



Sonic Element Ltd
Acoustic Excellence by Design

TECHNICAL REPORT

152-154 Uxbridge Road, Hayes
Noise Impact Assessment

AUTHOR : Mr Amber Naqvi BSc(Hons) MSc MIOA MANC MAES

REF : 112421 / 152–154 Uxbridge Road– Rev (-)

SIGNED :
Mr Amber Naqvi
BSc(Hons) MSc MIOA MANC MAES

CHECKED BY :
Ned Johnson
BSc(Hons) MSc MIOA MCIEH CEnvH

DATE : 24th November 2021

Executive Summary

Sonic Element Ltd has been appointed to undertake an acoustic assessment for the proposed development at 152 – 154 Uxbridge Road, Hayes.

This report provides the results of the acoustic survey, which covers all noise sources affecting the proposed dwellings.

As a result of the survey, this report makes recommendations for the sound insulation performance of building façade including glazing for the dwellings that will adequately protect future occupants from noise. This will ensure that the internal noise recommendations in BS8233:2014 and the World Health Organisation Guidelines for Community Noise are met.

Contents

Executive Summary	2
1. Introduction	4
2. Site & Project Description	5
3. Planning Reference Documents	7
4. Methodology	13
5. Noise Survey Results	14
6. Evaluation of Results	17
7. Mitigation	19
Appendix 1 Glossary of Terms	24
Appendix 2 Instrumentation & Measurement Conditions	25
Appendix 3 Data	26
Appendix 4 DEFRA Noise Maps	32

1. Introduction

- 1.1 Sonic Element Ltd has been appointed to undertake an acoustic assessment for the proposed development at 152 - 154 Uxbridge Road, Hayes on behalf of M S 4 Architects Ltd. Sonic Element Ltd is a member organisation of the Association of Noise Consultants and all our consultants and engineers are full members of The Institute of Acoustics.
- 1.2 The proposed development involves the demolition of an existing building and the erection of a three-story building containing nine residential flats and one retail unit.
- 1.3 The assessment takes account of the existing noise environment, which has been quantified using direct measurement. The noise levels inside the building have been compared to the internal noise recommendations contained in BS8233:2014 and the World Health Organisation *Guidelines for Community Noise*. The detailed method in BS8233:2014 was used to calculate the necessary level of glazing for bedrooms and the living room.
- 1.4 The impact of the commercial activities in close proximity of the proposed development and existing extractor and air conditioning units associated with the adjacently located business have also been assessed in line with the methodology in BS4142:2014+A1 2019.
- 1.5 This report relies on typical background noise level measurements and calculations of noise transmission over relatively large areas. Background noise at a given location can vary substantially from day to day with variations in road traffic and other sources, and propagation of noise can be strongly affected by weather, in particular wind direction and atmospheric conditions. We believe our assessment based on a typical day and night time combined traffic, commercial activity, and associated plant noise survey to be representative of typical conditions to establish the design targets for noise mitigation measures.

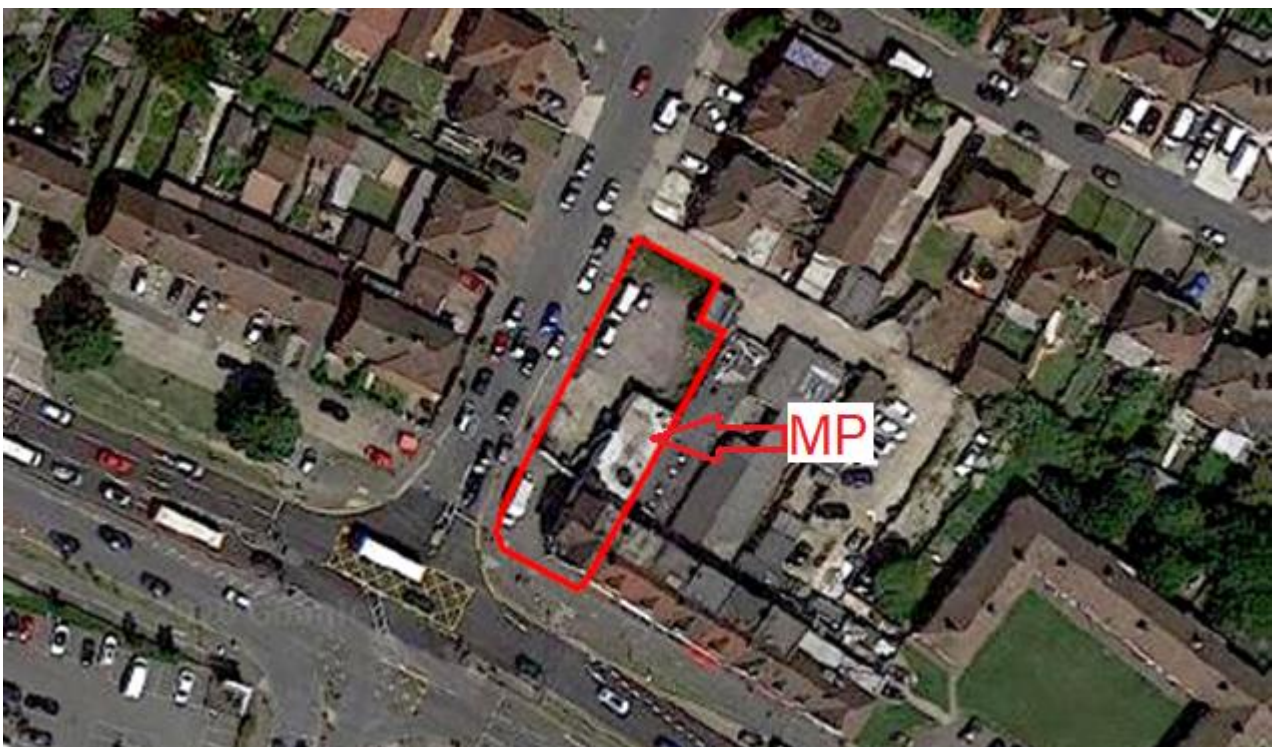
2. Site & Project Description

- 2.1 The application site is located on a prominent corner plot on the northern side of Uxbridge Road (A4020), at its junction with Brookside Road. The application site itself forms the end unit(s) within the two / three-story retail parade and incorporates residential accommodation. The site projects beyond the side elevation of the parade to the back edge of Brookside Road and along this road frontage forms a yard area, mainly in use for the parking of vans. An electricity substation is located towards the far end of the site on Brookside Road.

