ERNEST GORDON LTD

PROPOSED RESIDENTIAL DEVELOPMENT

DISUSED RAILWAY CUTTING, HECKMONDWIKE

NOISE IMPACT ASSESSMENT

Report Reference	Date of Issue	Author	Checked	Approved
NIA/7394/17/7339 V1.0	17th July 2017	RP	JR	JR

TABLE OF CONTENTS

SECTION 1 INTRODUCTION

1.1 Environmental Noise Solutions Limited (ENS) has been commissioned by VIDA Development and Investments Ltd, on behalf of its client Ernest Gordon Ltd, to undertake an assessment of the potential impact of environmental noise on the proposed residential redevelopment of a disused railway cutting off Brunswick Street, Heckmondwike (hereafter referred to as the application site). The proposals include the infilling of the cutting with engineered material to form a development platform.

1.2 The objectives of the investigation were to:

i. Determine the ambient noise climate at the application site during representative periods of the daytime and night time.

ii. Assess the potential impact of the external noise climate on the proposed development with reference to the National Planning Policy Framework (NPPF) and other pertinent guidelines.

iii. Provide recommendations for a scheme of sound attenuation works, as necessary, such that the future occupants of the proposed residential development do not experience any unacceptable loss of amenity due to noise.

iv. Consider the potential impact on local commercial premises associated with introducing a residential receptor at the site.

1.3 This report has been produced to accompany a planning application for the redevelopment of the site and details the methodology and results of the assessment, together with recommendations for the residential building envelope construction (fenestration and ventilation) and boundary treatment.

1.4 This report has been prepared for VIDA Development and Investments Ltd and its client Ernest Gordon Ltd for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties making reference to the report should consult the parties above and ENS as to the extent to which the findings may be appropriate for their use.

1.5 A glossary of acoustic terms used in the main body of the text is contained in Appendix 1.

SECTION 2 SITE SETTING AND DEVELOPMENT PROPOSALS

2.1 The application site is located in a mixed residential and commercial area to the south of the centre of Heckmondwike. An annotated development layout plan, including the surrounding area, is contained in Appendix 2.1.

2.2 The application site is bound by the following:

i. To the north by Brunswick Street and existing residential development off Horton Street.

ii. To the east by woodland and existing residential development.

iii. To the south by the B6117, Walkley Lane.

iv. To the west by a combination of existing residential development, commercial units and a Jehovah's Witnesses' meeting hall. The commercial units are located midway along the western boundary (off Artillery Street) with the closest units occupied by Romantica Beds, C&S Shutter Systems, RJH Finishing Systems and Morrisflex. The commercial units are bordered by existing residential development immediately to the north (Brunswick Mills development) and south (off Walkley Grove).

2.3 During the course of the noise survey, the main noise sources were noted to be birdsong and distant traffic, with local traffic contributing at the northern and southern ends of the site. The adjacent commercial uses were all noted to be operating, with no breakout noise audible; except for occasional faint impacts, which were not considered significant. Brunswick Street (to the north) was noted to be lightly trafficked, with a manual traffic count during the daytime noise survey recording of the order of 60 vehicles per hour (circa 16:00 hours). Walkley Lane (to the south) was more heavily trafficked, with a manual traffic count during the daytime noise survey recording of the order of 800 - 900 vehicles per hour (circa 13:00 hours), reducing significantly to of the order of 70 vehicles per hour during the night time period (circa 05:15 hours),

2.4 The development proposals consist of circa 96 dwellings with associated landscaping and estate roads (see layout in Appendix 2.1). With reference to the layout, the northern dwellings are set back circa 10 metres from Brunswick Street and the southern dwellings circa 50 metres from the Walkley Lane bridge.

2.5 It is understood that the railway cutting will be infilled to form a development platform which will roughly follow the existing boundary contours.

SECTION 3 ENVIRONMENTAL NOISE MONITORING

3.1 In order to establish the ambient noise levels at the application site, a baseline noise survey was undertaken on Wednesday 7th into Thursday 8th June 2017.

