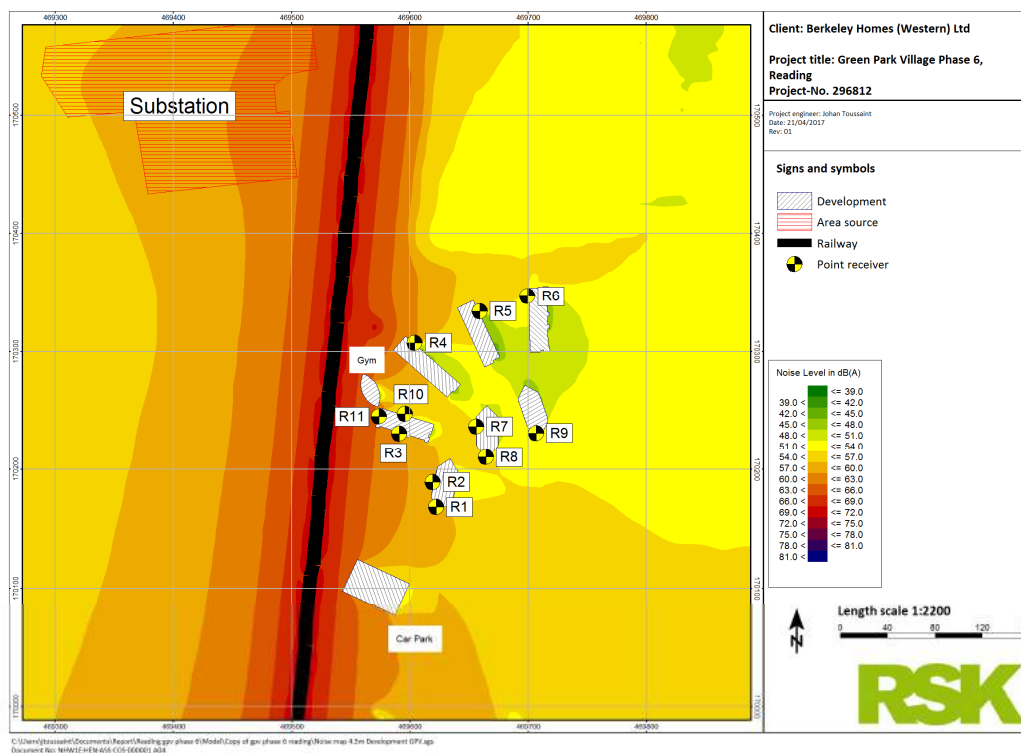


Figure 3-5 Noise map 4.5m height (wider context - daytime)

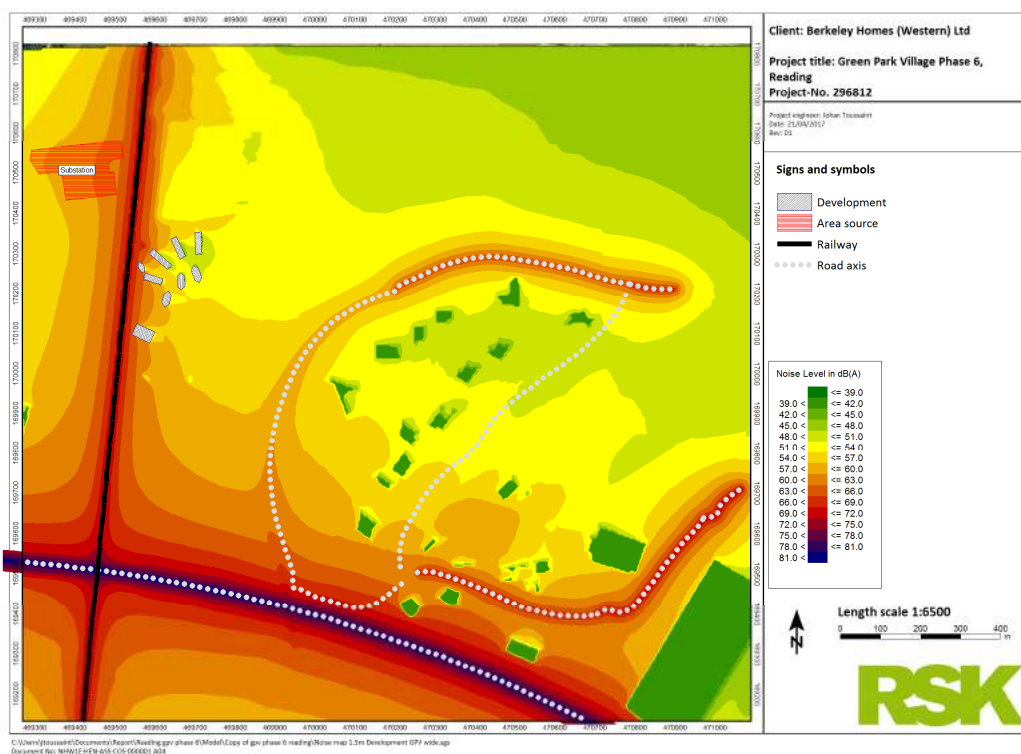


Figure 3-6 Noise map 37.5m height at the proposed site (daytime)

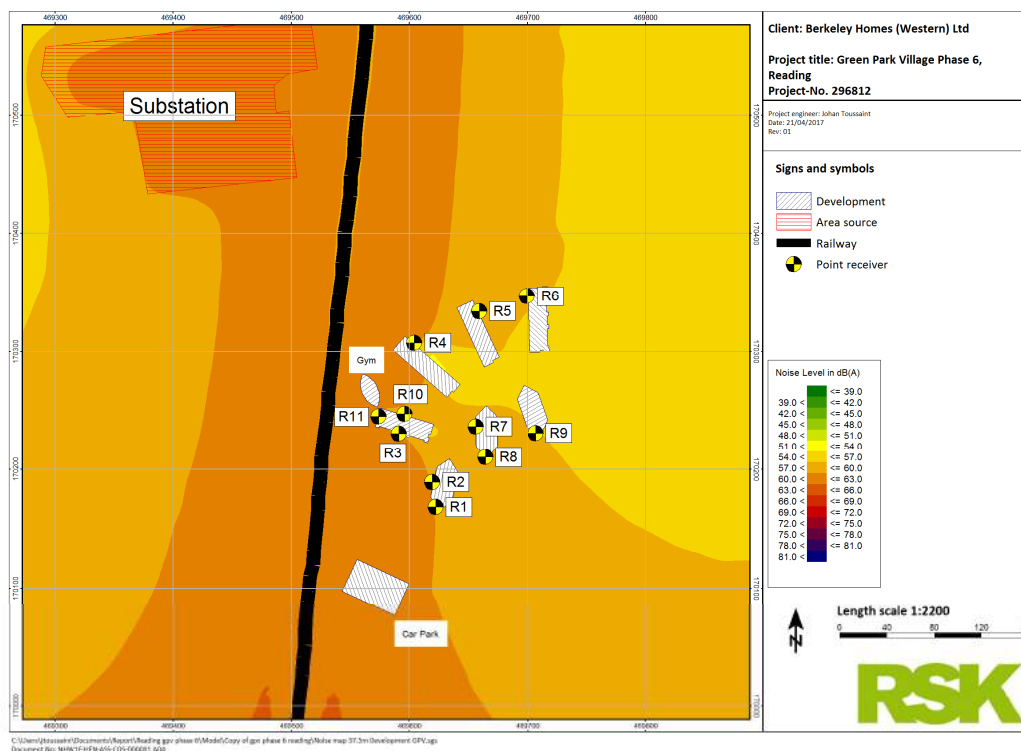


Figure 3-7 Noise map 37.5m height (wider context - daytime)

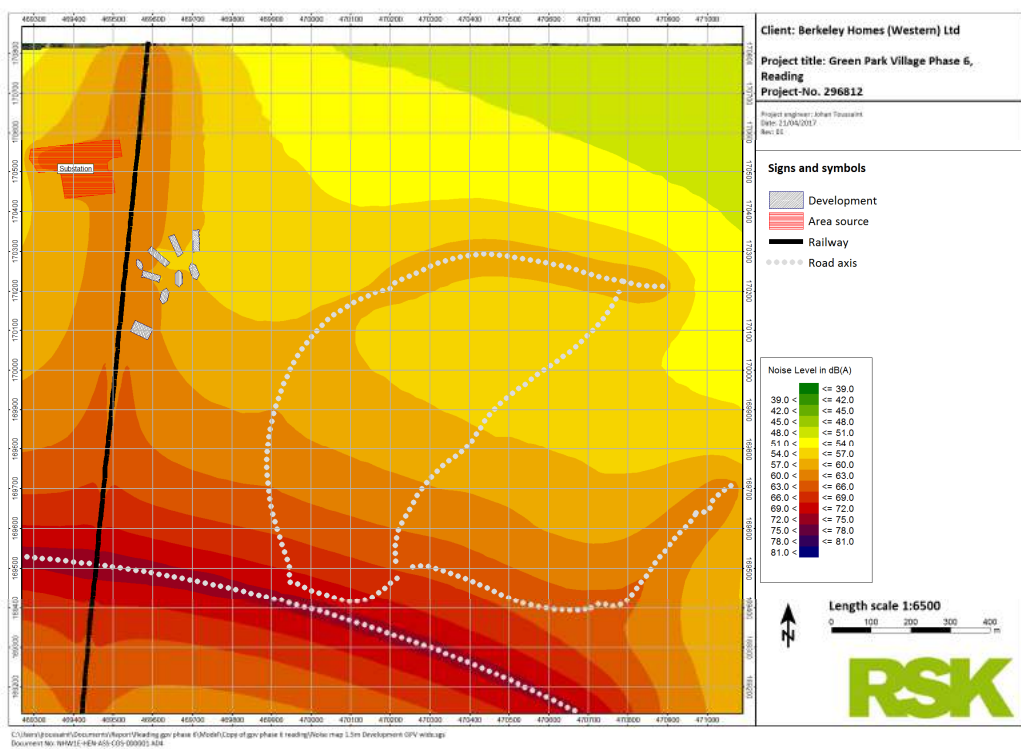


Figure 3-8 Noise map 1.5m height at the proposed site (night time)

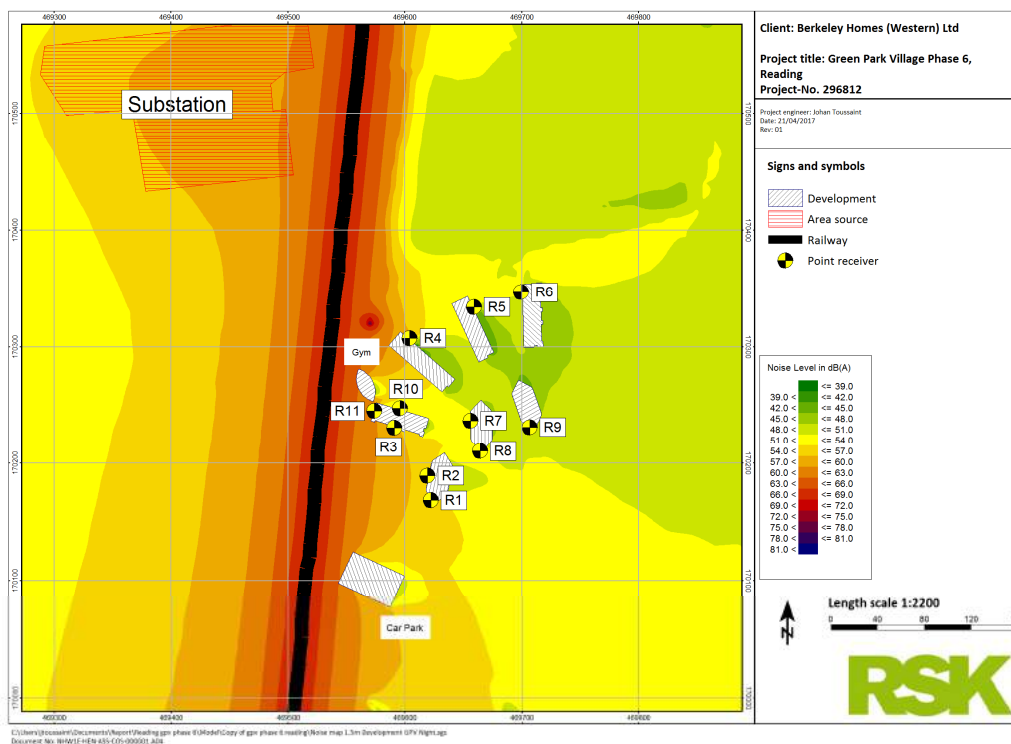


Figure 3-9 Noise map 1.5m height (wider context – night time)

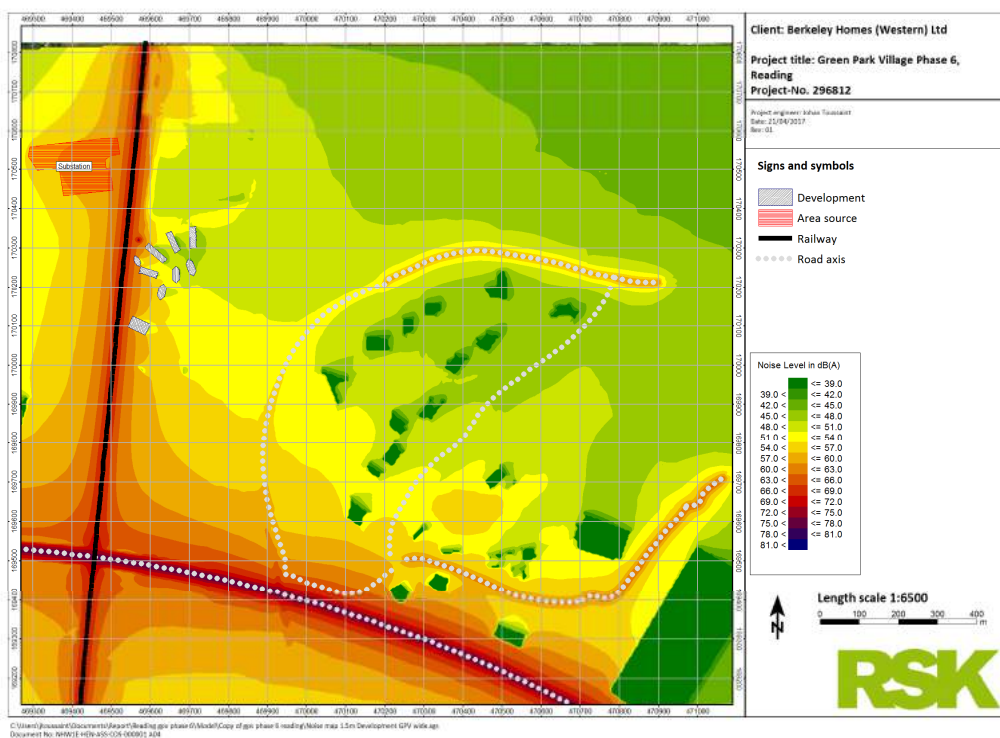


Figure 3-10 Noise map 4.5m height at the proposed site (night time)