On the other side of the road is a retail park and business units and a 12-story high building, the Hyatt Hotel.

- 2.2 Figure 1 below shows the location (in red) of the development and the measurement point location shown as MP.

Figure 1.



NOISE IMPACT ASSESSMENT REPORT

The proposal is for the demolition of part of the existing parade building and the erection of a 3-story attached building comprising a retail unit on the ground floor fronting Uxbridge Road and a total of 9 residential units above and to the rear fronting Brookside Road.

The ground floor comprises a retail unit with a floor area of approximately 220sqm, with servicing and car parking space behind with a 2 bedroom unit to the rear. The floors above would each comprise 2 x 2 bedroom and 2 x 3 bedroom units with private balcony/amenity space. The roof would provide 2 x 103sqm communal amenity areas.

2.3 Figure 2 below shows the proposed general arrangement layout of the site.

Figure 2.



Side Elevation (Right)



Rear Elevation

3. Reference Documents

National Planning Policy Framework

3.1 The Department of Housing, Communities, and Local Government published the National Planning Policy Framework (NPPF) in July 2021.

3.2 Paragraphs 174 (e) 185(a), (b), and 187 refer to noise in terms of policy approach:

174. Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water, or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and

185. 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:

a) mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life.

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason

NOISE IMPACT ASSESSMENT REPORT

187. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.

Noise Policy Statement for England

- 3.3 The Department for Environment, Food and Rural Affairs published the *Noise Policy Statement for England* (NPSE) in March 2010. The explanatory note of NPSE defines the terms used in the NPPF:

“2.20 There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They 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 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.

2.21 Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur.”

- 3.4 The NPSE does not define the SOAEL numerically, stating at paragraph 2.22:

“2.22 It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations.

NOISE IMPACT ASSESSMENT REPORT

Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.”

- 3.5 There is no local or national guidance on how the three terms should be defined numerically.
- 3.6 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development.
- 3.7 The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It 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.
- 3.8 This aim seeks, where possible, positively to improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.

British Standard 8233:2014

- 3.9 The scope of British Standard 8233: 2014 *Sound insulation and noise reduction for buildings – Code of practice* is the provision of recommendations for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new or refurbished buildings undergoing a change of use.

NOISE IMPACT ASSESSMENT REPORT

- 3.10 The standard suggests suitable internal noise levels for residential dwellings, as shown in Table 1. Below.

Table 1.

Activity	Location	07:00 - 23:00	23:00 - 07:00
		$L_{Aeq, 16 \text{ hour}}$	$L_{Aeq, 8 \text{ hour}}$
Resting	Living Rooms	35	-
Dining	Dining Area	40	-
Sleeping	Bedrooms	35	30

- 3.11 In terms of this development the internal noise levels have been compared to the internal noise levels in Table 1. It is suggested in this report that by meeting these noise levels the development would be classed as NOAEL.

- 3.12 In respect of outdoor amenity areas BS8233:2014 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 $L_{Aeq,T}$ 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.'

- 3.13 With respect to the night-time noise levels, the World Health Organisation guidelines state:

NOISE IMPACT ASSESSMENT REPORT

“Where noise is continuous, the equivalent sound pressure level should not exceed 30dB_A indoors if negative effects on sleep are to be avoided.”

‘For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB LAF max more than 10-15 times per night.’

No specific day time indoor noise levels are proposed but in terms of interference of speech there is reference to a figure of 35dB_A.

British Standard 4142:2014+A1 2019

3.14 The scope of British Standard 4142: *Method for rating industrial noise affecting mixed residential and industrial areas* describes methods for determining, at the outside of a building:

a) noise levels from factories, or industrial premises, or fixed installations, or sources of an industrial nature in commercial premises; and

b) background noise level.

3.15 In particular BS4142 describes the *“use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.”* It sets out a methodology for assessing a noise Rating level which is a combination of absolute or ‘specific’ noise level (in terms of L_{Aeq} average noise level over different durations; 1 hour for daytime and 15 minute at night); and then including penalties to account for character of a noise (i.e. tonality, impulsivity, intermittency and ‘other’).

3.16 BS4142 applies to new noise sensitive developments that are proposed near existing industrial sources, the following paragraph relates to such developments:

“Where a new noise-sensitive receptor is introduced and there is extant industrial and/or commercial sound, it ought to be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise

NOISE IMPACT ASSESSMENT REPORT

mitigation.”

Further to this BS4142:2014 also notes that other standards may be relevant; in this development this would include BS8233:2014.

3.17 The rating levels in BS4142 are as follows:

“a) Typically, the greater this difference, the greater the magnitude of the impact.

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

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

d) 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.”

3.18 BS4142:2014 also states ‘where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration’. In terms of those factors the document states the following: ‘The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as, facade insulation ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and acoustic screening.’

3.19 Where there is an adverse impact in terms of the BS4142 rating mitigation can be proposed to reduce the impact or achieve desirable internal noise levels.

