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Dear Sirs

**NOISE IMPACT ASSESSMENT  
PROPOSED COMMERCIAL DEVELOPMENT  
FORMER ALBION WORKS, HUNNINGLEY LANE, STAIRFOOT, BARNSELY, S70 3DY**

**1.00 INTRODUCTION**

1.01 Environmental Noise Solutions Limited (ENS) has been commissioned by C Soar & Sons (UK) Ltd to carry out a noise impact assessment for a proposed commercial development at the former Albion Works, Hunningley Lane, Stairfoot, Barnsley, S70 3DY (hereafter referred to as 'the application site').

1.02 The objectives of the noise impact assessment were to:

- Establish background noise levels at the nearest noise sensitive receptors (NSRs) to the application site during representative periods of the daytime.
- Assess the potential noise impact of the development on the nearest NSRs with reference to pertinent guidelines.

1.03 This report details the methodology and results of the assessment. It has been prepared to accompany a planning application to be submitted to the local planning authority.

1.04 This report has been prepared for C Soar & Sons (UK) 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 C Soar & Sons (UK) Ltd and ENS as to the extent to which the findings may be appropriate for their use.

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

**2.00 APPLICATION SITE SETTING AND PROPOSED RESIDENTIAL DEVELOPMENT**

2.01 The application site is located within a mixed-use setting within the Stairfoot area of Barnsley. Irregular in shape (see Appendix 2 for a site layout) the application site is bound by:

- Hunningley Lane to the north with Aldi supermarket opposite the application site.
- Former B&Q site to the east (vacant building and car park).
- Existing residential dwellings to the on Kays terrace to the south and south-west.
- MOT centre to the west.

2.02 Proposals are to erect two commercial units that will provide additional administration, vehicle storage, general storage and vehicle maintenance for C Soar & Sons (UK) (a site layout is shown in Appendix 2 for reference).

- 2.03 It is understood that up to 10 no. HGVs will be stored at the application site with HGVs departing from the site between 04:00 – 08:00 hrs and returning between 14:00 - 18:00 hrs Monday to Friday plus occasional Saturday mornings. It is also understood that basic vehicle maintenance will take place within the proposed units along with some forklift trucks use to move stored items. Both the vehicle maintenance and forklift operations would only take place during daytime hours 08:00 – 18:00 hrs Monday to Friday.
- 2.04 The nearest noise sensitive receptors (NSRs) to the application site are residential dwellings to the south on Kay's Terrace (NSR1).

### **3.00 BASELINE NOISE SURVEY**

- 3.01 In order to establish prevailing baseline noise levels at the application site, a noise survey was undertaken on Thursday 2<sup>nd</sup> January 2020 and the early hours of Friday 3<sup>rd</sup> January 2019. Additional monitoring as also undertaken on Thursday 27<sup>th</sup> February 2020.
- 3.02 A single noise monitoring position (MP1) was adopted (the approximate location of the noise monitoring position is shown in Appendix 2 for reference). The monitoring position was in the southern corner of the application site at 1.5 metres above ground level (AGL), representative of NSR1.
- 3.03 Noise measurements were made using a Bruel & Kjaer 2250 Type 1 integrating sound level meter. A windshield was fitted for all measurements. The measurement system 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. Weather conditions throughout the survey were appropriate for monitoring.
- 3.04 Measurements consisted of A-weighted broadband parameters, together with linear octave band  $L_{eq}$  levels. Table 3.1 presents a summary of the noise data for each measurement session, at each position, rounded to the nearest decibel.