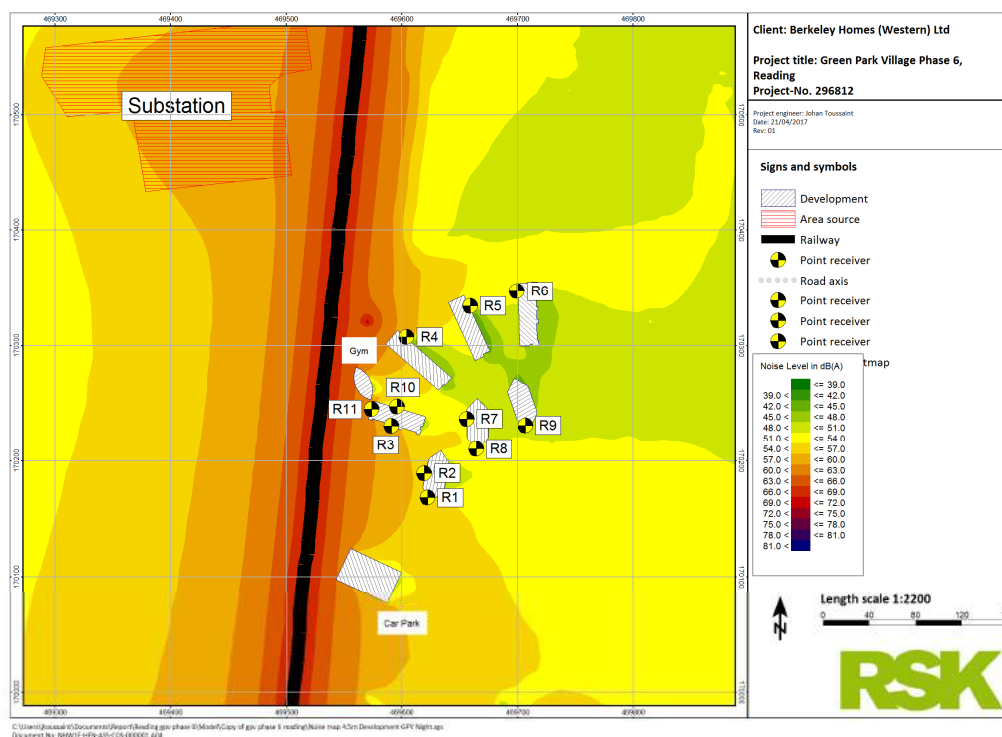


Figure 3-11 Noise map 4.5m height (wider context – night time)

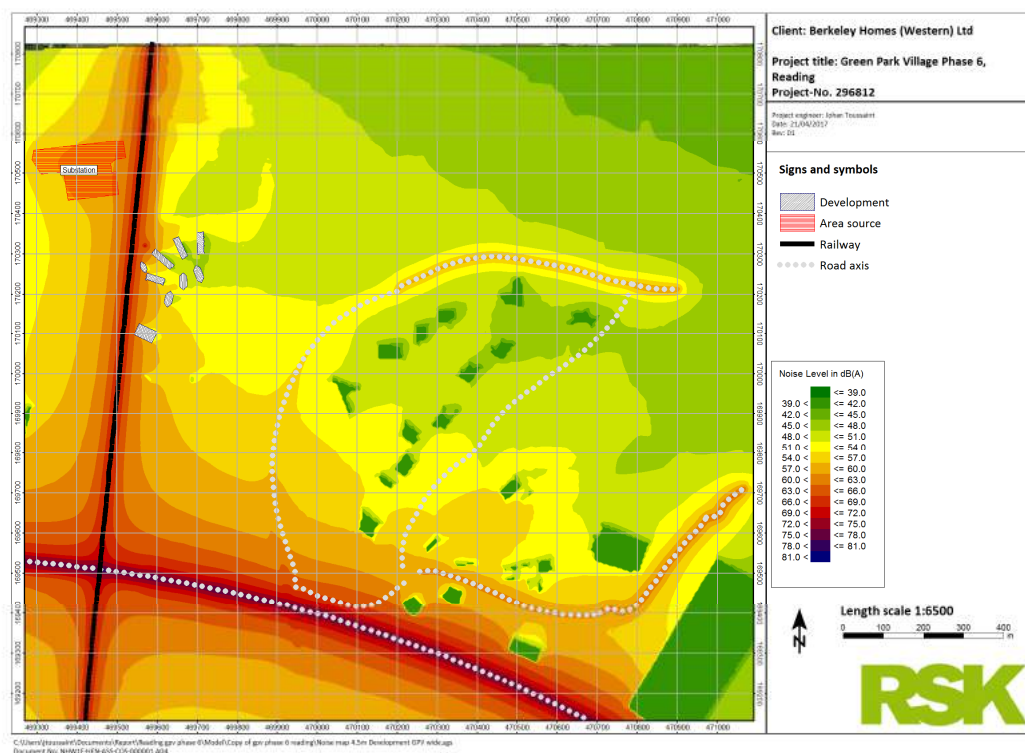


Figure 3-12 Noise map 37.5m height at the proposed site (night time)

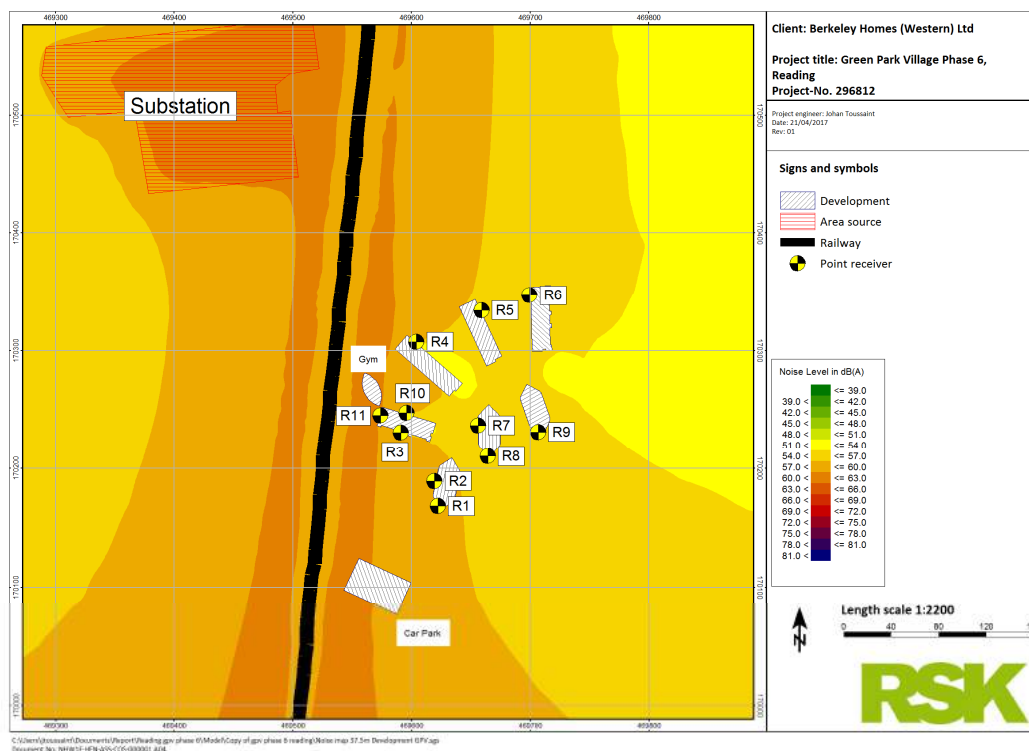
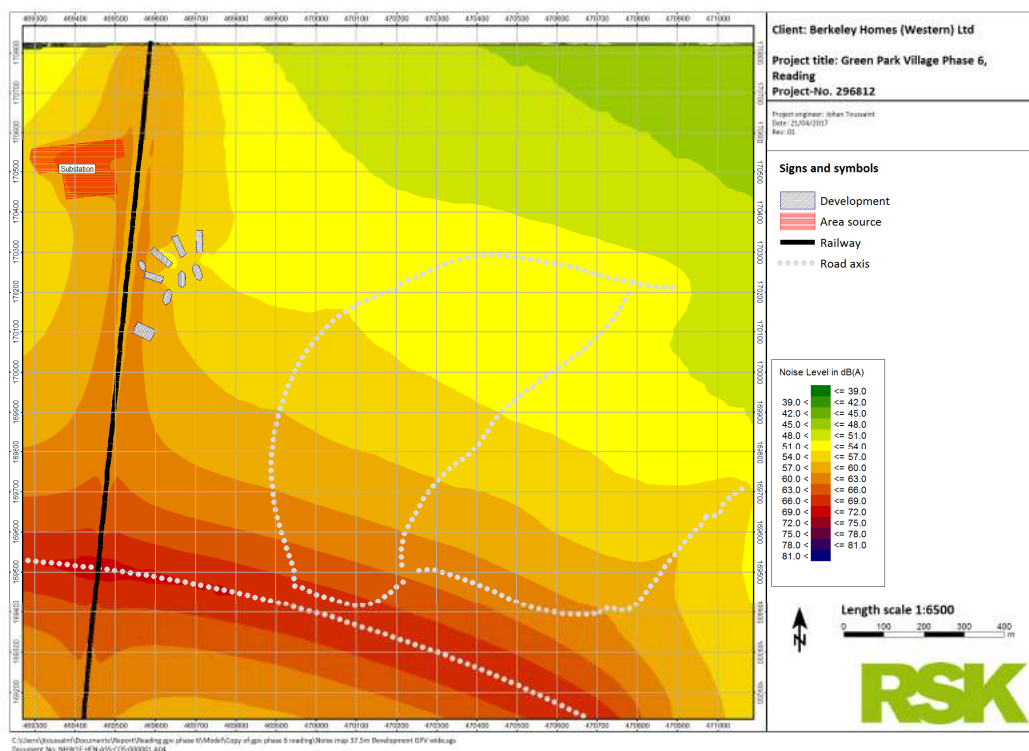


Figure 3-13 Noise map 37.5m height (wider context – night time)



3.4 Traffic Assessment

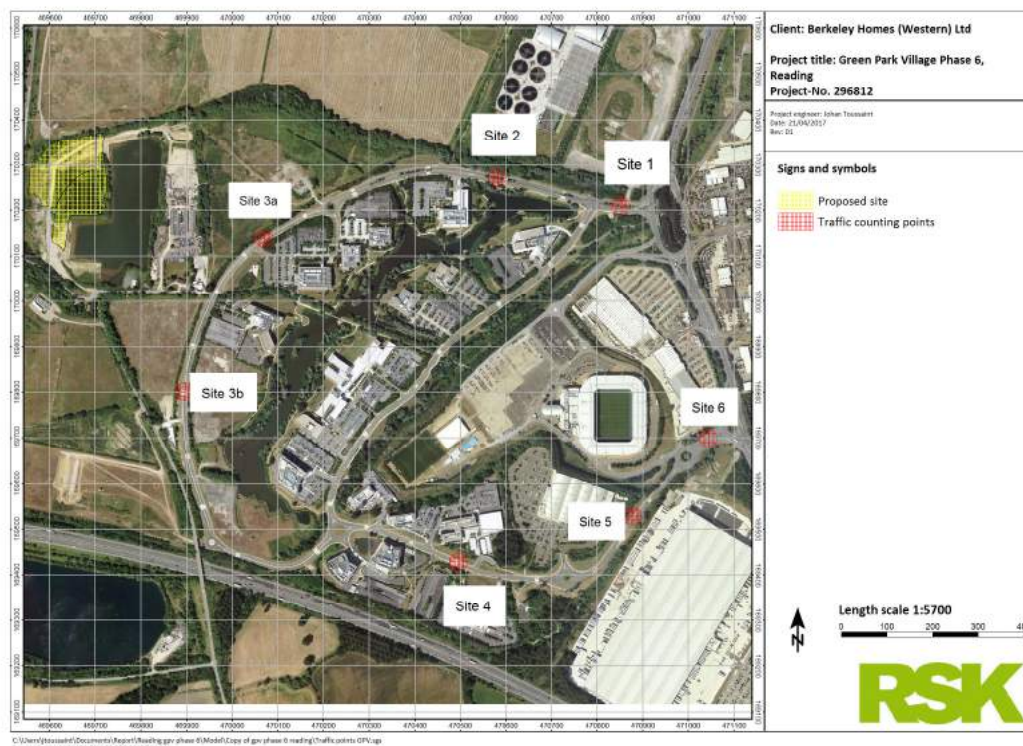
The traffic data for Longwater Avenue and South Oak Way supplied by the Glanville group is presented in Table 3.4. The traffic count locations/stations are shown on Figure 3.14.

Table 3-4 Traffic Data

Road Link Name	AAWT 18 hour 2017 Base		AAWT 18 hour 2022			
			Without Development		With Development	
	Total Flow	HGV%	Total Flow	HGV%	Total Flow	HGV%
Site 1	4790	9.6%	8317	5.5%	8939	5.1%
Site 2	1350	18%	5880	7.5%	3480	7%
Site 3a	1101	12%	3876	3.4%	4498	2.9%
Site 3b	1101	12%	8195	1.6%	8816	1.5%
Site 4	6042	6.5%	13676	2.9%	14298	2.8%
Site 5	10547	5.1%	18045	3.6%	18803	2.8%
Site 6	12342	6.4%	19975	3.8%	20597	3.6%
Road Link Name	AAWT 18 hour 2017 Base		AAWT 18 hour 2037			
			Without Development		With Development	
	Total Flow	HGV%	Total Flow	HGV%	Total Flow	HGV%
Site 1	4790	9.6%	12759	3.6%	13381	3.4%
Site 2	1350	18%	10040	4.4%	10662	4.1%
Site 3a	1101	12%	7275	1.8%	4320	1.9%
Site 3b	1101	12%	17093	0.8%	17715	0.7%
Site 4	6042	6.5%	23325	1.7%	23947	1.6%
Site 5	10547	5.1%	27829	1.9%	28451	1.9%
Site 6	12432	6.4%	29624	2.7%	30246	2.6%

It is generally accepted that noise level changes of 3 dB(A) are the minimum perceptible under normal conditions. Hence large variations in traffic flow numbers are needed before any noticeable change in traffic noise levels occur. For example, a total traffic flow increase of 50% leads to a traffic noise increase of 1.8 dB, barely noticeable to the human ear, and less than the 3 dB considered as a significant change by DMRB in reference to traffic noise assessments.