4. Survey Methodology

- 4.1 The survey was conducted over a 48-hour period from October 26th to October 28th 2021. The measurement point can be seen in Figure 1.
- 4.2 The instrument used for the survey was a Svantek 971 sound level meter.
- 4.3 The 971 sound level meter was calibrated immediately before and after use with a Bruel & Kjaer 4230 Acoustic Calibrator producing 94dB at 1KHz and no drift was noted in calibration readings. Both calibration results during the first survey were 93.8dB.
- 4.4 The measurements at MP were taken with the microphone mounted on a tripod on the flat roof at the site. The microphone was housed in a Svantek SA271 outdoor kit a 5-metre extension cable.
- 4.5 The sound level meter was set to log every 15 minutes. The metrics measured were LAEQ , LAFMAX & LA90 and un-weighted Octave band values. No unusual events appear to have occurred during the survey.
- 4.6 The weather during the survey was mainly dry. The temperature ranged between 12°C - 18°C with wind speed less than 5m/s.

5. Noise Survey Results

- 5.1 The table below shows the results of measurements taken during the survey at MP. We have also consulted DEFRA Noise map data for the area. Our noise survey results are in line with the published DEFRA noise map data, see appendix 4.

Table 2. Summary of measured noise levels at MP.

Date	Duration	L _{Aeq,T} (dB)	10 th Highest L _{AF} Max (dB)
26/10/21	12:45 – 23:00	62.9	N/A
26/10/21 & 27/10/21	23:00 – 07:00	58.5	71.7
27/10/21	07:00 – 23:00	63.3	N/A
27/10/21 & 28/10/21	23:00 – 07:00	59.7	70.9
28/10/21	07:00 – 12:45	61.7	N/A

- 5.2 The principles of a BS4142:2014+A1 2019 assessment are summarised in section 3 of this report. The table below sets out the assessment of the potential impact of the commercial activities, in close proximity to the proposed development. As there is intermittent noise from the commercial activity audible at the proposed development this has been accounted for in the BS4142 assessment. Due to the proposed commercial unit, delivery noise has also been assessed in the BS4142 assessment.

It should be noted that there is an electrical sub-station located to the far end of the proposed site on Brookside Road. There was no observed noise or tonality emitted by the sub-station at the time of the survey. However, due to the proximity of the Sub-station to the proposed habitable rooms, further screening may be required in the future to protect the residents if the noise

NOISE IMPACT ASSESSMENT REPORT

profile of the sub-station changed.

Table 3. BS4142 correction table

Commercial Activity	Correction
Correction for tonality	N/A
Correction for intermittency	+3
Correction for impulsivity	N/A
Other sound characteristics	+3

5.3 A correction of 3dB for intermittency has been added for the operation of the various mechanical plant in close proximity of the proposed development and 3dB has been added for the deliveries to the proposed commercial unit.

5.4 The daytime sound pressure level, with correction after the BS4142 assessment, is 69.3dB_A. The night-time sound pressure level correction is only 3dB for the intermittency of the condenser units as activities associated to the commercial unit do not operate at night and shop deliveries occur only during the day. The corrected night-time sound pressure level is 62.7dB_A.

The 'A' weighted sound pressure level cannot be used to define a spectrum or to compare sounds of different frequencies nor can be used to compare laboratory-measured or predicted figures of construction types and materials. Therefore, we have evaluated the un-weighted frequency spectrum of the measured noise data, and based on the corrected noise figures, the figures in table 4 below will be used for the purpose of the acoustic design of the façade of the proposed development.

Table 4. Leq Sound Pressure Level (dB) @ Octave Band Centre Frequency (Hz)

Octave Bands	63Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz	dB(A)
Day	73.0	63.0	62.0	64.0	66.0	63.0	54.0	45.0	69.0
Night	66.0	62.0	59.0	59.0	57.0	57.0	50.0	39.0	63.0

- 5.5 The next sections discuss the sound insulation required based on the external noise data and the BS4142 rating. The calculations were made using the detailed method in BS8233:2014. The insulation to be proposed will take account of the correction for intermittent operation of the commercial activity in the vicinity of the proposed development.

6 Evaluation of results

- 6.1 The suitability of the site for residential development has been determined by comparing the measured noise levels with the criteria set out in Section 3 of this report.
- 6.2 When comparing the results of the measurement point to the Noise Risk Assessment in ProPG, the results show that the site, with no mitigation, is in the medium-risk category during the day and medium risk during the night. The rating during the day includes the 6dB correction for the BS4142 assessment. The night-time result also includes a 6dB correction for the BS4142 assessment.
- 6.3 In terms of good acoustic design the Pro PG states that the following aspects should be properly considered be:
- Check the feasibility of relocating, or reducing noise levels from relevant sources
 - Consider options for planning the site or building layout
 - Consider the orientation of the proposed building(s).
 - Select construction types and methods for meeting building performance requirements.
 - Examine the effects of noise control measures on ventilation, fire regulation, health and safety, cost, CDM (construction, design, and management), etc.
 - Assess the viability of alternative solutions.
 - Assess external amenity area noise.
- 6.4 In terms of the proposed scheme of residential dwelling, the developer has no control or means of reducing noise generated by all sources of traffic or the noise from the commercial plant in close proximity of the development. It is not possible to change the orientation of the layout. Therefore, there are no alternative solutions in this development other than to adequately sound insulate the dwellings to be constructed.