3.2 For the purpose of this assessment, the following monitoring points (MPs) were adopted:

i. MP1A was located on the western boundary of the site, at circa 3 metres to the fence line adjacent to RJH and Morrisflex, in a free field environment at 4.0 metres above ground level (mAGL).

ii. MP1B was located on the western boundary of the site, at circa 3 metres to the fence line adjacent to Romantica Beds and C&S Shutter Systems, in a free field environment at 4.0 metres above ground level (mAGL).

iii. MP2 was located in the southern area of the site, at circa 30 metres to the nearside kerb of Walkley Lane bridge, in a free field environment on the eastern embankment of the cutting at 4.0 mAGL (above road level). An additional measurement, MP2A, was undertaken in the same location at 1.5 mAGL (below road level).

iv. MP3 was located in the northern area of the site, at circa 10 metres to the nearside kerb of Brunswick Street, in a free field environment at 1.5 mAGL.

3.3 The approximate locations of the MPs are identified in Appendix 2.1.

3.4 Noise measurements were undertaken using two Bruel & Kjaer 2250 Type 1 integrating sound level meters. The measurement systems calibration was verified immediately before the commencement of the measurement sessions and again at the end, using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration level was noted. Measurements consisted of A–weighted broadband parameters, together with linear octave band or third octave band L_{eq} levels (depending on the source under consideration) with a 2 second logging interval. Weather conditions throughout the survey periods were appropriate for monitoring, with a wind speed of ≤ 3 m/s.

3.5 The following table contains a summary of the measurement data, at each measurement position, rounded to the nearest decibel. Non-representative data has been excluded using Bruel & Kjaer Evaluator software.

Table 3.1 – Noise Measurement Data

Position	Date	Time	$L_{Aeq,T}$ (dB)	L_{AFMax} (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)	Comment
MP1A	7/6/17	09:49-11:56	52	68	55	44	Birdsong and distant traffic. Occasional faint impact noise audible from commercial units, but not considered significant. No other commercial noise sources audible. Typical L_{AFmax} < 60 dB.
MP1A	8/6/17	05:46-07:02	43	63	46	38	Birdsong and distant traffic, with some foliage noise. No commercial noise sources audible (staff arriving on foot noted at circa 06:15 hours).
MP1B	7/6/17	09:46-11:57	54	74	57	45	Birdsong and distant traffic. No commercial noise sources audible. Typical L_{AFmax} < 60 dB.
MP1B	8/6/17	05:44-07:00	43	60	45	40	Birdsong and distant traffic, with some foliage noise. No commercial noise sources audible.
MP2	7/6/17	12:30-15:19	57	73	59	53	Road traffic main noise source. Typical L_{AFmax} of vehicle pass < 65 dB. Circa 800-900 vehicles per hour.
MP2A	7/6/17	15:27-15:33	54	64	57	51	Road traffic main noise source (MP below road level).
MP2	8/6/17	04:57-05:30	49	62	54	35	Birdsong and road traffic. Circa 70 vehicles per hour. Less foliage noise noted at this location relative to MP1A/1B.
MP3	7/6/17	15:48-16:03	57	70	60	50	Birdsong, distant and local traffic. Typical L_{AFmax} of vehicle pass < 70 dB. Circa 60 vehicles per hour.

3.6 In summary, the existing ambient noise climate at the application site was noted to consist of birdsong, together with distant and local road traffic. No significant noise emissions were audible from the adjacent commercial uses.

SECTION 4 NOISE IMPACT ASSESSMENT CRITERIA

4.1 NATIONAL PLANNING POLICY FRAMEWORK

4.1.1 The National Planning Policy Framework (NPPF) is a material consideration in planning decisions. At the heart of the NPPF is a presumption in favour of sustainable development, and the policies in Paragraphs 18 to 219 of the NPPF, taken as a whole, constitute the Government's view on what sustainable development in England means in practice for the planning system.