Figure 3-14 Traffic Counting Points



The resulting traffic noise levels are shown in Table 3.5. There are no existing occupied residential receptors along the traffic route and therefore the noise differentials have been calculated at the count points themselves.

Table 3-5 Traffic Assessment Results

Road Link Name	Year	$L_{A10,18\text{hour}}$ without development dB	$L_{A10,18\text{hour}}$ with development dB	Level Difference dB
Site 1	2022	65.5	65.8	0.3
Site 2		64.0	61.7	-2.3
Site 3a		62.2	62.8	0.6
Site 3b		65.4	65.8	0.3
Site 4		67.7	67.9	0.2
Site 5		68.9	69.1	0.2
Site 6		69.3	69.5	0.2
Site 1	2037	68.7	68.8	0.1
Site 2		67.9	68.1	0.2
Site 3a		65.6	63.4	-2.2
Site 3b		69.0	69.1	0.1
Site 4		70.7	70.7	0.1
Site 5		71.5	71.6	0.1
Site 6		72.0	72.1	0.1

The traffic impact on the local road network is expected to be minimal resulting in levels which do not exceed the lowest thresholds, either short or long term within the DMRB. Regarding Flagstaff road (entrance for Phase 6A), the transport planner (Glanville) assumed that due to it being a cul-de-sac leading to a limited amount of space between the lake and the railway; therefore the maximum amount of development accessible via this route will be the GPV Phase 6A site and the adjacent railway station. Consequently, there is unlikely to be any further background traffic growth.

3.5 BS 4142 Assessment – Fixed Plant

3.5.1 Computer Noise Modelling Calibration and Data

The modelling parameters are as above. The substation located at the north west of the site was witnessed to be distinctive against the background noise.

Table 3-6 Computer Noise Modelling Data

Plant	Source Type	Height (m)	Broadband L _w Total (dBA) for the area
Substation	Area	1.5	100.5

3.5.2 Predicted Noise Levels

The predicted noise levels from the substation are reported in Table 3.7. The noise map of the site has been depicted in Figure 3.15 – Figure 3.17.

Table 3-7 Worst case predicted noise levels

Receiver	Floor	Predicted Specific Noise Levels (dBA) - Day	Predicted Specific Noise Levels (dBA) - Night
R1	F 5	24.2	24.2
R2	F 5	26.7	26.7
R3	F 11	29.8	29.8
R4	F 11	43	43
R5	F 8	42	42
R6	F 6	40.6	40.6
R7	F 5	37.6	37.6
R8	F 5	28.2	28.2
R9	F 5	26.9	26.9
R10	F 10	41.7	41.7
R11	F 11	41.7	41.7
R12	F 1	22.9	22.9

Figure 3-15 Noise map 1.5m height (Substation)

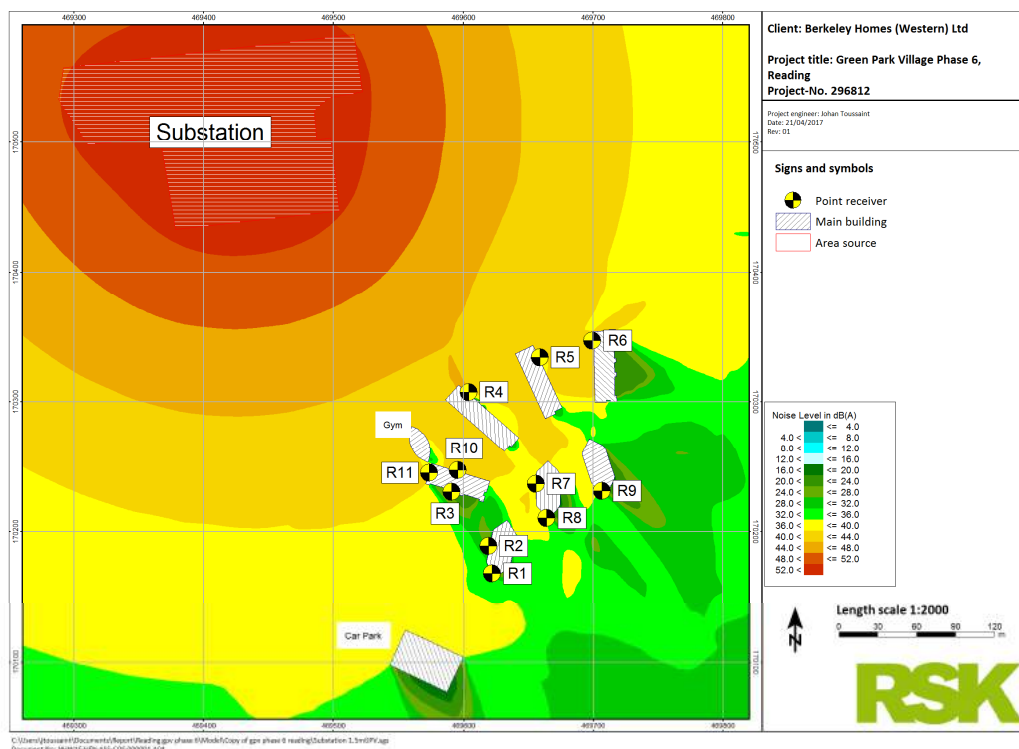


Figure 3-16 Noise map 4.5m height (Substation)

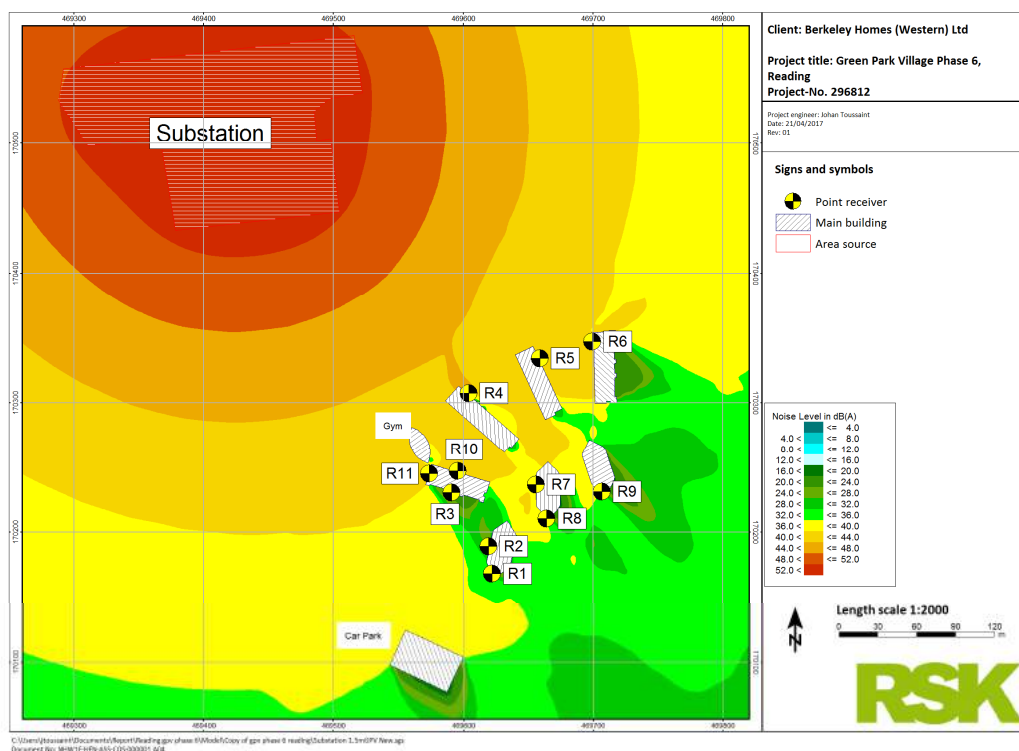
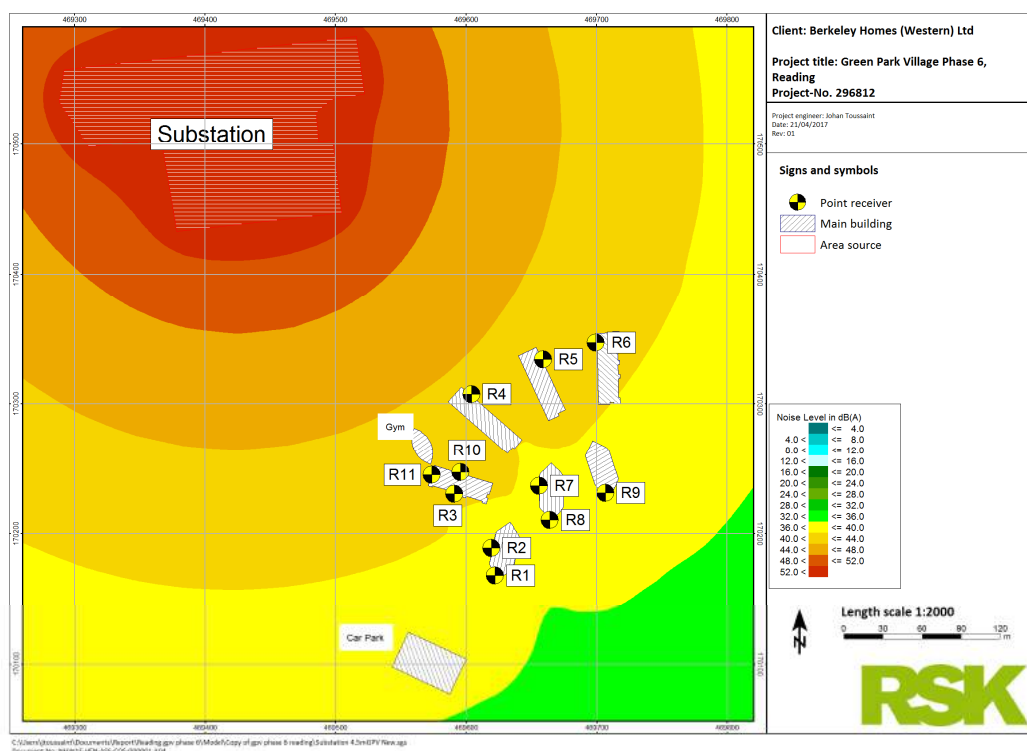


Figure 3-17 Noise map 37.5m height (Substation)



3.5.3 Assessment

Baseline Background Noise Levels

The representative baseline background noise level ($L_{A90,60min}$) measured at LT4 for residential receptors during daytime has been determined to be 45 dB(A) and 43 dB(A) during night time. The substation was not audible at this location.

Rating Levels

The noise emitted by the substation was perceived to be non impulsive and non intermittent. Although no third octave measurement were undertaken, from RSK experience most substation will present a tonality in the noise emitted as result a rating correction of +4 dB (A) has been added to the specific noise level.

BS4142:2014 Assessment

As the substation was observed to be operating during day and night, both periods will be considered for this assessment.

The results presented in Table 3.8 show that the substation would generate noise levels between 15 dB below and 4 dB above background at the sensitive receptors with R4 showing a difference of + 1 dB (day) and + 4 dB (night), and R5/10/11 +3dB (night). As a result the substation is likely to have a minor impact on the development, especially if you take into account the other noise sources such as the train line and the motorway into consideration.

Table 3-8 BS4142 Assessment

Receiver	Period	Rating Noise Level $L_{Aeq, T}$ dB	Background Noise Level, $L_{A90, T}$ dB	Difference dB
R1	Day	28	45	-17
	Night	28	43	-15
R2	Day	31	45	-14
	Night	31	43	-12
R3	Day	34	45	-11
	Night	34	43	-9
R4	Day	47	45	+2
	Night	47	43	+4
R5	Day	46	45	+1
	Night	46	43	+3
R6	Day	42	45	-3
	Night	42	43	-1
R7	Day	42	45	-3
	Night	42	43	-1
R8	Day	32	45	-13
	Night	31	43	-12
R9	Day	31	45	-14
	Night	31	43	-12
R10	Day	46	45	+1
	Night	46	43	+3
R11	Day	46	45	+1
	Night	46	43	+3

3.6 Site Suitability Assessment

The guidance document, BS 8233:2014 on sound insulation and noise reduction for buildings recommend indoor ambient noise levels for residential dwellings should not exceed 35 dB(A) during the daytime (0700 - 23:00) and 30 dB(A) during the night (23:00 – 07:00).

The suitability of the site for residential development has taken into account the measured survey levels as verified within the model as per transport and industrial noise levels.

3.6.1 Internal Noise Levels

Internal noise levels across the proposed site are dependent on their proximity to the railway at the west, the motorway at the south (M4), the substation and the sewer pipe at the north-west. Table 3.9 summarises the noise levels at various proposed facade positions across the development site and subsequently the BS 8233 assessment results.

Table 3-9 BS 8233 Assessment

Receiver	Period Day [07-23] Night [23-07]	Predicted Facade Level $L_{Aeq, T}$ dB	BS8233 Internal Ambient Noise Criteria $L_{Aeq, T}$ dB	Attenuation Required By Building Envelope $L_{Aeq, T}$ dB
R1	Daytime	61	35	26
	Night time	59	30	29
R2	Daytime	61	35	26
	Night time	60	30	30
R3	Daytime	63	35	28
	Night time	61	30	31
R4	Daytime	63	35	28
	Night time	61	30	31
R5	Daytime	60	35	25
	Night time	58	30	28
R6	Daytime	58	35	23
	Night time	56	30	26
R7	Daytime	58	35	23
	Night time	56	30	26
R8	Daytime	56	35	21
	Night time	54	30	24
R9	Daytime	56	35	21

Receiver	Period Day [07-23] Night [23-07]	Predicted Facade Level $L_{Aeq, T}$ dB	BS8233 Internal Ambient Noise Criteria $L_{Aeq, T}$ dB	Attenuation Required By Building Envelope $L_{Aeq, T}$ dB
	Night time	54	30	24
R10	Daytime	60	35	25
	Night time	58	30	28
R11	Daytime	65	35	30
	Night time	63	30	33

The façade of Block H facing west (towards the rail line) would experience the highest noise levels across the development site. Calculated noise levels would be 65 dB(A) during the daytime and 63 dB(A) during the night. The building envelope would therefore be required to achieve a minimum attenuation value of 33 dB(A).