NOISE IMPACT ASSESSMENT REPORT

- 6.5 The development, with suitable façade sound insulation and glazing will be able to meet the recommendations in BS8233:2014 for internal noise. The sound pressure levels, incident upon the proposed façade(s) of the proposed dwelling are not unusual for such an environment. Appropriate façade sound insulation and glazing is proposed in the next section. The same standard of glazing is recommended for all facades of the dwelling and the results of the survey at MP show that this area would require acoustic double-glazing arrangement to meet the internal noise levels in BS8233:2014.
- 6.6 The internal noise levels with windows open during the day would exceed the internal noise levels recommended in BS8233:2014. For this reason, alternative ventilation will be required as part of the design of the development to allow cooling of the dwellings without compromising the internal noise levels. The next section provides more detail on the proposed ventilation of the development. The ventilation discussed later will not involve sealed facades.
- 6.7 With suitable façade, roof and glazing, the internal noise levels at the property are considered acceptable for residential development, as they will be within the range of values deemed to be NOEL. This is consistent with the Noise Policy Statement England. Considering the noise levels as NOEL is justified here as the internal noise levels will meet those recommended in BS8233:2014, which is judged to be the point where there will be no adverse effect on human health.
- 6.8 In terms of other relevant issues, as stated above, with suitable sound insulation the proposed dwellings will comply with national planning guidance and meet the recommended internal noise levels set out in BS8233:2014. The dwellings will be complaint with Pro Pg so that future residents will be adequately protected from external noise.
- 6.9 In terms of unintended adverse consequences, the most likely would relate to ventilation. However, as the development will not have a sealed façade there will not be prevention of control of the personal environment.

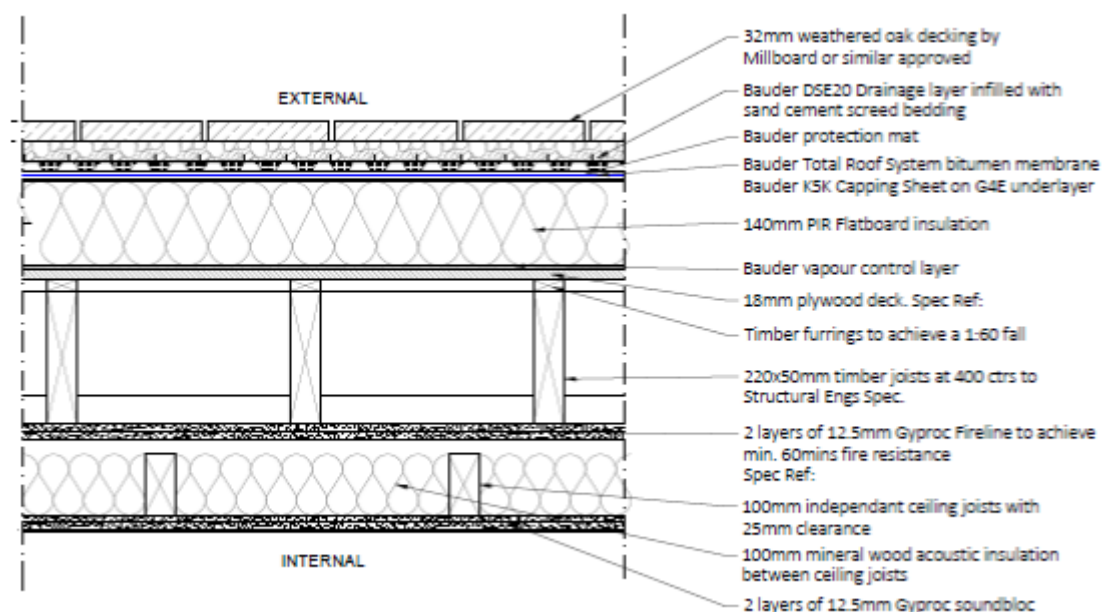
NOISE IMPACT ASSESSMENT REPORT

6.10 In terms of noise levels in the external amenity area at ground floor level, they will be above the recommendations in BS8233:2014, without mitigation. In the next section, there are recommendations for noise reduction in amenity areas.

7. Mitigation

- 7.1 The external façade walls for the proposed building will be cavity masonry walls, which will consist of an outer layer of brickwork, air cavity with insulation, and the inner leaf being concrete blockwork (minimum density 1800-2100 kg/m³), throughout. It is also recommended that the inner leaf be lined with a layer of 12.5mm British Gypsum Soundbloc® plasterboard on Gyproc® lining system or equal approved.
- 7.2 The proposed roof will have an external communal amenity space. Therefore, the minimum recommended roof specification is shown in 3 below, or similar approved. It is recommended that the ceilings should be formed of 2 layers of 12.5mm British Gypsum Soundbloc® plasterboards with taped/sealed joints and plaster skim on a MF suspended ceiling system or similar approved.

Figure 3.



NOISE IMPACT ASSESSMENT REPORT

- 7.3 Glazing performance for all facades, on all dwelling flats, must be a minimum of 39R_W dB (36 R_W + C_{tr} dB) as this is the level of sound reduction needed to meet the recommended sound pressure levels as set-out in BS8233:2014 for L_{Aeq-T} and the L_{AF Max} in the WHO guidance for bedrooms and living rooms and is calculated using the detailed method in BS8233:2014. This can typically be achieved with double-glazing using an acoustic laminate glass with acoustic PVB interlayer laminate such as SGG Stadip Silence or similar approved, of an arrangement of (for example) 10/12/6, which will be sufficient for the purposes of this building in this location. The following table shows the performance required in each octave band centre frequency, or similar approved:

Table 5. Acoustic performance of windows

	Octave band centre frequency, Hz					
	125	250	500	1000	2000	4000
Acoustic Performance	28	28	40	47	51	56

- 7.3 Any glazing manufacturer should provide certificates that their windows will meet the required sound insulation standard; the performance must be for the whole window and not just the glass.
- 7.4 The full sound insulation value of any window cannot be realized if there are air gaps. These commonly occur around frames due to insecure fixing, shrinkage of wood, and poor maintenance. A double-glazed unit must be used in a frame with good seals to realize its full insulating potential. Any gaps or poor fitting could reduce the glazing performance by 2-3dB.
- 7.5 The above glazing recommendation would ensure that during the daytime and night-time noise levels in the property would be 35dB_A and 30dB_A respectively due to external sources.
- 7.6 BS8233:2014 also states that if internal noise standards are achieved only with windows closed an alternative means of ventilation should be provided. The aforementioned British Standard states that an open window will provide 15db

NOISE IMPACT ASSESSMENT REPORT

of sound attenuation, this means that if façade levels are more than 50dB_A during the day or 45dB_A during the night then the internal noise targets will be exceeded with windows open and alternative ventilation is required.

