



BETTER SOLUTIONS, INTELLIGENTLY ENGINEERED

ENVIRONMENTAL PLANNING

Proposed Residential Development,
Henblas Square,
Wrexham

Noise Impact Assessment

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Proposed Residential Development,
Henblas square,
Wrexham

Noise Impact Assessment

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December 2018

DOCUMENT ISSUE RECORD

Revision	Date of Issue	Status	Author:	Checked:	Approved:
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EXECUTIVE SUMMARY

A Noise Impact Assessment has been undertaken to support a planning application for a proposed residential development on Henblas Square in Wrexham. The development comprises residential units on the first floor of an existing building, above existing retail units.

To inform the assessment, a baseline noise survey was undertaken in November 2018 at the Site, to determine the current noise environment on the Site.

This assessment considers the effect of the prevailing noise environment on the proposed noise sensitive elements of the development and sets noise level limits for the proposed noise generating elements of the development.

The assessment draws on the guidance within relevant local and national planning policy, guidance documents and British Standards and concludes that the site is suitable for the proposed use and that desirable internal conditions can be achieved in the proposed residential units.

Noise Level limits have been derived for proposed fixed plant items based on the requirements of BS 4142:2014, to ensure that noise from these sources have a low impact.

It is considered therefore that noise need not be a determining factor in granting planning consent for the proposed development.

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1. INTRODUCTION

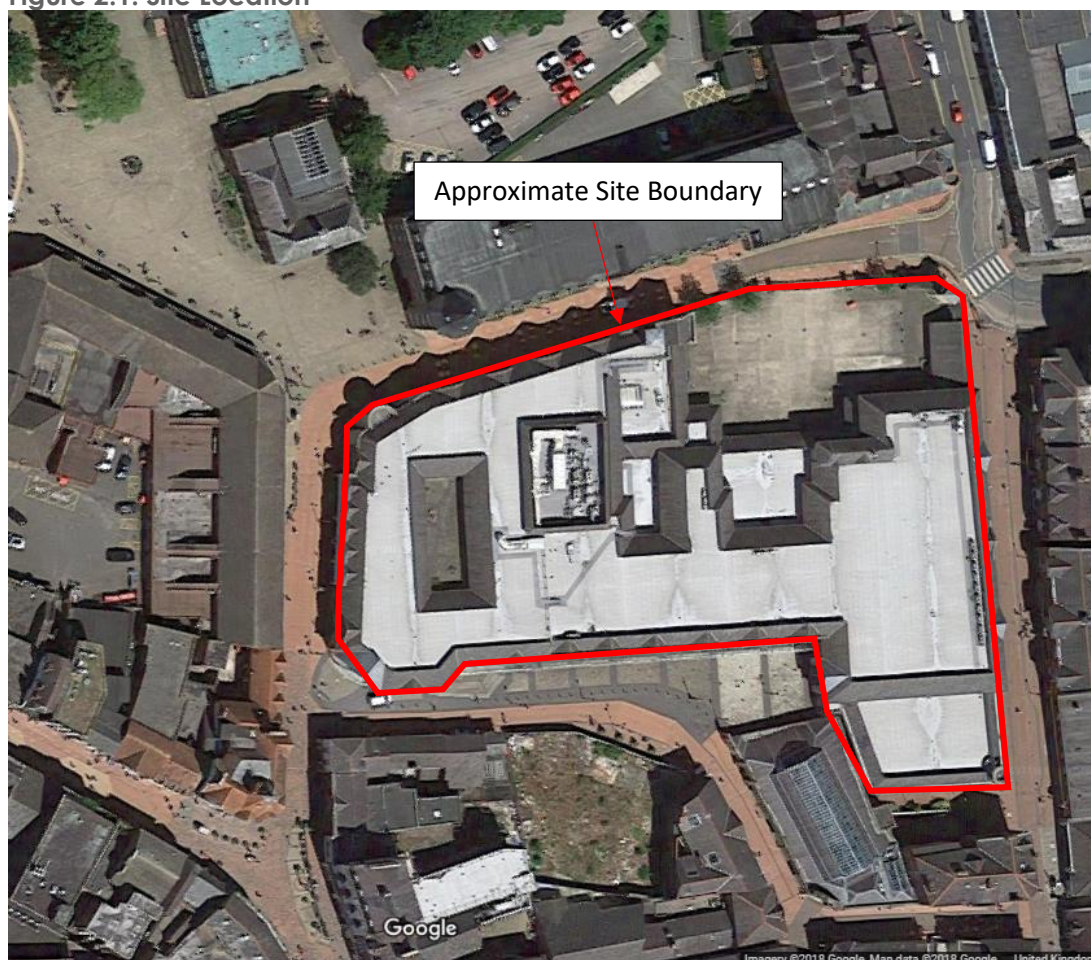
- 1.1 A Noise Impact Assessment has been undertaken to support a planning application for a proposed residential development on Henblas Square in Wrexham. The development comprises residential units on the first floor of an existing building, above existing retail units.
- 1.2 To inform the assessment, a baseline noise survey was undertaken in November 2018 at the Site, to determine the current noise environment on the Site.
- 1.3 This assessment considers the effect of the prevailing noise environment on the proposed noise sensitive elements of the development and sets noise level limits for the proposed noise generating elements of the development.
- 1.4 The assessment draws on the guidance within relevant planning policy, guidance documents and British Standards.
- 1.5 Whilst every effort has been made to ensure that this report is easy to understand, it is technical in nature. To assist the reader, a glossary of terminology is included in **Appendix A**.