**Table 3.1 – Summary of Noise Measurement Data – MP1**

Date	Time	L <sub>Aeq</sub> (dB)	L <sub>A90</sub> (dB)	L <sub>A10</sub> (dB)	Comment
02/10/19	1409-1439	53	49	56	Distant Road traffic noise on Hunningley Lane and the surrounding road network
	2349-0019	45	37	49	
27/02/20	0400-0415	43	34	46	
	0415-0430	43	34	46	
	0430-0445	45	37	50	
	0445-0500	44	38	48	
	0500-0515	47	40	51	
	0515-0530	48	41	52	
	0900-0915	55	52	57	
	0915-0930	56	53	58	
	0930-0945	56	52	57	
	0945-1000	54	51	56	
	1000-1015	55	52	57	
	1015-1030	54	51	56	
	1030-1045	55	52	57	
1045-1100	55	52	56		
<b>Daytime ambient and background noise levels 53 - 56 dB L<sub>Aeq, T</sub> and 49 - 52 dB L<sub>A90, T</sub> respectively.</b> <b>Night time ambient and background noise levels 43 - 48 dB L<sub>Aeq, T</sub> and 34 - 41 dB L<sub>A90, T</sub> respectively.</b>					

3.05 Typical (modal average) background noise levels at NSR1 were circa 52dB L<sub>A90 (15 min)</sub> during the daytime and 34dB L<sub>A90 (15 min)</sub> at night time.

3.06 During the survey it was noted that the noise environment at the application site was wholly attributed to road traffic noise on Hunningley Lane and the sounding road network.

#### Noise Associated with the Proposed Development

3.07 The developer has confirmed that the units will be used for the storage of 10 no. HGVs, with occasional vehicle maintenance, inspections and forklift operations.

3.08 The primary noise source associated with vehicle maintenance is the use of impact wrenches.

3.09 In order to determine the potential noise impact of the proposed development, the assessment has used noise measurement data measured previously (November 2019) by ENS at a tyre fitting premises (Discount Tyres on King Edward Road, Thorne).

3.10 Internal reverberant noise levels within the tyre fitting facility were measured at circa **67 dB L<sub>Aeq, (1 hour)</sub>** and were primarily due to impact wrenches (associated with removing tyres) and compressed air (associated with inflating tyres). This data is considered to be comparable to and representative of the internal operations within the proposed units.

3.11 ENS has also previously undertaken noise measurements of HGVs and Forklift operations at other similar facilities. For the purpose of the assessment the following noise levels have been adopted:

- Forklift Truck loading operations within a service yard – 54 dB L<sub>Aeq,30mins</sub> at 10 metres
- HGV Manoeuvring – 84 dB(A) SEL at 10 metres

#### 4.00 NOISE IMPACT ASSESSMENT CRITERIA

##### National Planning Policy Framework

4.01 The National Planning Policy Framework (NPPF) was updated in February 2019 and sets out the Government's planning policies for England and how these are expected to be applied.

4.02 Where issues of noise impact are concerned the NPPF provides brief guidance in paragraph 170 where it states that planning policies and decisions should contribute to and enhance the natural and local environment by:

*'preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of.....noise pollution'.*

4.03 Paragraph 180 advises that:

*'Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should.....mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life'.*

4.04 The NPPF also refers to the 2010 DEFRA publication, the Noise Policy Statement for England (NPSE) which reinforces and supplements the NPPF.

##### Noise Policy Statement for England

4.05 The Noise Policy Statement for England (NPSE) sets out the long-term vision of promoting good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development. This long-term vision is supported by the following aims:

- Avoid significant adverse impacts on health and quality of life.
- Mitigate and minimise adverse impacts on health and quality of life.
- Where possible, contribute to the improvement of health and quality of life.

4.06 NPSE describes the following levels at which noise impacts may be identified:

- 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 the noise.
- LOAEL – Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected.
- SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur.

##### Planning Practice Guidance – Noise

4.07 In December 2014, Planning Practice Guidance (PPG) was updated online which provides additional guidance and elaboration on the NPPF. It advises that the Local Planning Authority should consider the acoustic environment in relation to:

- Whether or not a significant adverse effect is occurring or likely to occur.
- Whether or not an adverse effect is occurring or likely to occur.
- Whether or not a good standard of amenity can be achieved.

- 4.08 In line with the Explanatory Note of the NPSE, the PPG references the LOAEL and SOAEL in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome.
- 4.09 Table 4.1 summarises the noise exposure hierarchy, based on the likely average response.