- 7.7 Approved Document F of the Building Regulations has four template systems for ventilation of a dwelling and the description of these systems is in the table below.

Table 6.

Ventilation System	Whole Dwelling Ventilation	Extract Ventilation	Purge Ventilation
System 1: Background ventilators and intermittent extract fans	Background ventilators (trickle vents)	Intermittent extract fans	Typically provided by opening windows
System 2: Passive stack (natural)	Background ventilators (trickle vents) and passive stack ventilation	Continuous via passive stack	Typically provided by opening windows
System 3: Continuous mechanical extract (MEV)	Continuous mechanical extract – minimum low rate Trickle vents provide inlet air	Continuous mechanical extract – minimum high rate Trickle vents provide inlet air	Typically provided by opening windows
System 4: Continuously mechanical supply and extract with heat recovery	Continuous mechanical extract – minimum low rate	Continuous mechanical extract – minimum high rate	Typically provided by opening windows

NOISE IMPACT ASSESSMENT REPORT

- 7.8 Regarding this development, the monitoring data shows that during the day and night the dwellings will have façade noise levels, which are above 50dB_A and 45dB_A respectively. As the façade noise levels during the day and night are exceeded it is recommended that an alternative means of ventilation to just opening windows should be incorporated into the design to allow residents to ventilate the rooms without having to open the windows. The ventilation strategy is likely to be based on one of the four systems set out in Approved Document F of the Building Regulations, as described in Table 6.
- 7.9 As part of the ventilation strategy, the design may use vents or trickle vents. Any trickle ventilators or vents to be fitted to the building should be acoustically lined with a minimum performance of 41 D_{ne,w}.
- 7.10 The table below shows the minimum acoustic performance for trickle vents or vents.

Table 7. Acoustic performance of trickle vents

	Octave band centre frequency, Hz					
	125	250	500	1000	2000	4000
Acoustic Performance	39	38	31	48	53	48

- 7.11 Should a mechanical extract or supply & extract be used as part of the ventilation strategy the noise from such systems should be controlled so as not to cause an unacceptable rise in internal noise levels. The following table proposes indoor ambient noise levels from mechanical services.

NOISE IMPACT ASSESSMENT REPORT

Table 8. Noise from mechanical services.

Ventilation Condition	Possible ADF System	Desirable Internal Ambient Noise Levels from Mechanical Services
ADF- Whole Dwelling Ventilation	System 3 System 4	Bedrooms $\leq L_{Aeq}$ 26dB Living Rooms $\leq L_{Aeq}$ 30dB
ADF- Extract Ventilation	System 1 System 3 System 4	Bedrooms $\leq L_{Aeq}$ 26dB Living Rooms $\leq L_{Aeq}$ 30dB Bathroom/WC/Kitchen $\leq L_{Aeq}$ 45dB
ADF- Purge Ventilation	Manually controlled fan exchanging a minimum of 4 air changes per hour	No desirable noise levels are proposed

7.12 The external amenity areas will be above the upper recommended noise level as set out in BS8233:2014. To reduce the noise to these areas, it is recommended that a 1.2 to 1.6 metre high glazed balustrade is installed to all balcony and rooftop areas, which will reduce the impact of the road noise by at least 5dB at ear height at sitting position. This would reduce the noise in the amenity areas to just above the recommended 55dB L_{Aeq} 16-hour in BS8233;2014.

Appendix 1: Glossary of Terms

Daytime Defined in BS8233 and BS4142 as the period 07:00-23:00 hours.

Night-time Defined in BS8233 and BS4142 as the period 23:00-07:00 hours.

Decibel (dB): A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure levels the reference quantity is 20 uPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.

dB_A : Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB_A broadly agree with people's assessment of loudness. A change of 3 dB is the minimum perceptible under normal conditions, and a change of 10 dB corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB_A ; normal conversation about 60 dB_A at 1 metre; heavy road traffic about 80 dB_A at 10 metres; the level near a pneumatic drill about 100 dB_A .

$L_{A10,T}$: The A weighted noise level exceeded for 10% of the measurement period, T. It gives an indication of the upper limit of fluctuating noise such as that from road traffic.

$L_{A90,T}$: The A weighted noise level exceeded for 90% of the measurement period, T. This is defined in BS 4142 as the background noise level.

L_{AE} : The sound exposure level – the level of a sound with a period of 1 second that has the same sound energy as the event considered.

$L_{Aeq,T}$: The equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T).

$L_{A\text{ Max}}$: The highest A weighted noise level recorded during a noise event. The time weighting (slow or fast) should be stated.