4.1.2 The NPPF states that there are three dimensions to sustainable development, which include an economic role (contributing to building a strong, responsive and competitive economy), a social role (providing the supply of housing required to meet the needs of present and future generations) and an environmental role (which includes minimising waste and pollution).

4.1.3 The NPPF supersedes Planning Policy Guidance Note 24 (PPG 24). The main policy statement in relation to noise is Paragraph 123 of the NPPF, which states:

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.*

4.1.4 In relation to 'adverse impacts', the NPPF refers to the Explanatory Note to the Noise Policy Statement for England (NPSE) for guidance.

4.1.5 The Noise Policy Statement for England (NPSE) and associated Explanatory Note were published by DEFRA in 2010 and set out the Government's noise management strategy to enable noise management decisions to be made within the wider context (i.e. guiding principles of sustainable development), in a cost-effective manner and in a timely fashion.

4.1.6 Fundamental to this approach is 'there is a need to integrate consideration of the economic and social benefit of the activity or policy under examination with proper consideration of the adverse environmental effects, including the impact of noise on health and quality of life. This should avoid noise being treated in isolation in any particular situation, i.e. not focussing solely on the noise impact without taking into account other related factors'.

4.1.7 The noise policy aims of NPSE are to (i) avoid significant adverse impact on health and quality of life, (ii) mitigate and minimise adverse impacts on health and quality of life, and (iii) where possible,

contribute to the improvement of health and quality of life. The policy aims are always to be considered within the context of the Government's policy on sustainable development.

4.1.8 In relation to the mitigation and minimisation of adverse impacts, NPSE considers that *'in reality, although not always stated, the aim has tended to be to minimise noise 'as far as is reasonably practical'*. This is reinforced in Paragraph 2.24 of the Explanatory Note, which requires that '*all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur'*.

4.1.9 In relation to explaining the 'significant adverse' and 'adverse' effects quoted in the NPPF, NPSE uses the two established concepts from toxicology that are currently being applied to noise impacts, for example by the World Health Organisation (WHO), these are:

- NOEL – No Observed Effect Level. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to noise.
- LOAEL – Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected.

4.1.10 The NPSE then extends these concepts to lead to a SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur.

4.1.11 No specific criteria are presented in the NPSE, to provide the necessary policy flexibility until further evidence and suitable guidance is available. In lieu of specific criteria, for this assessment, ENS makes reference to existing guideline documents, which are summarised in the following paragraph(s).

4.2 BS 8233:2014

4.2.1 BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' (BS 8233) sets guideline indoor ambient noise levels for dwellings, for steady external noise sources, which it is desirable are not exceeded. These levels are reproduced in Table 5.1 and are based on guidelines issued by the World Health Organisation (WHO). The Standard also states that where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The Standard considers that for regular individual noise events, a guideline value may be set in terms of SEL or L_{AFmax} depending on the character and number of events per night. The WHO Guidelines on Community Noise (1999) considers that if negative effects on sleep are to be avoided, noise events exceeding 45 dB L_{Amax} should be limited.

Table 4.1 – Indoor Ambient Noise Levels in Dwellings (as recommended in BS 8233:2014)

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

4.2.2 For traditional external areas that are used for amenity space, such as gardens and patios, BS 8233 considers that 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. BS 8233 also recognises that in higher noise areas, such as adjoining the strategic transport network, a balance needs to be made and in such a situation development should be designed to achieve the lowest practicable levels, but should not be prohibited.

4.2.3 With reference to the BS 8233 guidelines, by definition, 'reasonable internal conditions' cannot represent a significant adverse impact (the prevention of which is the 1st aim of NPSE). With cognisance to the 2nd aim of NPSE (to minimise noise impact), the internal ambient noise levels detailed in Table 5.1 are considered appropriate.

4.2.4 Likewise, for external amenity space, a design range of 50 to 55 dB $L_{Aeq,T}$ is considered appropriate to comply with the requirements of the NPPF. Furthermore, the BS 8233 guidance in certain circumstance that '*development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited'*, is considered to be in keeping with the NPSE Explanatory Note, which requires that '*all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur'*.