**Table 4.1 – Noise Exposure Hierarchy**

Perception	Examples of Outcomes	Increasing Effect Level	Action
<b>No Observed Effect Level (NOEL)</b>			
Not Noticeable	No Effect	No Observed Effect	No specific measures required
<b>No Observed Adverse Effect Level (NOAEL)</b>			
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
<b>Lowest Observed Adverse Effect Level (LOAEL)</b>			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
<b>Significant Observed Adverse Effect Level (SOAEL)</b>			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

- 4.10 However, in line with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG acknowledges that:

*'...the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation'.*

- 4.11 The PPG also provides general advice on the typical options available for mitigating noise. It goes on to suggest that Local Plans may include noise standards applicable to proposed developments within the Local Authority's administrative boundary, although it states that:

*'Care should be taken, however, to avoid these being implemented as fixed thresholds as specific circumstances may justify some variation being allowed'.*

- 4.12 With cognisance to this, further guidance is taken from British Standard BS 4142:2014+A1-2019 'Methods for Rating and Assessing Industrial and Commercial Sound' (BS 4142).

BS 4142:2014+A1-2019 'Methods for Rating and Assessing Industrial and Commercial Sound'

- 4.13 BS 4142 describes methods for determining, at the outside of a building, noise levels from factories or industrial premises and a method for assessing whether the noise is likely to give rise to adverse impacts, and states:

*'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. Typically, the greater this difference, the greater the magnitude of the impact. For example:*

- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. 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*

*Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.*

*Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the absolute level of sound.'*

- 4.14 The reference time interval of the specific sound is 1 hour during the day and 15 minutes at night.
- 4.15 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.
- 4.16 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.

## **5.00 NOISE IMPACT ASSESSMENT**

- 5.01 Indicative plans show an existing 3 metres high brick wall running partially along the southern boundary. In order to screen the NSRs to the south, it is recommended that this partial boundary treatment be continued along the entire southern boundary, maintaining a minimum height of at least 3 metres (mass per unit area  $\geq 12\text{kg/m}^2$ ). If a timber fence is installed, this should have no gaps or holes and should be fully sealed at the ground (i.e. include a gravel board), (see appendix 2 for location).
- 5.02 In relation to screening attenuation (SA), BS 5228:2009 Part 1 states:

*'In the absence of spectral data, as a working approximation, if there is a barrier or other topographic feature between the source and the receiving position, assume an approximate attenuation of 5 dB when the top of the plant is just visible to the receiver over the noise barrier, and of 10 dB when the noise screen completely hides the sources from the receiver. High topographical features and specifically designed and positioned noise barriers could provide greater attenuation'.*

### Noise Associated with Internal Operations – Vehicle Maintenance

- 5.03 For assessment purposes the reverberant internal noise level of **67 dB L<sub>Aeq</sub> (1 hour)** is used (see section 3.10).
- 5.04 For the assessment of the internal operations, screening attenuation is conservatively taken to be 5 dB for the NSRs to south (note: partial screening assumed due to the height of the building in relation to the height of the boundary treatments).
- 5.05 In order to predict noise emissions at the nearest noise sensitive receptor associated with internal operations at the application site, the following relationship may be employed:

$$SPL_{EXT} = SPL_{REV} - R_w - DA - 6$$

Where:

*SPL<sub>EXT</sub>* is the free field sound pressure level at the nearest noise sensitive receptor (dB L<sub>Aeq</sub>).  
*SPL<sub>REV</sub>* is the reverberant sound pressure level inside the proposed development (dB L<sub>Aeq</sub>).  
*R<sub>w</sub>* is the composite sound reduction index (SRI) of the of the façade facing the receptor.  
*DA* is the distance attenuation of noise.  
 '– 6' relates to a transition from an internal reverberant sound field to an external sound field.

- 5.06 For the purpose of the calculations:
- The indoor reverberant noise level within the proposed development is taken as **67 dB L<sub>Aeq</sub> (1 hour)** (see Paragraph 3.10).
  - For the southern elevation of the larger building facing towards NSR1, the composite SRI of the building envelope is taken as **29.2 dB R<sub>w</sub>** based on the sound reduction performance of standard masonry and standard insulated cladding.
  - Distance attenuation to NSR1, based on the distance to the dwelling, barrier attenuation and the dimensions of the southern elevation of the unit, is calculated using the Rathé Method at **11.4 dB**.
- 5.07 Processing the above, the resultant sound level at NSR1 due to internal operations within the units, is calculated at **15 dB L<sub>Aeq, T</sub>**.