Appendix 2: Instrumentation & Measurement Conditions

Table 8. Instrumentation

Instrumentation Description	Manufacturer	Type	Serial Number	Calibration
Type1 Data Logging Sound Level Meter	Svantek	971	100676	Calibration on 27/11/2020
Type 1 ½" Condenser Microphone	ACO Pacific	7052E	79073	Calibration on 27/11/2020
Preamp	Svantek	SV18	103792	Calibration on 27/11/2020
Acoustic Calibrator	B&K 4230	B&K	1559217	Calibration on 25/05/2021

Table 9. Measurement conditions and Parameters

Weather conditions	Dry, calm, south-easterly wind direction and scattered clouds, air temperature between 12°C - 18°C
Calibration level	93.8 dB @ 1 kHz
Person in charge of measurements	Mr A Naqvi BSc(Hons) MSc MIOA MANC MAES
Principal sound sources	All sources of traffic noise, plant noise and general urban noise
Measurement Parameters	LAeq, LAFmax, LA90 and Octave band LZeq, LZFmax in 15 min periods

Appendix 3: Data

Figure 4. MP

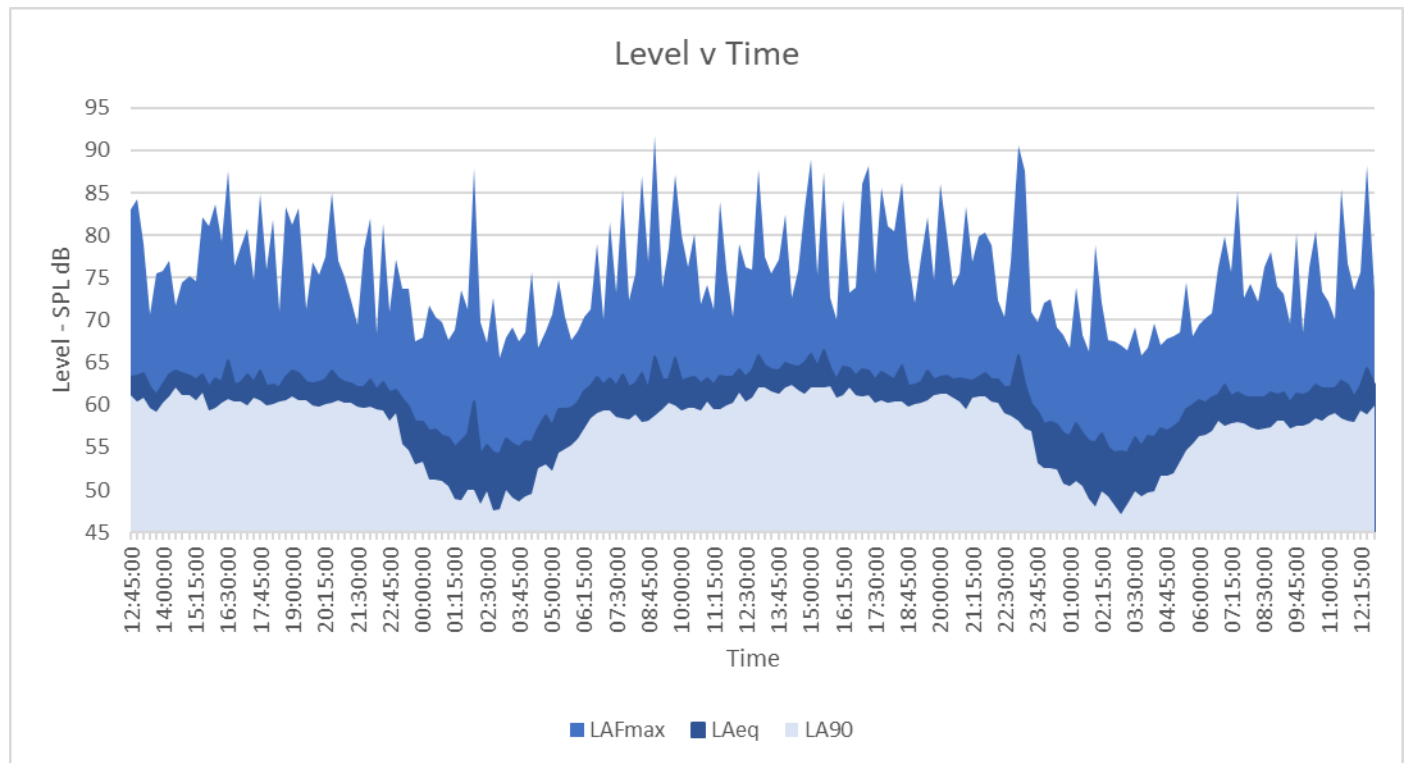


Table 10

Start Time	L _{Aeq} 15min	L _{AF} Max 15min
12:45:00	63.3	83
13:00:00	63.5	84.2
13:15:00	63.7	79
13:30:00	62.1	70.6
13:45:00	61.2	75.5
14:00:00	62.3	75.8
14:15:00	63.6	77
14:30:00	64.1	71.7
14:45:00	63.7	74.5
15:00:00	63.5	75.2
15:15:00	62.9	74.6
15:30:00	63.6	82.2
15:45:00	62	81.1

NOISE IMPACT ASSESSMENT REPORT

16:00:00	63.1	83.6
16:15:00	62.7	79.3
16:30:00	65.3	87.5
16:45:00	62.3	76.4
17:00:00	62.7	78.6
17:15:00	63.6	80.8
17:30:00	62.6	74.8
17:45:00	64.1	84.8
18:00:00	62.2	75.9
18:15:00	62.4	81.9
18:30:00	62	70.9
18:45:00	63.3	83.4
19:00:00	64.1	81.2
19:15:00	63.7	83.2
19:30:00	62.6	71.3
19:45:00	62.5	76.8
20:00:00	62.6	75.4
20:15:00	63	77.4
20:30:00	64.1	85
20:45:00	63.1	77
21:00:00	62.6	75
21:15:00	62.5	72.3
21:30:00	62	69.4
21:45:00	62	78.4
22:00:00	63	82
22:15:00	61.8	68.4
22:30:00	62.6	81.4
22:45:00	61.5	70.9
23:00:00	61.8	77.2
23:15:00	60.7	73.7
23:30:00	59.8	73.7
23:45:00	58	67.5
00:00:00	58	67.9
00:15:00	57	71.7
00:30:00	57.1	70.3
00:45:00	56.4	69.8
01:00:00	56.2	67.7
01:15:00	55	68.9
01:30:00	55.7	73.5
01:45:00	56.5	71.3
02:00:00	60.4	87.8
02:15:00	54	69.8
02:30:00	55.3	67.4