The insertion loss performance of a partially open window is widely accepted as being between 10 - 15 dB(A). The level of attenuation necessary for the indoor areas is likely to be achieved using a specific thermal double glazing product, which as part of the total facade performance for a room, provides a transmission loss of not less than 33 dB.

Windows will need to remain closed to achieve these levels of mitigation and, as such, alternative means of ventilation to residential space (e.g. passive ventilation or ventilation from unaffected façades) will also be required. The building fabric will also need to be constructed to ensure that a 33 dB reduction is achieved. Care should be taken when choosing fixing methods for glazing to ensure the attenuation is achieved.

3.6.2 Outdoor Living Areas

The proposed development does not include provision for private outdoor living areas.

4 VIBRATION ASSESSMENT

4.1 Vibration Survey Measurement Details

A vibration survey was undertaken between 6 and 13 April 2017, in order to measure the impact of VDV (vibration dosage value) sourced from the nearest operational rail line on proposed residential receptors.

The vibration meter was stationed at long term position 1 (west end of the site) as evident in Figure 2.1 above. The main vibration source at this measurement point was the rumbling effects produced by the operational railway line. The vibration meter was stationed approximately 16 metres from the operational railway line. The measurement location is considered representative of the proposed residential development, however as the measurements are deemed to be free-field, it represents a worst case scenario.

The vibration meter comprised of the following elements-

- Digital data logger to record and store the vibration levels; and
- Tri-axial geophone sensor capable of picking up vibratory effects with a high level of precision.

During the monitoring period there were no adverse weather conditions at the monitoring location which would affect the collection of representative vibration data.

4.2 Vibration Survey Measurement Equipment

Vibration measurement was undertaken using the following equipment:

- Instantel Minimate Pro 4 Vibration data logger- Serial Number: 0040152; and
- Instantel Minimate tri-axial geophone- Serial Number: 0040152.

The transducers (geophones) conform to the requirements of British Standard BS EN ISO 8041: 2005 'Human response to vibration, measurement instrumentation'. The equipment used has a calibration history that is traceable to a certified calibration institution. The equipment chosen allows the measurements across three dimensions (longitudinal-x, transverse-y, and vertical-z).

The geophones were set so that the 'x' transducer (longitudinal) was along the railway line, 'y' transducer (transverse) perpendicular to the rail line, and the 'z' transducer (Vertical) orientated towards the sky. Each geophone was checked as being level using an inbuilt spirit level.

4.3 Vibration measurement results

4.3.1 Baseline vibration data

Vibration levels measured at long term location 1 (figure 2.3) provides an indication of baseline vibration in the area. This assists with determining where rail movements are responsible for peak values. Potential non-rail sources of vibration were identified as road traffic movements from the M4. Baseline PPV (Peak Particle Velocity) was

typically at or below the minimum recording threshold of the meter i.e. 0.25 mms^{-1} at the monitoring location. In terms of baseline VDV per logged period, this was measured at less than $0.009 \text{ mms}^{-1.75}$.

4.3.2 Vibration measurement data summary

The vibration levels measured during the monitoring exercise are presented below. The following information is displayed:

- 16 hour daytime VDV;
- 8 hour night time VDV;
- Hourly VDV (cumulative) per axis;
- Hourly PPV;
- Cosmetic Damage Criteria (as per BS7385-2);
- Human comfort impact thresholds (based on BS6472) for 16 hr and 8 hr values;
- Observational notes from RSK personnel.

A summary of results is provided in Table 4.1. This represents the PPV (across all axes) as the VDV is measured and assessed across a 16 hour day or 8 hour night period.

Table 4-1 Summary of Results

Period	Measurement Location	Period VDV / $\text{ms}^{-1.75}$ (6 to 13 April 2017)			BS 6472 Significance		
		x	y	z			
Daytime (16hr)	LT1	0.06	0.05	0.05	Low probability of adverse comment		
Night-time (8hr)	LT1	0.03	0.02	0.03	Low probability of adverse comment		
Period	Measurement Location	16 hour Average VDV / $\text{ms}^{-1.75}$ (per day)			BS7385 Cosmetic Damage Criteria / mms^{-1}	Maximum PPV / mms^{-1}	Comments
		x	y	z			
6 April 2017	LT1	0.024	0.022	0.135	15	3.85	Potential freight movement
7 April 2017	LT1	0.032	0.030	0.208	15	2.15	potential freight and passenger train movements
8 April 2017	LT1	0.036	0.033	0.22	15	2.08	Potential freight and passenger train movements
9 April 2017	LT1	0.037	0.032	0.24	15	4.63	potential freight and passenger train movements
10 April 2017	LT1	0.032	0.021	0.20	15	3.62	potential freight and passenger train movements
11 April 2017	LT1	0.021	0.020	0.27	15	3.14	potential freight and passenger train movements
12 April 2017	LT1	0.032	0.031	0.177	15	2.45	potential freight and passenger train movements
13 April 2017	LT1	0.032	0.031	0.177	15	4.67	potential freight and passenger train movements

4.4 Discussion

4.4.1 Human Comfort (Vibration Dose Value)

The potential impacts of the operational railway line on future residents occupying the proposed residential development is assessed in accordance with BS 6472 for a typical 16 hour daytime period and an 8 hour night time period.

The data presented in Table 4.1 shows that in accordance with BS 6472 assessment criteria, the vibration generated by train movements along the operational railway line are within the lowest impact category 'Low probability of adverse comment'.

It should be advised that although the assessment shows that 'adverse comment' is unlikely, the levels measured would still be perceptible to some extent by some of the future occupants. The VDV value is based on a combination of magnitude of the vibration event, the duration and the number of events. Therefore although some of the trains generate clearly noticeable vibration events (in terms of magnitude), the frequency and duration of these events is not high enough to significantly affect the VDV, hence the low impact.

4.4.2 Cosmetic Damage (Peak Particle Velocity)

The potential for the onset of cosmetic damage or early signs of structural damage is assessed in accordance with BS7385-2. This presents a recommended threshold, in terms of Peak Particle Velocity (PPV), of 15 mms^{-1} (worst case). Where vibration levels exceed this threshold the potential for cosmetic damage is increased.

The data presented in Table 4.1 shows that in accordance with BS7385-2, there is no potential for cosmetic damage, as the PPV value is under 15 mms^{-1} for all the vibration events. All measured PPV values are significantly below the 15 mms^{-1} criteria during train movements.

5 MITIGATION

The predicted facade noise levels are not considered to be significant and are typical to those that would be found in close proximity to similar road transport links. Where façades are subject to levels 48dB or less during the day and 43dB or less at night, open window ventilation will suffice without mitigation. Where facade noise levels are predicted to be higher than these levels (up to 65 dB during the daytime and 63 dB during the night-time) suitable double (or triple if required for other factors) glazing and associated trickle vents would be readily available on the market in order to achieve BS8233 internal ambient noise levels. Based on the predictions the required transmission loss from outside to inside of proposed rooms would need to be 33 dB or higher.

As the exact glazing requirements are dependent on the internal layout and facade design, it is recommended that a detailed review of specification requirements is undertaken once a fixed design has been completed. Advice on ventilation from a specialist should be sought in order that the design provides sufficient air flow in accordance with Part F of the Building Regulations.

6 SUMMARY

A noise and vibration impact assessment has been undertaken for the proposed residential development at Green Park Village Phase 6A, Reading. The assessment includes baseline noise monitoring at positions indicative of those façades most exposed to the dominant noise sources across the site.

A site suitability assessment, to the requirements of BS 8233: 2014 has been undertaken to determine internal noise levels at various locations across the development site. Noise levels are of a magnitude where a suitable double glazed system (as part of the facade of each room providing a transmission loss from outside to inside of 33 dB) would be required to meet recommended internal noise levels for residential space. The glazing would need to be accompanied by similar specification ventilation systems. In practice the noise levels are not considered to be significant and are typical to those that would be found in close proximity to similar road transport links.

Due to the scale of the development, traffic impacts are predicted to be negligible along the surrounding road network.

Occupiers of the closest sensitive receptors to the substation located at the north west of the site are not predicted to be impacted by the resulting noise when assessed against British Standard BS4142, once the proposed facade mitigation is appropriately applied.

In summary, the noise assessment indicates that the proposed development is unlikely to have a significant impact on the existing environment on completion. In addition existing noise levels are predicted to be of a magnitude suitable for residential development assuming appropriate mitigation is included through design. The proposed site is therefore considered to be suitable for the intended development.

In terms of vibration impact assessment, the BS6472 impact assessment indicates that 'adverse comment' from the future residential occupiers is unlikely, however due to the nature of operational railway; the vibration effects would be perceptible to the closest boundary receptors to a minor extent.

The BS7385 impact assessment indicates that the potential for cosmetic damage to proposed residential dwellings is unlikely as the PPV levels stay below the stipulated criteria of 15 mms^{-1} .

APPENDIX A: UNATTENDED NOISE MEASUREMENT DATA

Table A-1: Unattended Noise Monitoring Results – LT1

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
06/04/2017	11:30-12:00	67.2	94.6	46.2	58.2
06/04/2017	12:00-13:00	70.5	95.1	42.8	56.9
06/04/2017	13:00-14:00	67.1	94.6	41.7	53.2
06/04/2017	14:00-15:00	67.4	90.9	42.3	54.2
06/04/2017	15:00-16:00	69.6	98.5	42.4	51.4
06/04/2017	16:00-17:00	64.3	92.6	42.7	51.8
06/04/2017	17:00-18:00	72.9	95.9	43.0	53.7
06/04/2017	18:00-19:00	65.7	92.9	41.1	52.7
06/04/2017	19:00-20:00	66.1	92.9	40.6	52.3
06/04/2017	20:00-21:00	69	95.3	41.8	51
06/04/2017	21:00-22:00	67.5	94.2	43.4	49.7
06/04/2017	22:00-23:00	63.5	89.5	44.5	49.3
06/04/2017	23:00-00:00	57.5	86.7	41.4	45.4
07/04/2017	00:00-01:00	53.7	79	39.5	45.1
07/04/2017	01:00-02:00	68.9	95.2	38.1	53.5
07/04/2017	02:00-03:00	67.5	93.8	38.6	44.5
07/04/2017	03:00-04:00	69	93.4	37.9	46.8
07/04/2017	04:00-05:00	56	80.9	40.3	45.2
07/04/2017	05:00-06:00	64.4	91.7	45.6	52.8
07/04/2017	06:00-07:00	67.4	92.9	49	56.8
07/04/2017	07:00-08:00	63.4	91.1	48.4	54.1
07/04/2017	08:00-09:00	61.7	89	44.8	50.4

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
07/04/2017	09:00-10:00	65.6	90.3	46.9	58.5
07/04/2017	10:00-11:00	65.7	90.5	41	54.8
07/04/2017	11:00-12:00	69.6	93.7	41.3	56.6
07/04/2017	12:00-13:00	70.6	95	42.2	56.6
07/04/2017	13:00-14:00	66.5	95.4	40.2	51
07/04/2017	14:00-15:00	64	90.2	41.1	50.4
07/04/2017	15:00-16:00	65.9	90.6	41.6	49.1
07/04/2017	16:00-17:00	69.5	94.7	40	52
07/04/2017	17:00-18:00	70.2	95.5	37.5	50.4
07/04/2017	18:00-19:00	63.4	90.9	37.7	51.3
07/04/2017	19:00-20:00	66.2	92.9	40.9	51.9
07/04/2017	20:00-21:00	67.8	93.7	40.7	52.8
07/04/2017	21:00-22:00	69.4	93.4	44.5	51.8
07/04/2017	22:00-23:00	64.1	91.6	44	47.9
07/04/2017	23:00-00:00	73	101.7	41.9	50.1
08/04/2017	00:00-01:00	67	92.1	42.2	48.6
08/04/2017	01:00-02:00	69.5	93.5	41.2	50.4
08/04/2017	02:00-03:00	43	58.9	40.8	44.3
08/04/2017	03:00-04:00	70	94.4	41.4	47.9
08/04/2017	04:00-05:00	70	97.5	42.7	46.9
08/04/2017	05:00-06:00	60.8	86.9	46.6	53.1
08/04/2017	06:00-07:00	64.6	90.9	49.6	55.8
08/04/2017	07:00-08:00	62.5	90.8	49.5	53.3
08/04/2017	08:00-09:00	65.5	92.2	50	55.4
08/04/2017	09:00-10:00	61.4	88.3	47	53.2
08/04/2017	10:00-11:00	66.4	93.7	46.1	55.8
08/04/2017	11:00-12:00	72.4	96.7	45.5	59.3

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
08/04/2017	12:00-13:00	70.1	96.3	43.8	54.6
08/04/2017	13:00-14:00	66.9	94.4	43.9	56
08/04/2017	14:00-15:00	62.6	90.4	44	51.8
08/04/2017	15:00-16:00	60.3	89.2	43.4	50.7
08/04/2017	16:00-17:00	64.6	89.1	45.9	56.7
08/04/2017	17:00-18:00	63.9	89.1	47	53.5
08/04/2017	18:00-19:00	70.5	94.4	49.1	55.7
08/04/2017	19:00-20:00	61.7	87.6	50.2	55.5
08/04/2017	20:00-21:00	63.8	90.8	48.6	52.4
08/04/2017	21:00-22:00	61.8	90.2	47.4	50.2
08/04/2017	22:00-23:00	63	91.3	47.3	51.7
08/04/2017	23:00-00:00	56.8	86.9	46	49.8
09/04/2017	00:00-01:00	46.2	63.9	43.8	47.9
09/04/2017	01:00-02:00	45	53.5	42.5	46.9
09/04/2017	02:00-03:00	44.3	58.2	40.7	46.5
09/04/2017	03:00-04:00	43.6	54.2	40.1	46
09/04/2017	04:00-05:00	45.4	57.6	41.8	47.7
09/04/2017	05:00-06:00	53.2	80.2	46.3	52.6
09/04/2017	06:00-07:00	51.9	73.4	47.7	54
09/04/2017	07:00-08:00	58.4	89.1	48.2	54.4
09/04/2017	08:00-09:00	57.5	88.5	48.1	53.3
09/04/2017	09:00-10:00	61.1	90.3	45.3	52.7
09/04/2017	10:00-11:00	60.9	91	43.7	52.3
09/04/2017	11:00-12:00	64.1	92.1	47.7	53.2
09/04/2017	12:00-13:00	61	88.7	49.7	54.5
09/04/2017	13:00-14:00	62	89.8	49.5	53.4
09/04/2017	14:00-15:00	62.3	90.7	49.7	53.3