### Noise Associated with Forklift Truck Operations

- 5.08 With respect to FLT (Fork Lift Truck) loading operations within the service yards, the noise level of a busy service yard (several FLTs loading pallets onto open-sided wagons) has previously been measured by ENS at circa 54 dB L<sub>Aeq, T</sub> at 10 metres over a 30-minute period.
- 5.09 For the purpose of the assessment it is assumed that the forklift trucks will operate continuously.
- 5.10 The distance to NSR1 from the centre of the service yard is taken at 50 metres for assessment purposes.
- 5.11 For the assessment of the FLT loading operations, screening attenuation is taken to be 10 dB for the NSRs to south.
- 5.12 In order to predict the resultant FLT noise levels at the nearest NSRs, the following relationship may be employed:

$$SPL_{NSR} = SPL_{REF} - DA - SA$$

Where:

*SPL<sub>NSR</sub>* is the resultant sound pressure level at the nearest NSR (dB).  
*SPL<sub>REF</sub>* is the calculated sound pressure level (dB).  
*DA* is the distance attenuation of noise.  
*SA* is the screening attenuation of noise.

- 5.13 Distance attenuation (DA) is calculated as follows:

$$DA = 20 \times \log ( D_{\text{source}} / D_{\text{rec}} ) (20\log(10/50))$$

Where:

*D<sub>SOURCE</sub>* is the distance to source (10 metres in this case).

*D<sub>REC</sub>* is the distance to receiver (50 metres in this case).

- 5.14 The resultant noise associated with forklift operation noise levels at the nearest NSR is therefore calculated at 30 dB L<sub>Aeq, 1hour</sub>.

#### Noise Associated with HGV Movements

- 5.15 It is understood that **up to 20** no. HGV movements will take place per day (equates to 10 HGV's per day as each HGV has two movements, both entering and leaving site). It is assumed for assessment purposes that up to 2 no. HGVs would leave the site within the same 15-minute period and that all 10 no. HGVs would return to site within the same hour in the afternoon / evening.

- 5.16 The distance to NSR1 from the HGV storage area is taken at 70 metres for assessment purposes.

- 5.17 For the assessment of the HGV movements, screening attenuation is taken to be 10 dB for the NSRs to south.

- 5.18 The SEL of HGV movements at low speed has previously been measured by ENS at circa **84 dB(A)** at 10 metres

- 5.19 The following formula may be used for calculating the L<sub>Aeq</sub> level from the SEL:

$$L_{\text{Aeq, T}} = 10 * \log_{10} [(n \times 10^{\text{SEL}/10}) / T]$$

Where:

*SEL* is the Single Event Level (84 dB(A))

*n* is the number of occurrences (10 per hour for daytime and 2 per 15 minutes for night)

*T* is the time period in seconds (3600 for daytime and 900 for night)

- 5.20 Using the above formula, noise associated with HGV movements is calculated at 10 metres as **58 dB L<sub>Aeq</sub> (1 hour)** for the daytime period and **57 dB L<sub>Aeq</sub> (15 mins)** for the night time period.

- 5.21 Using the noise propagation calculation methodology outlined in paragraphs 5.12 – 5.13, the resultant noise associated with HGV movements at NSR1 is calculated at 31 dB L<sub>Aeq</sub> during the daytime period and 30 dB L<sub>Aeq</sub> during the night time period.

Impact Assessment

- 5.22 The cumulative resultant noise level at NSR1 (existing residential dwellings to the south) associated with the proposed development are set out in Table 5.1 for daytime and Table 5.2 for night time.