NOISE IMPACT ASSESSMENT REPORT

02:45:00	54.4	72.6
03:00:00	54.2	65.6
03:15:00	56.1	67.9
03:30:00	55.4	69.1
03:45:00	55	67.5
04:00:00	55.8	68.5
04:15:00	55.6	75.7
04:30:00	57.2	66.7
04:45:00	58.8	68.7
05:00:00	57.5	70.7
05:15:00	59.5	74.7
05:30:00	59.5	70.3
05:45:00	59.7	67.7
06:00:00	60.2	68.7
06:15:00	61.6	70.4
06:30:00	62.2	71.3
06:45:00	63.2	79
07:00:00	62.4	70
07:15:00	63.1	81.6
07:30:00	62.2	73.3
07:45:00	63.6	85.3
08:00:00	62	72.4
08:15:00	62.5	75.5
08:30:00	63.7	86.9
08:45:00	61.8	76.8
09:00:00	65.7	91.7
09:15:00	62.9	73.9
09:30:00	63	78.5
09:45:00	65.5	87.1
10:00:00	62.8	80
10:15:00	63.1	76.3
10:30:00	63.2	80.1
10:45:00	62.5	71.8
11:00:00	63.1	74.1
11:15:00	62.3	71.2
11:30:00	63.4	84
11:45:00	63.2	75.9
12:00:00	63.3	70.3
12:15:00	64.2	78.9
12:30:00	63.3	76.3
12:45:00	64	75.9
13:00:00	65.8	87.7
13:15:00	64.6	77.4

NOISE IMPACT ASSESSMENT REPORT

13:30:00	64.2	75.5
13:45:00	64	77.1
14:00:00	65	82.5
14:15:00	64.6	72.6
14:30:00	64.5	75.8
14:45:00	64.9	83.1
15:00:00	66	89
15:15:00	64.5	75.4
15:30:00	66.4	87.4
15:45:00	64.4	72.6
16:00:00	62.9	70
16:15:00	64.5	84.1
16:30:00	64.3	73.3
16:45:00	63.5	73.8
17:00:00	64.2	86
17:15:00	64.1	88.2
17:30:00	63	75.5
17:45:00	63.9	85.6
18:00:00	63.5	81.1
18:15:00	63	80.5
18:30:00	64.7	86.2
18:45:00	62.2	77.3
19:00:00	62.3	72
19:15:00	62.6	77.4
19:30:00	64.1	82.1
19:45:00	63	74.8
20:00:00	63.3	86.1
20:15:00	63.4	80.1
20:30:00	62.9	74
20:45:00	63.1	75.5
21:00:00	63	83.4
21:15:00	62.8	76.8
21:30:00	63.2	79.8
21:45:00	63.7	80.4
22:00:00	63	78.8
22:15:00	63	72.3
22:30:00	62.1	70.3
22:45:00	62	76.9
23:00:00	65.8	90.6
23:15:00	62.3	87.6
23:30:00	60.1	70.9
23:45:00	59.2	69.7
00:00:00	57.7	72

NOISE IMPACT ASSESSMENT REPORT

00:15:00	58	72.5
00:30:00	57.7	69.2
00:45:00	56.6	68.2
01:00:00	56.3	66.8
01:15:00	57.8	73.9
01:30:00	56.7	68.3
01:45:00	55.7	66.3
02:00:00	55.6	78.8
02:15:00	56.7	72
02:30:00	55	67.6
02:45:00	54.4	67.5
03:00:00	54.5	67
03:15:00	54.4	66.4
03:30:00	56.2	69.1
03:45:00	55.2	65.8
04:00:00	56.3	66.7
04:15:00	56.2	69.6
04:30:00	57.3	67.1
04:45:00	57	67.8
05:00:00	57.4	68.1
05:15:00	58	68.5
05:30:00	59.5	74.4
05:45:00	59.9	68.1
06:00:00	60.5	69.5
06:15:00	60.3	70.2
06:30:00	60.8	70.8
06:45:00	61.1	76.2
07:00:00	62.3	79.9
07:15:00	61	75.7
07:30:00	61.5	85.1
07:45:00	61	72.6
08:00:00	60.8	74.3
08:15:00	60.8	72.2
08:30:00	60.9	76.2
08:45:00	61.4	78
09:00:00	61.2	74
09:15:00	61.4	73.1
09:30:00	60.3	69.6
09:45:00	61.3	80.2
10:00:00	61.2	68.6
10:15:00	61.4	76.3
10:30:00	62.4	80.5
10:45:00	61.9	73.4

M S 4 Architects Ltd

152 – 154 Uxbridge Road, Hayes

NOISE IMPACT ASSESSMENT REPORT

11:00:00	61.9	72.2
11:15:00	61.9	70.1
11:30:00	62.8	85.4
11:45:00	62.3	76.7
12:00:00	60.9	73.5
12:15:00	62.2	75.7
12:30:00	64.4	88.2
12:45:00	62.4	73.2