4.2.5 On the basis of the above, the following design criteria are considered to be in keeping with the aims of the NPPF:

i. Living rooms and bedrooms ≤ 35 dB $L_{Aeq\ (07:00–23:00)}$.

ii. Bedrooms ≤ 30 dB $L_{Aeq\ (23:00–07:00)}$.

iii. 45 dB L_{AFmax} not normally exceeded in bedrooms at night.

iv. Guideline range of 50 - 55 dB $L_{Aeq(0700-2300)}$ in gardens during the daytime and where this is not achievable, design to achieve the lowest practicable levels.

4.3 **BS 4142:2014**

4.3.1 British Standard BS 4142:2014 'Methods for Rating and Assessing Industrial and Commercial Sound' (BS 4142) describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

i. sound from industrial and manufacturing processes;

ii. sound from fixed installations which comprise mechanical and electrical plant and equipment;

iii. sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and

iv. sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

4.3.2 The methods described in BS 4142 use outdoor sound levels to assess the likely effects of sound on people for the purposes of (i) investigating complaints, (ii) assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature, and (iii) assessing sound at proposed new dwellings or premises used for residential purposes.

4.3.3 BS 4142 considers that the significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. It goes on to suggest that:

i. A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;

ii. A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and

iii. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

4.3.4 Where the initial estimate of the impact needs to be modified due to the context, factors to be taken into account include the absolute level of sound and whether dwellings will already incorporate design measures that secure good internal and/or outdoor acoustic conditions. The reference time interval of the specific sound is 1 hour during the day and 15 minutes at night.

4.3.5 The rating level is described as the specific sound level (the equivalent continuous A-weighted sound pressure level at the assessment position (NSR) produced by the specific sound source over the given reference time interval) plus any adjustment for the characteristic features of the sound. The character correction relates to whether and to what degree the specific sound is assessed to have an element of tonality, impulsivity and/or characteristics that are readily distinctive against the residual acoustic environment.

4.3.6 The background sound level is the A-weighted sound pressure level of the residual sound at the assessment position that is exceeded for 90 percent of a given time interval, T, measured using time weighting 'F' and quoted to the nearest whole number of decibels. The residual sound is described as the ambient sound remaining in a given position in a given situation when the specific sound source is suppressed to a degree such that it does not contribute to the ambient sound.

4.3.7 With reference to the NPPF/NPSE and BS 4142, a rating level of < + 10 dB accords with the 1st aim of NPSE (to avoid significant adverse impacts), whilst a rating level of ≤ the representative background level accords with the 2nd aim of NPSE (to mitigate and minimise adverse impacts).

4.3.8 When introducing a new noise sensitive receptor, BS 4142 considers that other guidance and criteria (e.g. BS 8233 criteria) can inform the extent of required noise mitigation.

SECTION 5 SOUND ATTENUATION SCHEME PROPOSALS

5.1 INTRODUCTION

5.1.1 The sound attenuation scheme proposals are based on the measured noise climate data detailed in Section 3, the design criteria detailed in Section 4 and the layout contained in Appendix 2.1. Should layout changes be considered, ENS should be consulted as to the potential impact on the sound attenuation scheme.

5.1.2 Where appropriate, in order to calculate the sound insulation requirements of the building envelope for habitable rooms throughout the development, the Building Research Establishment (BRE) building envelope insulation calculation spreadsheet was used. This spreadsheet is based on the calculation methodology advocated in BS 8233. The spreadsheet allows input of external noise levels, room dimensions and reverberation time together with parameters for the various elements of the building envelope and calculates the internal noise level in terms of the external noise level metric (L_{Aeq} and L_{AFmax} in this case). For the calculations, a standard masonry construction has been assumed.

5.2 GLAZING AND VENTILATION STRATEGY

5.2.1 Based on the BRE spreadsheet, the sound insulation provided by standard double glazed windows with standard trickle vents in a masonry façade is of the order of 27 dB(A); see Appendix 2.2 for a generic noise break-in calculation.