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
09/04/2017	15:00-16:00	60.7	88.7	49.7	52.6
09/04/2017	16:00-17:00	60.4	88.7	49.7	52.7
09/04/2017	17:00-18:00	60.7	88.8	50	53.5
09/04/2017	18:00-19:00	61.3	88.4	49.2	52.4
09/04/2017	19:00-20:00	60.1	88.4	47.8	51.9
09/04/2017	20:00-21:00	60	88.4	45.3	49.5
09/04/2017	21:00-22:00	59.1	88.4	44.5	47.6
09/04/2017	22:00-23:00	61.6	88.8	42	45.3
09/04/2017	23:00-00:00	57.7	88.6	39.4	43
10/04/2017	00:00-01:00	57.4	85.2	37.1	43.3
10/04/2017	01:00-02:00	39.1	50.6	36.4	40.5
10/04/2017	02:00-03:00	39.6	57	37	41.4
10/04/2017	03:00-04:00	40.5	49.9	38.2	42.3
10/04/2017	04:00-05:00	67.9	93.9	40.3	48.3
10/04/2017	05:00-06:00	58	89.1	44.8	51
10/04/2017	06:00-07:00	63.5	92.5	44.9	55.2
10/04/2017	07:00-08:00	63.8	92.7	44.3	53.4
10/04/2017	08:00-09:00	64.5	93.1	44.5	51.8
10/04/2017	09:00-10:00	68.7	93.5	45.2	55.2
10/04/2017	10:00-11:00	68	99.5	43	53.6
10/04/2017	11:00-12:00	69.4	94.8	45.6	58.6
10/04/2017	12:00-13:00	70.8	93.7	44.8	59.6
10/04/2017	13:00-14:00	68.7	97.8	46.4	57.5
10/04/2017	14:00-15:00	68.1	93.9	44.6	56.8
10/04/2017	15:00-16:00	69.1	98.5	43	50.7
10/04/2017	16:00-17:00	68.1	94	41.8	53.7
10/04/2017	17:00-18:00	63.7	93.1	42.6	50.2

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
10/04/2017	18:00-19:00	65.4	94.2	40.5	51.4
10/04/2017	19:00-20:00	66.1	93.3	40	52.1
10/04/2017	20:00-21:00	66.9	93.9	39.3	50
10/04/2017	21:00-22:00	68.7	94.3	38.9	46.6
10/04/2017	22:00-23:00	61.2	88.6	38.2	43.5
10/04/2017	23:00-00:00	57.4	88.4	37.3	41.4
11/04/2017	00:00-01:00	64.8	91.5	37.4	49.2
11/04/2017	01:00-02:00	68	92.5	37.4	47.2
11/04/2017	02:00-03:00	40.2	62.4	37.7	41.6
11/04/2017	03:00-04:00	56.6	82	38.1	44.5
11/04/2017	04:00-05:00	62.9	91	39.9	47.9
11/04/2017	05:00-06:00	70	95.3	45.7	54
11/04/2017	06:00-07:00	67.7	93	48.4	56.5
11/04/2017	07:00-08:00	64.9	93.1	46.8	52.7
11/04/2017	08:00-09:00	63.9	92.2	47.2	53.2
11/04/2017	09:00-10:00	65.9	93	51.6	61.5
11/04/2017	10:00-11:00	69.1	93.1	49.6	61.2
11/04/2017	11:00-12:00	70.5	93.8	45.5	59.7
11/04/2017	12:00-13:00	67.8	94.9	43.4	53
11/04/2017	13:00-14:00	66.9	93.8	44.6	53.4
11/04/2017	14:00-15:00	65.7	93.7	46.1	54.4
11/04/2017	15:00-16:00	70.7	97.5	48.5	55.9
11/04/2017	16:00-17:00	68.2	94.2	49.1	57.6
11/04/2017	17:00-18:00	64.6	93.6	48.3	54.7
11/04/2017	18:00-19:00	65.7	93.1	47.9	56.8
11/04/2017	19:00-20:00	67.3	94.3	46	53.9
11/04/2017	20:00-21:00	68.5	94.6	46.8	54

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
11/04/2017	21:00-22:00	67.6	96	44.7	52.8
11/04/2017	22:00-23:00	60.5	87.1	42.9	47.8
11/04/2017	23:00-00:00	60.5	88.4	42.7	49.2
12/04/2017	00:00-01:00	68.4	95.1	41.2	51.2
12/04/2017	01:00-02:00	68	96.3	40.4	46.7
12/04/2017	02:00-03:00	55.7	83.2	39.6	46.2
12/04/2017	03:00-04:00	61.6	90.3	40.5	47.9
12/04/2017	04:00-05:00	59.6	89.1	43.1	47.2
12/04/2017	05:00-06:00	62.5	91.6	48.8	55.4
12/04/2017	06:00-07:00	61.5	88.8	49.2	55.7
12/04/2017	07:00-08:00	64.3	91.6	50.4	55
12/04/2017	08:00-09:00	64.6	91.4	49.1	54.9
12/04/2017	09:00-10:00	65.6	92	50.9	58.9
12/04/2017	10:00-11:00	66.6	96.4	50.2	56.1
12/04/2017	11:00-12:00	70.9	94.8	48.6	59.9
12/04/2017	12:00-13:00	66.7	91	47.4	55.8
12/04/2017	13:00-14:00	65.1	92.4	46.3	53.5
12/04/2017	14:00-15:00	67.2	90.5	46.9	55.6
12/04/2017	15:00-16:00	69.2	97.3	46.9	54
12/04/2017	16:00-17:00	64.8	93.5	46	52.3
12/04/2017	17:00-18:00	67.4	94.4	46.2	52.3
12/04/2017	18:00-19:00	65.9	92.7	46.6	54.4
12/04/2017	19:00-20:00	66.8	93.5	45.9	56.3
12/04/2017	20:00-21:00	67.5	93	44.1	53.7
12/04/2017	21:00-22:00	68.4	93.3	42.4	49.2
12/04/2017	22:00-23:00	61.8	92.4	41.2	46.7
12/04/2017	23:00-00:00	59.9	91.7	39.2	47.3

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
13/04/2017	00:00-01:00	65.8	93.2	36.7	47.2
13/04/2017	01:00-02:00	68	93	38	47.6
13/04/2017	02:00-03:00	39.1	48.8	36.3	40.7
13/04/2017	03:00-04:00	57.7	85.6	38	43.7
13/04/2017	04:00-05:00	64.1	89.8	40.9	49.2
13/04/2017	05:00-06:00	69.6	93.2	46.7	53.7
13/04/2017	06:00-07:00	68.1	93.9	48	55.7
13/04/2017	07:00-08:00	64.3	93	46.8	52.8
13/04/2017	08:00-09:00	63.1	93.3	44.2	51.9
13/04/2017	09:00-10:00	65.8	92.9	40.9	51.6
13/04/2017	10:00-10:00	61.9	84.8	41.1	58

Table A-2: Unattended Noise Monitoring Results – LT2

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
06/04/2017	10:28-11:03	65.3	89.6	56	66.1
06/04/2017	11:03-12:03	60.8	79.2	53.4	62.4
06/04/2017	12:03-13:03	60.7	89.7	50.6	59.8
06/04/2017	13:03-14:03	54.8	81.7	47.5	55.7
06/04/2017	14:03-15:03	51	71.7	45.4	52.8
06/04/2017	15:03-16:03	53.5	74	47.6	55.9
06/04/2017	16:03-17:03	58.7	85.7	45.6	55.5
06/04/2017	17:03-18:03	50	79	45.2	51.2
06/04/2017	18:03-19:03	49.7	71.6	45	52.4
06/04/2017	19:03-20:03	49.2	65.1	44.9	52
06/04/2017	20:03-21:03	50.2	69.4	45.7	50.8
06/04/2017	21:03-22:03	49.8	68	46.3	50.3
06/04/2017	22:03-23:03	48.5	61.8	46.8	49.7
06/04/2017	23:03-00:03	47.2	57.8	45.9	48.2
07/04/2017	00:03-01:03	45.8	56.3	45	46.5
07/04/2017	01:03-02:03	48.3	66.4	44.6	49.4
07/04/2017	02:03-03:03	47.7	63.7	45	48.6
07/04/2017	03:03-04:03	47.9	66.2	44.9	47.9
07/04/2017	04:03-05:03	46.8	62.6	45.4	47.6
07/04/2017	05:03-06:03	51.7	64.1	47.5	53.4
07/04/2017	06:03-07:03	55.2	72.5	52	56.8
07/04/2017	07:03-08:03	57	87.5	49.3	55.6
07/04/2017	08:03-09:03	51.9	78	48	53.6
07/04/2017	09:03-10:03	51.4	67	47.2	53.2
07/04/2017	10:03-11:03	54	76.2	46.1	55.7

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
07/04/2017	11:03-12:03	53.8	76	46.2	55.8
07/04/2017	12:03-13:03	55.1	83.4	45.9	56.1
07/04/2017	13:03-14:03	54	86.6	45	53.3
07/04/2017	14:03-15:03	53.7	72.6	45.1	53
07/04/2017	15:03-16:03	48.9	65.5	44.9	50.3
07/04/2017	16:03-17:03	49.1	77.4	44.3	51.2
07/04/2017	17:03-18:03	48.3	64.3	44.5	50.4
07/04/2017	18:03-19:03	47.4	67.9	44.8	49.2
07/04/2017	19:03-20:03	47.7	60.6	45.1	49.9
07/04/2017	20:03-21:03	47.2	62.9	45.1	48.5
07/04/2017	21:03-22:03	47.8	59	46.5	48.8
07/04/2017	22:03-23:03	47.6	58.9	46.4	48.5
07/04/2017	23:03-00:03	49	68.9	46	49.3
08/04/2017	00:03-01:03	49.2	67.2	46.1	50.3
08/04/2017	01:03-02:03	48.2	61	46.1	49.3
08/04/2017	02:03-03:03	48	64.8	45.9	48.4
08/04/2017	03:03-04:03	47.4	58.8	46.4	48.2
08/04/2017	04:03-05:03	48.6	63.2	47	49.5
08/04/2017	05:03-06:03	51.5	61.5	48.5	53.3
08/04/2017	06:03-07:03	52.1	62.9	49.4	54.3
08/04/2017	07:03-08:03	51.7	75.2	50.1	52.8
08/04/2017	08:03-09:03	52.6	65.3	50	54.1
08/04/2017	09:03-10:03	56.8	91.8	47.8	53.9
08/04/2017	10:03-11:03	52.8	73.9	47.6	54.1
08/04/2017	11:03-12:03	51.4	81.6	46.8	53.4
08/04/2017	12:03-13:03	50.4	74.7	46.2	51
08/04/2017	13:03-14:03	50.2	69.9	46.3	51.6

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
08/04/2017	14:03-15:03	49.8	69	46.5	51.3
08/04/2017	15:03-16:03	49.3	69.5	46.5	50.4
08/04/2017	16:03-17:03	58.6	82.9	47.5	55.8
08/04/2017	17:03-18:03	51.2	73.4	48	52.6
08/04/2017	18:03-19:03	52	66.6	49.4	53.9
08/04/2017	19:03-20:03	52.7	64.6	50.5	54.2
08/04/2017	20:03-21:03	51.1	64.3	49.5	52.2
08/04/2017	21:03-22:03	50.1	56.7	48.9	51
08/04/2017	22:03-23:03	50.6	66.6	49.1	51.6
08/04/2017	23:03-00:03	49.6	62.9	48.2	50.7
09/04/2017	00:03-01:03	47.9	67.8	46.5	48.8
09/04/2017	01:03-02:03	47.4	54	46	48.6
09/04/2017	02:03-03:03	46.8	57.2	45.5	48.1
09/04/2017	03:03-04:03	46.6	54.3	45.3	47.7
09/04/2017	04:03-05:03	47.5	60.7	46	48.9
09/04/2017	05:03-06:03	51.4	63	47.8	53.1
09/04/2017	06:03-07:03	51.2	61.3	48.6	53.5
09/04/2017	07:03-08:03	51.4	62	48.8	53.7
09/04/2017	08:03-09:03	50.6	61.6	48.7	52.2
09/04/2017	09:03-10:03	49.3	62.4	47	51.2
09/04/2017	10:03-11:03	48.7	63.6	46.1	50.6
09/04/2017	11:03-12:03	50.3	62.3	48.4	51.4
09/04/2017	12:03-13:03	53.2	70.2	49.6	54.2
09/04/2017	13:03-14:03	51	61.9	49.3	52.6
09/04/2017	14:03-15:03	51.3	65.3	49.6	52.5
09/04/2017	15:03-16:03	50.9	69.1	49.6	51.7
09/04/2017	16:03-17:03	50.9	64.6	49.6	52

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
09/04/2017	17:03-18:03	51.5	66.5	49.8	52.6
09/04/2017	18:03-19:03	50.7	63.9	49.3	51.7
09/04/2017	19:03-20:03	51.3	66.4	48.7	53.2
09/04/2017	20:03-21:03	48.8	65.3	46.9	49.8
09/04/2017	21:03-22:03	47.7	65	46.5	48.3
09/04/2017	22:03-23:03	46.3	60.8	45.1	46.8
09/04/2017	23:03-00:03	45.3	59.3	44.5	45.8
10/04/2017	00:03-01:03	46.1	66	44.3	46.1
10/04/2017	01:03-02:03	44.9	61.7	44.2	45.5
10/04/2017	02:03-03:03	45.1	59	44.4	45.6
10/04/2017	03:03-04:03	45.6	73.1	44.6	46
10/04/2017	04:03-05:03	49.1	67.4	45	50.2
10/04/2017	05:03-06:03	54	67.5	46.6	57.6
10/04/2017	06:03-07:03	51.5	68.9	45.9	54.5
10/04/2017	07:03-08:03	54.3	85.7	46.2	55.4
10/04/2017	08:03-09:03	56.9	77.4	48.2	57
10/04/2017	09:03-10:03	50.7	71.7	45.6	53.4
10/04/2017	10:03-11:03	52.7	85.3	44.9	53.6
10/04/2017	11:03-12:03	65.4	93.9	47	57.7
10/04/2017	12:03-13:03	51.3	73.4	45.4	53.9
10/04/2017	13:03-14:03	52.2	71.2	46.2	55.1
10/04/2017	14:03-15:03	51.4	70.4	45.5	54.1
10/04/2017	15:03-16:03	50.8	71.3	44.6	52.2
10/04/2017	16:03-17:03	55.9	78	46.2	55.3
10/04/2017	17:03-18:03	48.8	73.7	45.1	49.8
10/04/2017	18:03-19:03	47.1	61.7	44.6	48.4
10/04/2017	19:03-20:03	48.2	64.7	44.7	50.5