Appendix 4: DEFRA Noise Map

Figure 5. DEFRA day time noise map – site location pointer in black

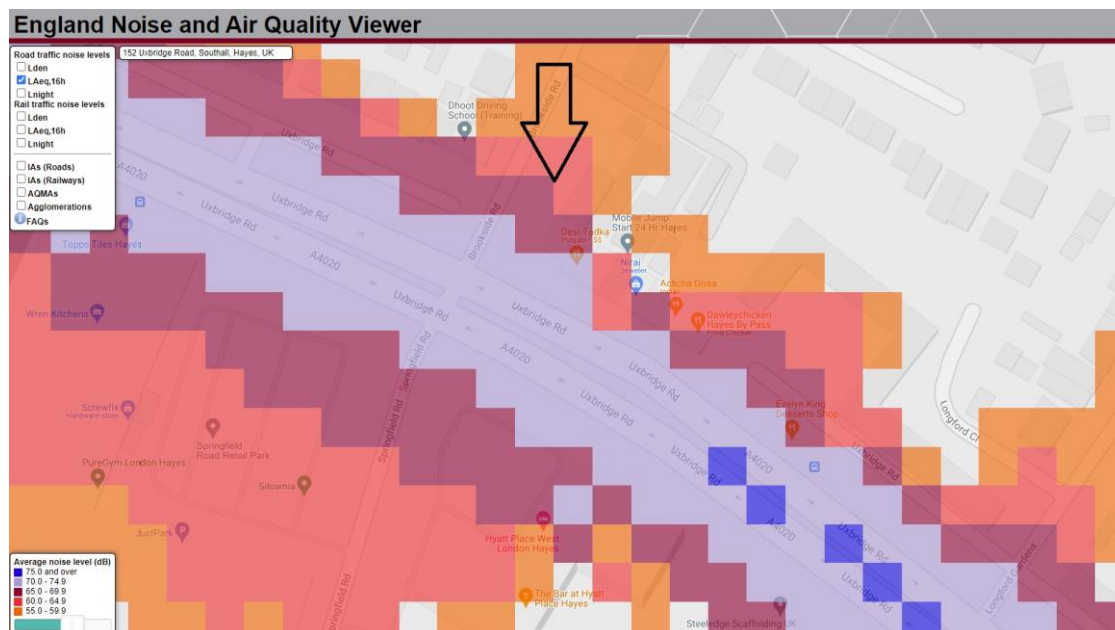
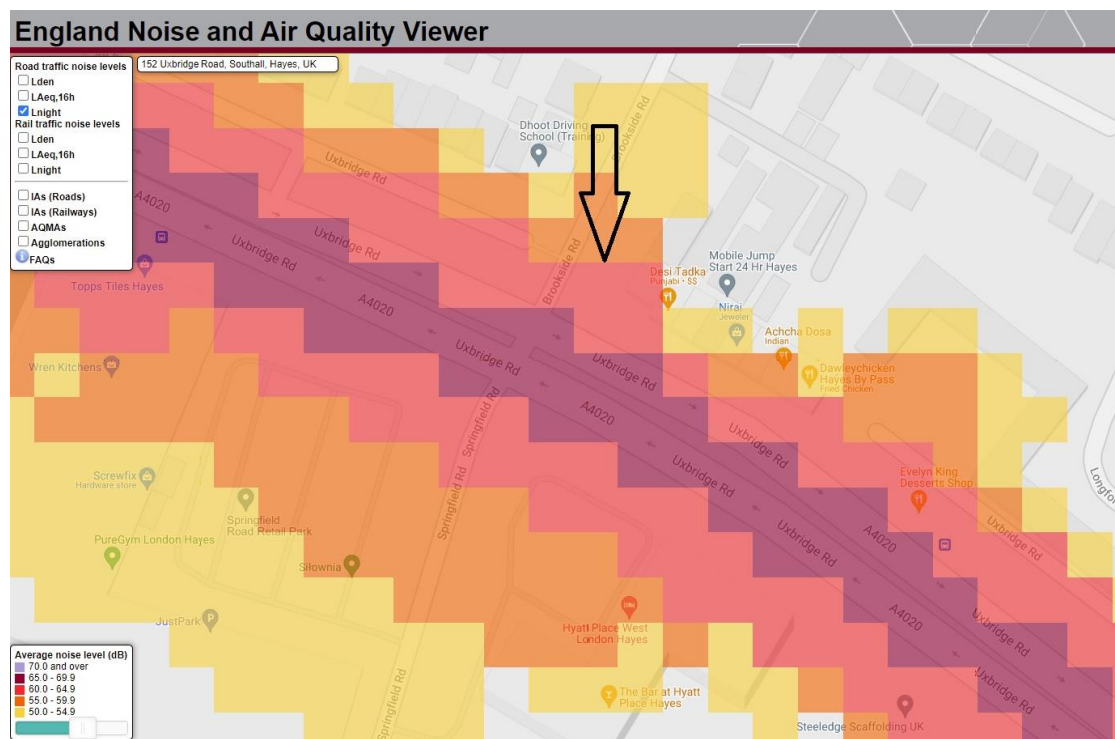


Figure 6. DEFRA night time noise map – site location pointer in black



NOISE IMPACT ASSESSMENT REPORT

This report was completed by Sonic Element Ltd on the basis of a defined programme of work and terms and conditions agreed with the client. The report has been prepared with all reasonable skill, care and diligence within the terms of the Contract with the Client and taking into account the project objectives, the agreed scope of works, prevailing site conditions and the degree of manpower and resources allocated to the project. Recommendations in this report are for acoustics purposes only, and it is the responsibility of the Project Manager or Architect to ensure that all other requirements are met including (but not limited to) structure, fire and Building Controls.

Sonic Element Ltd accepts no responsibility, following the issue of the report, for any matters arising outside the agreed scope of the works. Any surveys were conducted and this report has been prepared for the private and confidential use of the client only and cannot be reproduced in whole or in part or relied upon by any third party for any use whatsoever without the express written authorisation of Sonic Element Ltd. If any third party whatsoever comes into possession of this report, they rely on it at their own risk and Sonic Element Ltd accepts no duty or responsibility to any such third party.

Unless specifically assigned or transferred within the terms of the agreement, Sonic Element Ltd retains all copyright and other intellectual property rights, on and over the report and its contents.

© Sonic Element Ltd 2021