5.2.2 On this basis, standard thermal double glazing and window frame trickle vents are considered appropriate across the site.

5.3 GARDEN STRATEGY

5.3.1 The garden criteria are achieved across the vast majority of the application site. At the northern extent of the residential footprint (adjacent to Brunswick Street), depending on the finished ground levels, it may be necessary to provide a degree of screening to road traffic. In this scenario, it is recommended that a reflective barrier is constructed along the northern boundary to the northern most plot. The barrier should have a mass per unit area of ≥ 10 kg/m^2, be fully sealed to the ground and fitted with cover strips to prevent gaps forming over time.

SECTION 6 CONCLUSIONS

6.1 A noise impact assessment has been undertaken for the proposed residential redevelopment of a disused railway cutting off Brunswick Street, Heckmondwike.

6.2 The ambient noise climate across the application site is primarily associated with birdsong and road traffic.

6.3 A scheme of sound insulation works has been developed to protect the proposed residential development from the ambient noise climate in accordance with the requirements of the National Planning Policy Framework. Existing commercial noise sources were not noted to be significant and the proposed development is not considered to represent an unreasonable restriction on the existing commercial businesses in the vicinity.

6.4 On this basis, the ambient noise climate is not considered to represent a constraint to the proposed residential development of the application site.

APPENDIX 1 ▪ Glossary of Acoustic Terms

APPENDIX 1 GLOSSARY OF TERMS

Sound is transmitted to the ear by pressure fluctuations in the air at different frequencies. The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from $20x10^{-6}$ Pascals to 200 Pascals, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB), with 0 dB representing the normal threshold of hearing ($20x10^{-6}$ Pascals) and 120 dB representing the threshold of pain (20 Pascals). In general terms, a person can hear mid frequencies (500 Hz, 1000 Hz and 2000 Hz) more effectively than lower or higher frequencies. A young person can hear sound from around 20 to 20,000 Hz. As one gets older the ability to hear higher frequencies diminishes.

A change in sound level of less than 3 dB is not perceptible under normal conditions and a change of 10 dB subjectively equates to a doubling or halving of the loudness of a sound.

The ear is frequency sensitive, in that it doesn't ascribe the same importance to all frequencies in the audible frequency range. A frequency filtering system in a sound level meter approximates the frequency response of the human ear. This weighting network is called "A-weighting" and the "A-weighted" sound pressure level is expressed in dB(A). This weighting is typically used to measure and assess environmental noise.

As sound levels are constantly fluctuating, a number of statistical metrics are used to describe the sound. The most commonly used measurement descriptors of environmental noise are as follows:

- $L_{Aeq,T}$ - The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T, has the same mean-square sound pressure as a sound that varies with time. This is in effect the average noise level, used to describe the ambient (all encompassing) noise level.

- $L_{A90,T}$ - The A-weighted sound pressure level in decibels exceeded 90% of a given time interval, T. L_{A90} is typically taken as representative of background noise.

- L_{AFmax} - The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes a fast time weighting, which equates to the time averaging of the human ear.

The ambient noise is defined as the totally encompassing sound in a given situation at a given time usually composed of sound from many sources near and far.

For the assessment of noise, the 24 hour day is typically broken down into two or three segments, consisting of daytime from 07:00 to 23:00 hours (further divided to daytime from 07:00 to 19:00 hours and evening from 19:00 to 23:00 hours) and night time from 23:00 to 07:00 hours.