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
10/04/2017	20:03-21:03	47.2	63.9	44.3	48.2
10/04/2017	21:03-22:03	48.3	72.9	44.3	47.8
10/04/2017	22:03-23:03	45.7	60.7	44.2	46.4
10/04/2017	23:03-00:03	45.3	58.2	44.2	46
11/04/2017	00:03-01:03	45.7	59.7	44	47.1
11/04/2017	01:03-02:03	46.3	63.5	43.9	47.7
11/04/2017	02:03-03:03	44.7	63.1	43.9	45.3
11/04/2017	03:03-04:03	45.3	57.6	44.2	46
11/04/2017	04:03-05:03	48.5	67.4	44.9	48.7
11/04/2017	05:03-06:03	53.4	67	47.6	54.4
11/04/2017	06:03-07:03	55.3	66.7	51.1	56.7
11/04/2017	07:03-08:03	52.8	72.6	48	55
11/04/2017	08:03-09:03	50.3	68.7	46.9	52.2
11/04/2017	09:03-10:03	52	68.9	47.1	54.2
11/04/2017	10:03-11:03	51.8	75	45.4	54
11/04/2017	11:03-12:03	51.5	66.3	45.8	53.2
11/04/2017	12:03-13:03	51.4	72	45.8	53
11/04/2017	13:03-14:03	52.5	82.5	46.4	53.9
11/04/2017	14:03-15:03	50.7	72	45.8	52.5
11/04/2017	15:03-16:03	51.4	68.6	46.8	53.1
11/04/2017	16:03-17:03	54.4	77.7	48.6	55.1
11/04/2017	17:03-18:03	50.7	70.5	47.4	52.7
11/04/2017	18:03-19:03	51.2	77.1	47.5	52.8
11/04/2017	19:03-20:03	50.4	67	47.2	52.2
11/04/2017	20:03-21:03	50.8	67.4	47.9	52.3
11/04/2017	21:03-22:03	50.1	68.1	46.6	51.3
11/04/2017	22:03-23:03	47.2	60.5	45.9	47.8

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
11/04/2017	23:03-00:03	48	72.5	45.5	48.9
12/04/2017	00:03-01:03	48.5	66.5	45	48.8
12/04/2017	01:03-02:03	48	67	44.5	48.4
12/04/2017	02:03-03:03	45.5	59.2	44.4	46.4
12/04/2017	03:03-04:03	46.5	71.1	44.6	47.2
12/04/2017	04:03-05:03	47.1	64.1	45.7	48
12/04/2017	05:03-06:03	53.8	64.5	49.4	56.1
12/04/2017	06:03-07:03	54.4	70.8	51.4	55.9
12/04/2017	07:03-08:03	53.2	71.9	49.6	55.3
12/04/2017	08:03-09:03	53.2	71	48.9	55.7
12/04/2017	09:03-10:03	52.7	72.4	48.3	55
12/04/2017	10:03-11:03	55.7	70.9	49	56.3
12/04/2017	11:03-12:03	52.8	71.8	47.1	54.8
12/04/2017	12:03-13:03	53.8	77.1	46.9	54.8
12/04/2017	13:03-14:03	50.4	70.2	46.4	52.8
12/04/2017	14:03-15:03	50.5	65	46.3	52.8
12/04/2017	15:03-16:03	51.4	70	46.2	53.7
12/04/2017	16:03-17:03	50.4	69.2	45.9	52.5
12/04/2017	17:03-18:03	50.5	75.7	47.3	52
12/04/2017	18:03-19:03	50.4	69.2	47.6	51.7
12/04/2017	19:03-20:03	50.4	70.7	46.8	51.5
12/04/2017	20:03-21:03	48.9	63.8	46	49.8
12/04/2017	21:03-22:03	47.7	62.8	45.3	48.5
12/04/2017	22:03-23:03	47.5	66.6	44.8	48
12/04/2017	23:03-00:03	45.4	58.7	44.1	46.1
13/04/2017	00:03-01:03	44.8	61	43.5	45.7
13/04/2017	01:03-02:03	47.5	65.3	44	48.6

Date	Time	$L_{Aeq,1h}$	$L_{AF,max}$	L_{A90}	L_{A10}
		dB			
13/04/2017	02:03-03:03	44.5	57.7	43.7	45.2
13/04/2017	03:03-04:03	45.9	60.9	44.2	46.9
13/04/2017	04:03-05:03	47.6	64.3	45	48.6
13/04/2017	05:03-06:03	55.3	67.1	48.6	57.6
13/04/2017	06:03-07:03	54.6	68.9	49.7	56.8
13/04/2017	07:03-08:03	52.6	72.3	47.7	55
13/04/2017	08:03-09:03	51.2	67.6	45.5	53.9
13/04/2017	09:03-09:43	50.2	72.9	44.3	52.8

Table A-3: Unattended Noise Monitoring Results – LT3

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
06/04/2017	12:52-13:02	63	82.3	42	63
06/04/2017	13:02-14:02	57.4	80.2	40.3	55.6
06/04/2017	14:02-15:02	58.4	81	40.6	55.5
06/04/2017	15:02-16:02	60.6	86.6	40.5	59.5
06/04/2017	16:02-17:02	57.2	90.5	41	57.1
06/04/2017	17:02-18:02	56.3	78.5	40.2	55.5
06/04/2017	18:02-19:02	49.3	71	39.2	51.7
06/04/2017	19:02-20:02	50	69.5	39.7	51
06/04/2017	20:02-21:02	52.3	74	40.9	49.9
06/04/2017	21:02-22:02	51.1	73.6	41.6	48.3
06/04/2017	22:02-23:02	47.2	66.8	41.9	46.4
06/04/2017	23:02-00:02	44.1	66.9	40.4	44.1
07/04/2017	00:02-01:02	41.3	60.7	38.4	42.3
07/04/2017	01:02-02:02	52.7	76	37.6	49.4
07/04/2017	02:02-03:02	51.7	75.3	37.9	45.1
07/04/2017	03:02-04:02	52.1	75.9	38.4	43.7
07/04/2017	04:02-05:02	44.1	67.6	38.1	43.3
07/04/2017	05:02-06:02	51.1	71.7	41.6	50.7
07/04/2017	06:02-07:02	54.6	73.8	45.7	57.1
07/04/2017	07:02-08:02	56.5	82.2	45.9	59
07/04/2017	08:02-09:02	58.9	82.7	44.1	57.6
07/04/2017	09:02-10:02	53.9	79	42.5	52.7
07/04/2017	10:02-11:02	54.7	78.3	41.3	53.7
07/04/2017	11:02-12:02	58.2	78	47.3	60.1
07/04/2017	12:02-13:02	55.5	76.3	39.8	56.7

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
07/04/2017	13:02-14:02	52.7	79	38.5	53.2
07/04/2017	14:02-15:02	53.7	80	40.4	53.8
07/04/2017	15:02-16:02	58.3	88.1	45	58.7
07/04/2017	16:02-17:02	53.2	71.4	37	55.1
07/04/2017	17:02-18:02	50.8	74.7	35.5	51.7
07/04/2017	18:02-19:02	46.9	68	36.4	48.6
07/04/2017	19:02-20:02	47.4	69.7	40.3	48.4
07/04/2017	20:02-21:02	48.8	70.4	39.8	47.8
07/04/2017	21:02-22:02	48.2	71.6	39.1	45
07/04/2017	22:02-23:02	46.4	69	39.1	43.7
07/04/2017	23:02-00:02	50.8	75.5	38.5	44.8
08/04/2017	00:02-01:02	50.9	71.7	38.2	46.6
08/04/2017	01:02-02:02	48.3	70.6	39.6	45
08/04/2017	02:02-03:02	43.1	68.3	39.1	43.7
08/04/2017	03:02-04:02	48.7	70.1	38.6	44.2
08/04/2017	04:02-05:02	48.4	73.3	39	43.9
08/04/2017	05:02-06:02	47.5	65	40.3	47.5
08/04/2017	06:02-07:02	51.8	69.9	42.2	55
08/04/2017	07:02-08:02	52.9	77.9	43.6	55
08/04/2017	08:02-09:02	50.3	68.2	43.7	54.1
08/04/2017	09:02-10:02	47.2	68.5	40.7	49.6
08/04/2017	10:02-11:02	52	76	40.1	52.9
08/04/2017	11:02-12:02	50.7	75	39.7	53.2
08/04/2017	12:02-13:02	51.2	77	38.2	51.3
08/04/2017	13:02-14:02	48.6	69.5	38.4	51.1
08/04/2017	14:02-15:02	48.3	68.6	38	50.9
08/04/2017	15:02-16:02	48.4	70.5	38.2	50.1

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
08/04/2017	16:02-17:02	59.2	83.9	40.2	55.4
08/04/2017	17:02-18:02	49.9	69.6	39.8	50.6
08/04/2017	18:02-19:02	51.4	78.6	41.4	51.4
08/04/2017	19:02-20:02	50.6	71.9	42.1	53.7
08/04/2017	20:02-21:02	45.3	66.8	40	45.6
08/04/2017	21:02-22:02	43.8	65.5	39.2	43.5
08/04/2017	22:02-23:02	44.8	70.1	38.9	43.2
08/04/2017	23:02-00:02	42.6	67.5	37.8	41.8
09/04/2017	00:02-01:02	39.2	56	36.3	40.2
09/04/2017	01:02-02:02	37.7	53.1	35.8	38.8
09/04/2017	02:02-03:02	38.9	58.4	37.4	39.7
09/04/2017	03:02-04:02	38.5	52.4	37.1	39.3
09/04/2017	04:02-05:02	38.5	54.1	37	39.4
09/04/2017	05:02-06:02	50.5	72.9	40.4	48.7
09/04/2017	06:02-07:02	50.6	77.5	41.6	53.7
09/04/2017	07:02-08:02	48.2	64.5	40.5	51.2
09/04/2017	08:02-09:02	47.1	72.4	39.7	49.4
09/04/2017	09:02-10:02	48.4	70.8	38.8	51.1
09/04/2017	10:02-11:02	47.4	66.1	37.1	49.4
09/04/2017	11:02-12:02	46.8	64.4	40.7	50.1
09/04/2017	12:02-13:02	51.1	72	43.1	51.4
09/04/2017	13:02-14:02	47.1	63.3	42.7	49.6
09/04/2017	14:02-15:02	48	67.9	43.5	50.1
09/04/2017	15:02-16:02	46.8	63.5	43.6	48.3
09/04/2017	16:02-17:02	47	67.9	43.6	48.4
09/04/2017	17:02-18:02	47.7	67.9	43.5	49.6
09/04/2017	18:02-19:02	45.8	63.7	42.9	46.6

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
09/04/2017	19:02-20:02	46.6	65.9	43.1	47.3
09/04/2017	20:02-21:02	46.4	69.6	41.8	46.4
09/04/2017	21:02-22:02	44.6	65.2	40.9	44.5
09/04/2017	22:02-23:02	43.9	65	39.1	43.1
09/04/2017	23:02-00:02	43	68	37.8	42.4
10/04/2017	00:02-01:02	43.9	64.8	36.8	41.6
10/04/2017	01:02-02:02	39	59.7	35.8	39.7
10/04/2017	02:02-03:02	37.8	48.7	36.2	39.1
10/04/2017	03:02-04:02	38.6	52.1	36.9	39.8
10/04/2017	04:02-05:02	56.5	76.7	38.5	51.4
10/04/2017	05:02-06:02	55.3	77.6	41.9	52.6
10/04/2017	06:02-07:02	55.3	84	42.8	57.7
10/04/2017	07:02-08:02	59	80.5	44.6	60.4
10/04/2017	08:02-09:02	59.2	80.8	46.1	59.2
10/04/2017	09:02-10:02	56.1	75.4	45	57.2
10/04/2017	10:02-11:02	55.8	79.8	43.8	57.2
10/04/2017	11:02-12:02	58	79.4	49.7	59.3
10/04/2017	12:02-13:02	59.3	78.5	48.4	59.9
10/04/2017	13:02-14:02	59.6	79.6	44.7	60.3
10/04/2017	14:02-15:02	57.6	78.8	43.2	57.8
10/04/2017	15:02-16:02	56.4	78.9	42.6	56.2
10/04/2017	16:02-17:02	55.5	76.8	41.8	56.8
10/04/2017	17:02-18:02	53.2	76.6	40.9	54.2
10/04/2017	18:02-19:02	49.4	71.4	39.9	50.7
10/04/2017	19:02-20:02	49	69.9	40.2	50.3
10/04/2017	20:02-21:02	50.5	73.8	40.1	48.8
10/04/2017	21:02-22:02	51	71.4	40.3	46.3

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
10/04/2017	22:02-23:02	45.7	68.2	39	43.8
10/04/2017	23:02-00:02	43.1	65.6	38.4	42.4
11/04/2017	00:02-01:02	48	71.4	37.7	46.6
11/04/2017	01:02-02:02	47.9	70.2	37.1	45.6
11/04/2017	02:02-03:02	45.2	78.4	36.9	40.7
11/04/2017	03:02-04:02	42.7	64.3	37.8	42.3
11/04/2017	04:02-05:02	46.8	68.4	39.5	46
11/04/2017	05:02-06:02	56	76.8	43.3	55.3
11/04/2017	06:02-07:02	56.4	85.4	45.8	57.9
11/04/2017	07:02-08:02	56.1	71.8	46.3	59.8
11/04/2017	08:02-09:02	54.7	76	44.8	56.3
11/04/2017	09:02-10:02	55	74.7	45.3	56.1
11/04/2017	10:02-11:02	54.5	74.2	43.5	56.8
11/04/2017	11:02-12:02	54.7	79	42.7	53.9
11/04/2017	12:02-13:02	52.7	79.7	41.6	52.9
11/04/2017	13:02-14:02	54	77.6	41.1	52.8
11/04/2017	14:02-15:02	51.5	73.2	40.8	52.4
11/04/2017	15:02-16:02	54.9	79.4	42.5	55.8
11/04/2017	16:02-17:02	55.3	76.6	43	56.7
11/04/2017	17:02-18:02	51.7	72.3	41.9	54.7
11/04/2017	18:02-19:02	51.4	75.6	42	53.1
11/04/2017	19:02-20:02	49.4	72.8	41.5	49.8
11/04/2017	20:02-21:02	49.1	71.7	41.9	49
11/04/2017	21:02-22:02	48.7	71.7	40.4	47.2
11/04/2017	22:02-23:02	43	61.8	39.5	43.3
11/04/2017	23:02-00:02	45	70.5	39	44.4
12/04/2017	00:02-01:02	46.8	70.8	37.5	44.6