**Table 5.1 – Daytime Cumulative Specific Noise Levels at NSR1**

Noise Source	Resultant Specific Noise Level at NSR1
Internal Operations	15 dB L <sub>Aeq</sub> (1 hour)
Forklift Operations	30 dB L <sub>Aeq</sub> (1 hour)
HGV Movements	31 dB L <sub>Aeq</sub> (1 hour)
<b>Cumulative Noise Level</b>	<b>34 dB L<sub>Aeq</sub> (1 hour)</b>

- 5.23 The resultant calculated daytime levels are significantly (at least 18 dB) below existing daytime background noise levels at the nearest NSRs (52 dB L<sub>A90</sub>). Inaudibility is a subjective matter but it is commonly accepted that it is approached when the source noise level is at least 10 dB below the background noise level. Since the internal operations and forklift operations are expected to be at least 10 dB below the background noise levels at NSR1, it follows that noise associated with the proposed development, will be inaudible. In this instance it has not been considered appropriate to apply BS4142 'acoustic feature' corrections to a noise source which will be inaudible.

**Table 5.2 – Night time Specific Noise Levels at NSR1**

Noise Source	Resultant Specific Noise Level at NSR1
HGV Movements	30 dB L <sub>Aeq</sub> (15 mins)
<b>Cumulative Noise Level</b>	<b>30 dB L<sub>Aeq</sub> (15 mins)</b>

- 5.24 Processing the above, Tables 5.3 and 5.4 present BS 4142 assessments for the nearest NSR to the proposed development.

**Table 5.3 – Daytime BS 4142 Assessment at NSR1**

Noise Parameter	Value	Comments
(A) Specific noise level	34 dB L <sub>Aeq</sub> (1 hour)	Predicted daytime noise level at NSR1
(B) Background noise level	52 dB L <sub>A90</sub> (1 hour)	Background noise level measured by ENS
Excess of rating over background noise level (A – B)	-18 dB	Indication of a low impact

**Table 5.4 – Night Time BS 4142 Assessment at NSR1**

Noise Parameter	Value	Comments
(A) Specific noise level	30 dB $L_{Aeq}$ (15 mins)	Predicted night time noise level at NSR1
(B) Background noise level	34 dB $L_{A90}$ (15 mins)	Background noise level measured by ENS
Excess of rating over background noise level (A – B)	–4 dB	Indication of a low impact

5.25 As detailed in the tables above, when assessed under BS 4142, rating noise levels associated with the proposed development do not exceed existing background noise levels at the nearest NSR during the daytime and night time period.

5.26 BS 4142 states:

*'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'.*

## 6.00 CONCLUSIONS

6.01 A noise impact assessment has been undertaken for a proposed commercial development at the former Albion Works, Hunningley Lane, Stairfoot, Barnsley, S70 3DY.

6.02 At the nearest noise sensitive receptor, the cumulative sound level associated with the proposed development is predicted to be below existing background noise levels.

6.03 In accordance with BS 4142 methodology, this is an indication of the proposed development having a low impact.

I trust the foregoing is sufficient for your needs. Should you have any queries regarding the above, please do not hesitate to contact me.

Yours sincerely



Richard Whitaker  
AMIOA, Diploma in Acoustics & Noise Control  
For Environmental Noise Solutions Limited

cc File

## Appendix 1 Glossary of Acoustic Terms

### Sound Pressure Level ( $L_p$ )

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20  $\mu\text{Pa}$  to 200 Pa, 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) as follows:

$$L_p = 20 \log_{10}(p/p_0)$$

Where  $L_p$  = sound pressure level in dB;  $p$  = rms sound pressure in Pa; and  $p_0$  = reference sound pressure (20  $\mu\text{Pa}$ ).

### A-weighting Network

A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

### Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$

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.  $L_{Aeq, 16h}$  (07:00 to 23:00 hours) and  $L_{Aeq, 8h}$  (23:00 to 07:00 hours) are used to qualify daytime and night time noise levels.

### $L_{A10, T}$

The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period,  $T$ .  $L_{A10, 18h}$  is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

### $L_{A90, T}$

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

### $L_{AF \max}$

The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

### Sound Exposure Level (SEL or $L_{AE}$ )

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.

### Weighted Sound Reduction Index ( $R_w$ )

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  
Site Plan / Noise Monitoring Position / Boundary Treatment

= 3-metre-high solid timber fence



Appendix 3  
Drawings