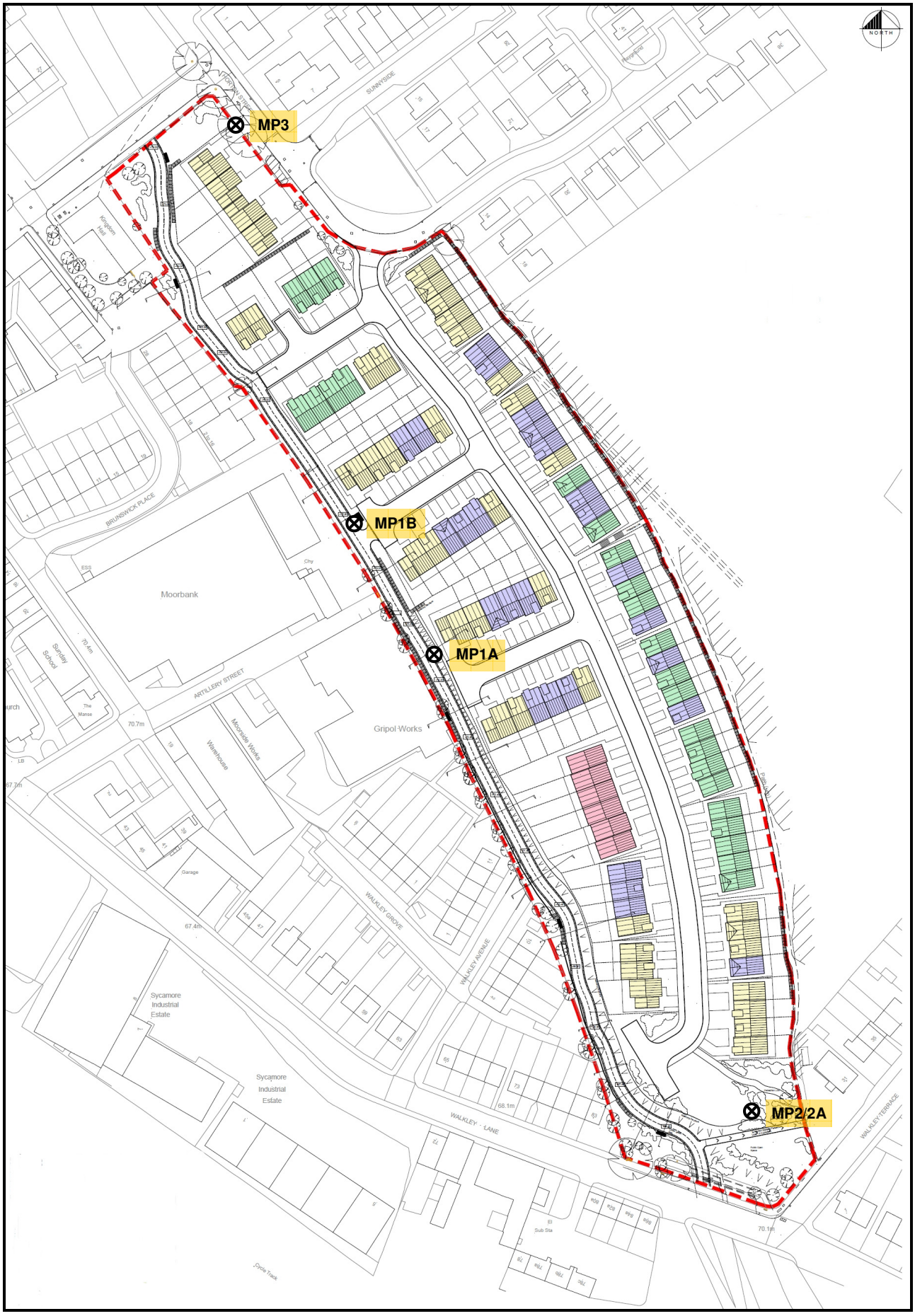
The Sound Exposure Level (SEL or L_{AE}) is the energy produced by a discrete noise event averaged over one second, no matter how long the event actually took. This allows for comparison between different noise events which occur over different lengths of time.

The weighted sound reduction index (R_w) is the single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies (R_W is used to characterise the insulation of a material or product that has been measured in a laboratory).

APPENDIX 2

- 2.1: Annotated layout plan
- 2.2: BRE noise break-in calculation spreadsheet

Appendix 2.1: Site Layout Plan and Noise Monitoring Positions (MPs)



Appendix 2.2: Generic BRE Break-in Calculation Spreadsheet