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
12/04/2017	01:02-02:02	47.3	74.6	36.5	42.9
12/04/2017	02:02-03:02	39.1	56.4	36.3	40.6
12/04/2017	03:02-04:02	44.7	69.4	36.9	42
12/04/2017	04:02-05:02	43.4	66.1	39.1	43.4
12/04/2017	05:02-06:02	57.8	77	43.7	52.7
12/04/2017	06:02-07:02	55.9	81.2	44.5	55.5
12/04/2017	07:02-08:02	57.9	80.4	45.8	59.9
12/04/2017	08:02-09:02	56.2	82	44.8	56.6
12/04/2017	09:02-10:02	52.7	75.4	43.7	52.9
12/04/2017	10:02-11:02	53.9	74.9	43	54.3
12/04/2017	11:02-12:02	54.4	77.1	42.5	55.2
12/04/2017	12:02-13:02	54.1	79.1	42.5	53.5
12/04/2017	13:02-14:02	52.9	76.2	42	52.9
12/04/2017	14:02-15:02	53.1	74.9	42.4	53.8
12/04/2017	15:02-16:02	55.4	80.4	42.2	56.1
12/04/2017	16:02-17:02	53.8	76	42.2	55.1
12/04/2017	17:02-18:02	52.6	82.8	42.4	54.4
12/04/2017	18:02-19:02	50.5	74.2	42.9	51.6
12/04/2017	19:02-20:02	51.2	71.4	43	51.9
12/04/2017	20:02-21:02	51	72.9	41.3	49.3
12/04/2017	21:02-22:02	50.6	73.7	39.1	46.6
12/04/2017	22:02-23:02	48.2	72.3	38.7	45.6
12/04/2017	23:02-00:02	44	65.4	37.7	42.9
13/04/2017	00:02-01:02	45	71.4	35.1	42.3
13/04/2017	01:02-02:02	50.4	74.2	35.5	45.2
13/04/2017	02:02-03:02	37.1	52.2	34.7	38.2
13/04/2017	03:02-04:02	42.5	66.6	35.8	39.8

Date	Time	$L_{Aeq,1h}$	$L_{AF,max}$	L_{A90}	L_{A10}
		dB			
13/04/2017	04:02-05:02	48.2	71.7	38.2	44.3
13/04/2017	05:02-06:02	52.9	73.8	42.7	50.5
13/04/2017	06:02-07:02	55.2	80.4	43.9	55.3
13/04/2017	07:02-08:02	57.3	78	45.2	59.3
13/04/2017	08:02-09:02	54.8	78.5	41.9	55.3
13/04/2017	09:02-10:02	52.6	74.2	41.6	52.2
13/04/2017	10:02-10:27	56.8	89.5	42.4	53.8

Table A-4: Unattended Noise Monitoring Results – LT4

Date	Time	$L_{Aeq,1h}$	$L_{AF,max}$	L_{A90}	L_{A10}
		dB			
06/04/2017	09:51-10:01	60.6	84.5	46.2	62.6
06/04/2017	10:01-11:01	52	73.4	44.1	54.3
06/04/2017	11:01-12:01	54.5	77.5	44.4	57.4
06/04/2017	12:01-13:01	55.1	75	44.3	57.8
06/04/2017	13:01-14:01	50.9	69.5	42.8	53
06/04/2017	14:01-15:01	53.2	74.3	42.1	54.8
06/04/2017	15:01-16:01	54.3	75.2	42.6	56.5
06/04/2017	16:01-17:01	55.4	78.4	45.4	56.8
06/04/2017	17:01-18:01	54	81.4	44.4	52.7
06/04/2017	18:01-19:01	49.9	67.6	40.4	52.1
06/04/2017	19:01-20:01	50.3	69.3	41.7	51.2
06/04/2017	20:01-21:01	53.5	74.3	43.9	50.8
06/04/2017	21:01-22:01	51.5	72.5	44.6	50
06/04/2017	22:01-23:01	48.7	66.9	44.1	48.4
06/04/2017	23:01-00:01	44.8	62.4	42.5	45.1
07/04/2017	00:01-01:01	44.3	62.1	41.8	45
07/04/2017	01:01-02:01	52.3	70.6	42.2	51.1
07/04/2017	02:01-03:01	51.2	70.9	41.9	46.9
07/04/2017	03:01-04:01	51.8	74	40.4	45.3
07/04/2017	04:01-05:01	46.6	66.7	42.4	47
07/04/2017	05:01-06:01	49	65.8	45.5	49.9
07/04/2017	06:01-07:01	53.5	72.4	48.9	54.7
07/04/2017	07:01-08:01	56.2	79.3	52.3	57.4
07/04/2017	08:01-09:01	52.8	73.9	46.3	54.8
07/04/2017	09:01-10:01	52.4	72.8	43.1	53.9

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
07/04/2017	10:01-11:01	55.1	76.8	42	55.9
07/04/2017	11:01-12:01	55.6	77.7	43.7	56.7
07/04/2017	12:01-13:01	55.8	74.1	44	57.5
07/04/2017	13:01-14:01	53.2	75.6	43.5	53.2
07/04/2017	14:01-15:01	51.8	78.6	42.6	51.1
07/04/2017	15:01-16:01	50.1	72.7	42.2	50.7
07/04/2017	16:01-17:01	50.7	75.7	40.2	50.5
07/04/2017	17:01-18:01	50.8	72.2	39.5	50
07/04/2017	18:01-19:01	48.4	64.1	41.8	50.7
07/04/2017	19:01-20:01	50.6	73.6	44.9	51
07/04/2017	20:01-21:01	50.7	71.2	42.3	49.8
07/04/2017	21:01-22:01	51.1	71.3	44.7	49.1
07/04/2017	22:01-23:01	48.6	66.8	44.7	47.8
07/04/2017	23:01-00:01	50.6	73.7	43.9	48.5
08/04/2017	00:01-01:01	51.4	70.5	43.9	49.4
08/04/2017	01:01-02:01	50.4	69.5	42.8	47.5
08/04/2017	02:01-03:01	43.9	53.8	42.4	45.1
08/04/2017	03:01-04:01	51.7	73.8	43.6	47.9
08/04/2017	04:01-05:01	51.3	72.4	44.4	48
08/04/2017	05:01-06:01	49.4	62.4	45.8	51.3
08/04/2017	06:01-07:01	52.5	66.5	48.5	54.9
08/04/2017	07:01-08:01	51.5	70.9	49	53.2
08/04/2017	08:01-09:01	55.4	78.1	50.1	56.1
08/04/2017	09:01-10:01	51.8	76	47.4	53.5
08/04/2017	10:01-11:01	53.4	74	46.3	54.6
08/04/2017	11:01-12:01	55.8	77.7	45.6	56.4
08/04/2017	12:01-13:01	50.9	71.3	45.1	52

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
08/04/2017	13:01-14:01	50.9	74.5	44.9	52.4
08/04/2017	14:01-15:01	51.9	77.8	44.5	52.1
08/04/2017	15:01-16:01	49	67.5	44.5	50.3
08/04/2017	16:01-17:01	59.4	82.9	46.2	56.3
08/04/2017	17:01-18:01	50.5	67.3	46.8	51.3
08/04/2017	18:01-19:01	52.8	71.2	47.8	53.3
08/04/2017	19:01-20:01	51.5	64.1	49.1	53
08/04/2017	20:01-21:01	50.7	71.5	48.2	51.2
08/04/2017	21:01-22:01	50.1	67.1	47.9	50.4
08/04/2017	22:01-23:01	50.9	67.1	48.4	51.5
08/04/2017	23:01-00:01	49.4	66.5	47.1	50.3
09/04/2017	00:01-01:01	47	64	45.2	48.1
09/04/2017	01:01-02:01	46.3	52.8	44.4	47.6
09/04/2017	02:01-03:01	45.6	53.5	43.6	47.1
09/04/2017	03:01-04:01	44.4	54.2	41.9	45.9
09/04/2017	04:01-05:01	45.8	55.8	43.6	47.5
09/04/2017	05:01-06:01	50	66.1	46.3	51.5
09/04/2017	06:01-07:01	50.4	67.2	47.3	52.8
09/04/2017	07:01-08:01	50.3	66.7	47.6	52.1
09/04/2017	08:01-09:01	49.5	66.8	47.7	50.8
09/04/2017	09:01-10:01	49	69	45.5	50.4
09/04/2017	10:01-11:01	48.7	74.1	44.7	50.1
09/04/2017	11:01-12:01	50.7	74.7	47.5	51.3
09/04/2017	12:01-13:01	53.3	73.1	48.5	54.3
09/04/2017	13:01-14:01	50.7	63.3	48.3	52.2
09/04/2017	14:01-15:01	50.9	66	48.6	52.2
09/04/2017	15:01-16:01	50.2	64.3	48.4	51.2

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
09/04/2017	16:01-17:01	50.3	64.8	48.2	51.5
09/04/2017	17:01-18:01	50.8	66.9	48.5	52.2
09/04/2017	18:01-19:01	50.7	72.1	47.9	51.6
09/04/2017	19:01-20:01	49.4	67.4	46.9	49.8
09/04/2017	20:01-21:01	47	65.3	44	46.9
09/04/2017	21:01-22:01	46.3	65.1	43.7	45.9
09/04/2017	22:01-23:01	45.9	65.3	42.3	44.7
09/04/2017	23:01-00:01	43.6	63.9	40.6	43.1
10/04/2017	00:01-01:01	45.1	68.2	38.2	42.4
10/04/2017	01:01-02:01	41.5	50	39.4	41.7
10/04/2017	02:01-03:01	41.9	47.4	40.2	42.5
10/04/2017	03:01-04:01	41.8	47.7	40.1	42.4
10/04/2017	04:01-05:01	49.6	70	40.5	47.3
10/04/2017	05:01-06:01	47.5	66.3	43.3	49.4
10/04/2017	06:01-07:01	49.9	69.8	43.5	51.9
10/04/2017	07:01-08:01	53.8	76.2	46.2	54.4
10/04/2017	08:01-09:01	53.9	75.7	44.1	55.4
10/04/2017	09:01-10:01	54.2	75.4	46.6	55
10/04/2017	10:01-11:01	53.5	78.4	43.5	55
10/04/2017	11:01-12:01	53.8	81.9	42.9	54.4
10/04/2017	12:01-13:01	55.2	80.8	43.4	56.8
10/04/2017	13:01-14:01	55.1	79.4	44.2	55.7
10/04/2017	14:01-15:01	53.6	76.6	43.2	55.4
10/04/2017	15:01-16:01	54	79	42.2	52.5
10/04/2017	16:01-17:01	53.8	83.7	41.4	53.9
10/04/2017	17:01-18:01	50.4	74	42.6	50.5
10/04/2017	18:01-19:01	50.3	75.3	41.7	49.9

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
10/04/2017	19:01-20:01	50.7	71.6	41.9	51.7
10/04/2017	20:01-21:01	49.8	70.2	40.7	48.1
10/04/2017	21:01-22:01	51.6	73.2	42.2	48
10/04/2017	22:01-23:01	47.1	67	41.8	46
10/04/2017	23:01-00:01	43.2	65.3	39.4	42.3
11/04/2017	00:01-01:01	47.6	67.9	38.9	46.5
11/04/2017	01:01-02:01	49.4	69.8	40.5	47.3
11/04/2017	02:01-03:01	41.8	52.6	40.5	42
11/04/2017	03:01-04:01	42.9	60.6	38.6	42.8
11/04/2017	04:01-05:01	46.9	68.2	40.5	46.3
11/04/2017	05:01-06:01	54.2	77.1	44.4	52.6
11/04/2017	06:01-07:01	52.9	74.5	46.7	54.4
11/04/2017	07:01-08:01	54.4	76	46.4	55.1
11/04/2017	08:01-09:01	51.3	79.4	43.6	52
11/04/2017	09:01-10:01	52.1	73	43.8	53
11/04/2017	10:01-11:01	54	75.9	43.4	55.2
11/04/2017	11:01-12:01	54	76.4	42.4	53.2
11/04/2017	12:01-13:01	53.8	75.5	42.4	55.8
11/04/2017	13:01-14:01	52.1	74.5	43.9	52.7
11/04/2017	14:01-15:01	50.9	71.7	44.2	52
11/04/2017	15:01-16:01	52.1	74.1	44.6	52
11/04/2017	16:01-17:01	53.7	80.2	46.1	54.8
11/04/2017	17:01-18:01	50.4	77.6	45.8	51.8
11/04/2017	18:01-19:01	51.4	79	45.2	52.3
11/04/2017	19:01-20:01	51.2	72.8	44.5	51.4
11/04/2017	20:01-21:01	51.5	70.5	45.9	50.8
11/04/2017	21:01-22:01	50.9	71	44.4	49.7

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
11/04/2017	22:01-23:01	46.2	64.6	42.7	46
11/04/2017	23:01-00:01	45.9	64.5	42	46.3
12/04/2017	00:01-01:01	50.3	73.9	41.8	47.8
12/04/2017	01:01-02:01	49.9	71.8	41.3	46.4
12/04/2017	02:01-03:01	41.7	48.6	39.6	43
12/04/2017	03:01-04:01	46.3	67.3	40.3	45.4
12/04/2017	04:01-05:01	46.2	66	43.5	46.4
12/04/2017	05:01-06:01	51	69.8	46.8	52.2
12/04/2017	06:01-07:01	50.8	68.2	47.4	52.9
12/04/2017	07:01-08:01	54	77.7	48.9	55.1
12/04/2017	08:01-09:01	53.2	70.8	47.2	55.4
12/04/2017	09:01-10:01	52	74	46.2	53.6
12/04/2017	10:01-11:01	52.1	71.4	44.8	53.8
12/04/2017	11:01-12:01	54.7	73.2	45.3	55.9
12/04/2017	12:01-13:01	53.8	77.1	45.3	54.5
12/04/2017	13:01-14:01	51.4	73.1	44.4	51.7
12/04/2017	14:01-15:01	51.8	72.7	44.1	53
12/04/2017	15:01-16:01	53.7	80.9	44.6	54.6
12/04/2017	16:01-17:01	51.8	72.4	44.7	53
12/04/2017	17:01-18:01	49.8	70	44.8	50.5
12/04/2017	18:01-19:01	50.6	72	44.9	51.1
12/04/2017	19:01-20:01	51.7	72.2	44.7	52.3
12/04/2017	20:01-21:01	51	71.2	43.6	50
12/04/2017	21:01-22:01	50.4	71.3	42.7	49
12/04/2017	22:01-23:01	47.1	66.5	40.5	45.7
12/04/2017	23:01-00:01	45.2	65.9	40.5	44.2
13/04/2017	00:01-01:01	46.8	69.7	40.2	45.1

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
13/04/2017	01:01-02:01	49.9	71.6	39	46.8
13/04/2017	02:01-03:01	40.1	46.8	37.9	40.6
13/04/2017	03:01-04:01	44.6	64.9	41.4	43.7
13/04/2017	04:01-05:01	49	71.4	42.4	47.3
13/04/2017	05:01-06:01	56.1	83.2	44.7	54.2
13/04/2017	06:01-07:01	52.8	71.1	46.5	54.4
13/04/2017	07:01-08:01	53.6	78.1	47.6	55.4
13/04/2017	08:01-09:01	51.4	77.7	43.2	52.5
13/04/2017	09:01-10:01	49.8	70.1	40.2	51.5
13/04/2017	10:01-10:16	53.7	82.2	43.2	51.2

Table A-5: Unattended Noise Monitoring Results – LT5

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
06/04/2017	19:34-20:04	55.1	81.4	45.6	54.4
06/04/2017	20:04-21:04	50.4	72.2	45.4	50.3
06/04/2017	21:04-22:04	48.3	68.7	45.1	48.4
06/04/2017	22:04-23:04	49.2	71.3	45.8	49.4
06/04/2017	23:04-00:04	47	69.8	43.2	48.3
07/04/2017	00:04-01:04	45.6	69.3	40.6	46.9
07/04/2017	01:04-02:04	43.9	64.9	34.8	45.2
07/04/2017	02:04-03:04	41.8	58.9	34.6	42.5
07/04/2017	03:04-04:04	42.4	63.8	37.2	43.6
07/04/2017	04:04-05:04	43.7	65.8	40.6	45
07/04/2017	05:04-06:04	52.3	70.6	46.2	51.9
07/04/2017	06:04-07:04	54.7	77	50.7	55.3
07/04/2017	07:04-08:04	55.6	79	49.5	57.6
07/04/2017	08:04-09:04	54	75.6	44.4	55.7
07/04/2017	09:04-10:04	53.4	77	42.7	53.9
07/04/2017	10:04-11:04	52.9	74.3	42.6	53.5
07/04/2017	11:04-12:04	52.1	73.2	42.7	53.3
07/04/2017	12:04-13:04	55.8	84.8	44.7	54.9
07/04/2017	13:04-14:04	51.9	72.1	44.2	52.4
07/04/2017	14:04-15:04	51.5	69.6	45.5	52.3
07/04/2017	15:04-16:04	54.3	79.3	45.4	55.7
07/04/2017	16:04-17:04	54.9	78.6	43	56.9
07/04/2017	17:04-18:04	53.8	77.5	40.2	54.9
07/04/2017	18:04-19:04	51.1	71.5	38.5	50.8
07/04/2017	19:04-20:04	49.6	70.5	40.7	50.5

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
07/04/2017	20:04-21:04	48.6	73.3	41.6	49.1
07/04/2017	21:04-22:04	48.6	67.6	44.1	49.8
07/04/2017	22:04-23:04	46.6	71.6	42.5	46.2
07/04/2017	23:04-00:04	46.2	66.6	40.7	47.7
08/04/2017	00:04-01:04	46.6	68.8	39.6	47.2
08/04/2017	01:04-02:04	44.3	67.9	39.7	45.2
08/04/2017	02:04-03:04	45.6	75.2	39.2	44
08/04/2017	03:04-04:04	42.3	64.4	39.3	42.9
08/04/2017	04:04-05:04	44.8	65.8	41.6	45.6
08/04/2017	05:04-06:04	52.2	71.6	44.8	51.2
08/04/2017	06:04-07:04	57.2	74	45.9	55.9
08/04/2017	07:04-08:04	50.3	70.4	45.9	50.7
08/04/2017	08:04-09:04	52.1	75	48	52.6
08/04/2017	09:04-10:04	52.1	77	46.3	51.5
08/04/2017	10:04-11:04	54	76.4	48.1	54.9
08/04/2017	11:04-12:04	52.8	76	46.2	54.1
08/04/2017	12:04-13:04	52.8	73	44.8	53.4
08/04/2017	13:04-14:04	52	71.1	43.6	53.5
08/04/2017	14:04-15:04	51.8	74.5	45	54
08/04/2017	15:04-16:04	52.4	70.8	44.8	53.9
08/04/2017	16:04-17:04	63.6	89.2	46.5	58.4
08/04/2017	17:04-18:04	52.3	72.7	47	53.3
08/04/2017	18:04-19:04	53.1	71.1	49.8	53.9
08/04/2017	19:04-20:04	54.1	79.4	50.8	54.1
08/04/2017	20:04-21:04	51.2	68	48.8	52.1
08/04/2017	21:04-22:04	49.5	67	46.7	50
08/04/2017	22:04-23:04	48.5	62.8	46.4	49.9

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
08/04/2017	23:04-00:04	48.5	69.1	45.3	49.2
09/04/2017	00:04-01:04	45.6	68.1	41.6	46.6
09/04/2017	01:04-02:04	44.2	63.8	40.4	45.6
09/04/2017	02:04-03:04	42.3	54.5	38.6	44.6
09/04/2017	03:04-04:04	42.6	64.5	38.2	44.4
09/04/2017	04:04-05:04	43	56.8	39.1	45.4
09/04/2017	05:04-06:04	50.2	66.7	43.6	51.4
09/04/2017	06:04-07:04	49.6	69.4	45.8	51.2
09/04/2017	07:04-08:04	50.7	69.8	45.8	51.9
09/04/2017	08:04-09:04	50.1	78	45.5	51
09/04/2017	09:04-10:04	53.1	72.8	44.5	53.7
09/04/2017	10:04-11:04	52	74.1	44.4	53.9
09/04/2017	11:04-12:04	54	73.9	48.2	56.1
09/04/2017	12:04-13:04	55.3	74.2	51.4	56.8
09/04/2017	13:04-14:04	54.3	71.2	51.1	55.5
09/04/2017	14:04-15:04	54.4	72.2	51.7	55.2
09/04/2017	15:04-16:04	53.6	68.4	51.8	54.4
09/04/2017	16:04-17:04	54	69.5	51.7	54.8
09/04/2017	17:04-18:04	54	71.1	51.8	55
09/04/2017	18:04-19:04	53.1	69.3	50.8	54
09/04/2017	19:04-20:04	52.7	68.9	50.5	53.7
09/04/2017	20:04-21:04	51.5	70.3	49	52.4
09/04/2017	21:04-22:04	50.1	71.2	47.6	50.7
09/04/2017	22:04-23:04	47.3	65.4	45	48.5
09/04/2017	23:04-00:04	46	67.9	42.4	46.6
10/04/2017	00:04-01:04	44.5	67.3	39.6	44.7
10/04/2017	01:04-02:04	42.3	64.2	38.2	43.8

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
10/04/2017	02:04-03:04	42.9	64	39.1	44.8
10/04/2017	03:04-04:04	44.1	55	40.9	46.2
10/04/2017	04:04-05:04	47	58.4	44	48.7
10/04/2017	05:04-06:04	52.7	67.8	48.2	53.7
10/04/2017	06:04-07:04	53.4	72.7	48.9	54.4
10/04/2017	07:04-08:04	55.1	73.4	47.4	57.9
10/04/2017	08:04-09:04	54.8	76.2	47.2	56.3
10/04/2017	09:04-10:04	52.6	72.9	46.3	53.6
10/04/2017	10:04-11:04	52.2	73	45.5	53.3
10/04/2017	11:04-12:04	55.4	87.8	46	54.4
10/04/2017	12:04-13:04	53.4	79.2	46.6	52.8
10/04/2017	13:04-14:04	51.8	71	46.3	53
10/04/2017	14:04-15:04	52.9	76	46.9	52.9
10/04/2017	15:04-16:04	54.1	77	46.6	54.7
10/04/2017	16:04-17:04	54.8	70.7	44.4	57
10/04/2017	17:04-18:04	56.3	84.3	47.1	57.8
10/04/2017	18:04-19:04	53.6	75.3	44.3	54.6
10/04/2017	19:04-20:04	49.3	69.7	41.1	49.5
10/04/2017	20:04-21:04	48.5	70.1	40.4	49.5
10/04/2017	21:04-22:04	41.8	62.1	38.7	42.8
10/04/2017	22:04-23:04	43	67.6	38.7	43.3
10/04/2017	23:04-00:04	43.7	61.2	40	45.2
11/04/2017	00:04-01:04	43.6	64.4	39.8	45.1
11/04/2017	01:04-02:04	44	68.3	39.8	45.5
11/04/2017	02:04-03:04	43.7	65.8	40.2	45.4
11/04/2017	03:04-04:04	43.7	58.9	40.7	45.6
11/04/2017	04:04-05:04	45.6	63.4	43.3	46.9

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
11/04/2017	05:04-06:04	53.9	70.2	49.4	54.4
11/04/2017	06:04-07:04	55.6	72.2	52.8	56.7
11/04/2017	07:04-08:04	55.6	71.4	50.3	58
11/04/2017	08:04-09:04	54.4	72.2	47.8	56.6
11/04/2017	09:04-10:04	53.9	71.7	47.4	55.4
11/04/2017	10:04-11:04	52.1	71.9	46.7	53.8
11/04/2017	11:04-12:04	52.5	71.2	48.2	53.6
11/04/2017	12:04-13:04	52.3	68.6	48.1	53.9
11/04/2017	13:04-14:04	54	85	48.1	52.8
11/04/2017	14:04-15:04	55.5	85.5	49.3	54
11/04/2017	15:04-16:04	54.5	71.7	50.2	55.9
11/04/2017	16:04-17:04	56.3	76.3	49.9	58.9
11/04/2017	17:04-18:04	56.4	76.7	49.4	58.6
11/04/2017	18:04-19:04	54	70.7	48.7	55.1
11/04/2017	19:04-20:04	52.7	69.2	48.9	53.4
11/04/2017	20:04-21:04	52.9	70.5	49.8	53.8
11/04/2017	21:04-22:04	50.4	79.7	47.2	50.7
11/04/2017	22:04-23:04	48.6	73	45.9	49.4
11/04/2017	23:04-00:04	49.8	79.8	45.4	49.4
12/04/2017	00:04-01:04	45.9	57.3	43.4	47.6
12/04/2017	01:04-02:04	45.1	54.8	42.5	46.9
12/04/2017	02:04-03:04	45	59.7	42.2	46.8
12/04/2017	03:04-04:04	46.9	69.1	43.5	48.4
12/04/2017	04:04-05:04	48.8	63.4	46.3	50.2
12/04/2017	05:04-06:04	54.2	73.2	51	55.7
12/04/2017	06:04-07:04	55.1	70.7	52.1	56.4
12/04/2017	07:04-08:04	56.8	73.1	53.2	58.5

Date	Time	L _{Aeq,1h}	L _{AF,max}	L _{A90}	L _{A10}
		dB			
12/04/2017	08:04-09:04	56.9	77.2	52	59
12/04/2017	09:04-10:04	55.1	75.9	51.4	56.2
12/04/2017	10:04-11:04	53.8	70	50	55.1
12/04/2017	11:04-12:04	53.9	68.4	51.3	55.2
12/04/2017	12:04-13:04	55.3	76.9	51	56.8
12/04/2017	13:04-14:04	53.8	76.5	49.7	55.3
12/04/2017	14:04-15:04	57.9	90.2	50.4	55.6
12/04/2017	15:04-16:04	56.9	88.6	50.5	56.7
12/04/2017	16:04-17:04	55	72.6	49.6	56.8
12/04/2017	17:04-18:04	56.7	76.4	49	59.3
12/04/2017	18:04-19:04	54.8	75.6	49.8	55.7
12/04/2017	19:04-20:04	52.9	72.1	49.4	53.6
12/04/2017	20:04-21:04	50.9	71.7	47.8	51.6
12/04/2017	21:04-22:04	48.2	73	45.3	48.8
12/04/2017	22:04-23:04	49	71.3	44.2	49.2
12/04/2017	23:04-00:04	44.4	61.1	41.8	46
13/04/2017	00:04-01:04	42.6	65.6	38.7	43.7
13/04/2017	01:04-02:04	44.7	68	39.5	45.5
13/04/2017	02:04-03:04	42	63.3	38.6	43.5
13/04/2017	03:04-04:04	44.4	68.1	41.1	45.7
13/04/2017	04:04-05:04	46.8	57.1	44.2	48.4
13/04/2017	05:04-06:04	53.3	66.9	48.6	55.4
13/04/2017	06:04-07:04	54.9	72.2	51	56.6
13/04/2017	07:04-08:04	55.4	71.1	50.4	57.4
13/04/2017	08:04-09:04	55.3	74.3	49.1	57.3
13/04/2017	09:04-10:04	51.9	71	46.1	52.8
13/04/2017	10:04-10:59	56.3	89.7	44.4	53.4

APPENDIX B: VIBRATION GLOSSARY

Term	Definition
Amplitude	Maximum displacement or distance moved by a point on a vibrating body or wave measured from its equilibrium position.
dB	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10 ⁻⁵ Pa).
dB(A)	Describing the level as being A weighted
Geophone	A sensor that converts ground movement into a voltage.
mms ⁻¹	Millimeters per second – used to measure velocity
mms ⁻²	Millimeters per second squared – used to measure acceleration
PPV	Peak Particle Velocity, mms ⁻¹
Triaxial accelerometer/geophone	A transducer for measuring acceleration across all three planes, dimensions or axis.
VDV	Vibration Dose Value, mms ^{-1.75}