2. SITE SETTING

Site Location

- 1.1 The site is located in the centre of Wrexham, to the southeast of Queens Square. The site is bounded to the north by Lambpit Street, to the east by Chester Street, to the south by Henblas Street and to the west by Queen Street. The area surrounding the site is pedestrianised and contains mostly retail or mixed retail and residential buildings.
- 1.2 The site location is shown in **Figure 2.1** below.

Figure 2.1: Site Location



Proposed Development

- 2.1 The proposed development comprises refurbishment of an existing two storey commercial building to introduce new residential flats at first floor level in the western and southern portions of the site, overlooking Henblas Street, Queen Street and a small part of Lambpit Street. The residential units are set well away from the nearest pubs at the eastern end of Lambpit Street to the north. **Figures 2.2** and **2.3** show the proposed layout for the ground floor and first floor respectively.

Figure 2.2: Proposed Ground Floor Layout

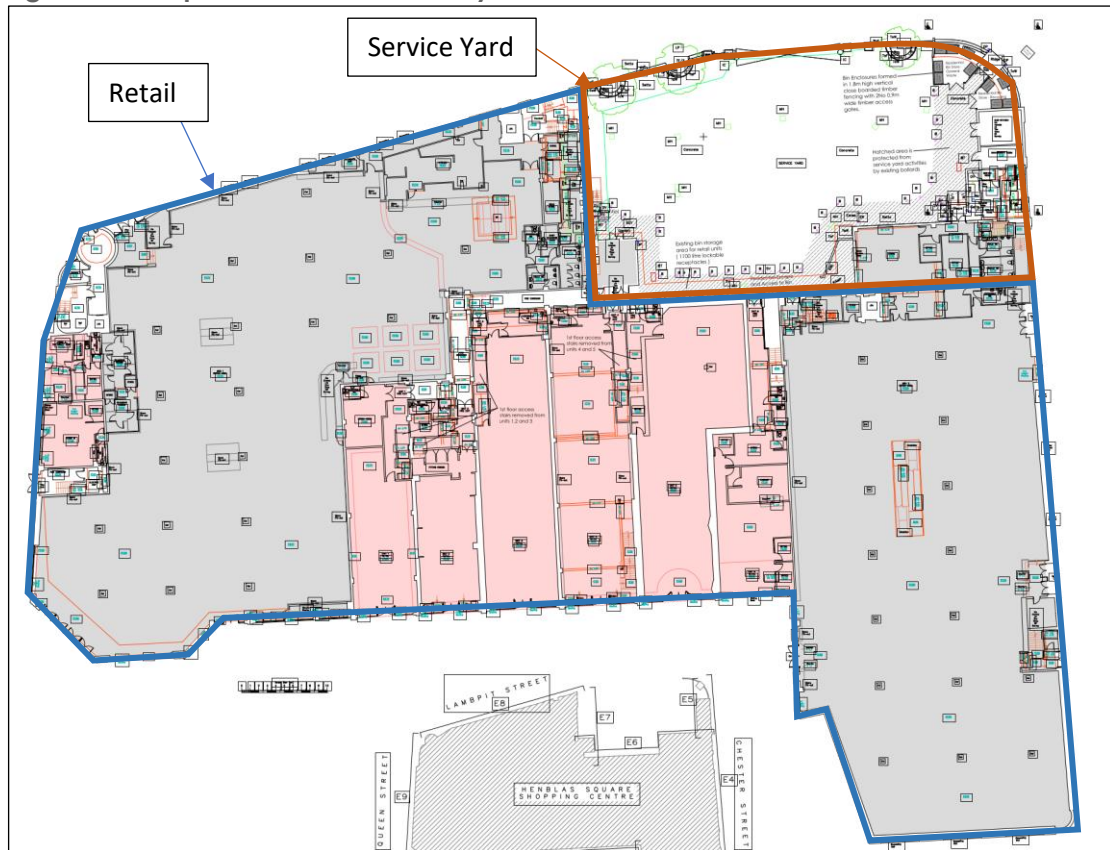
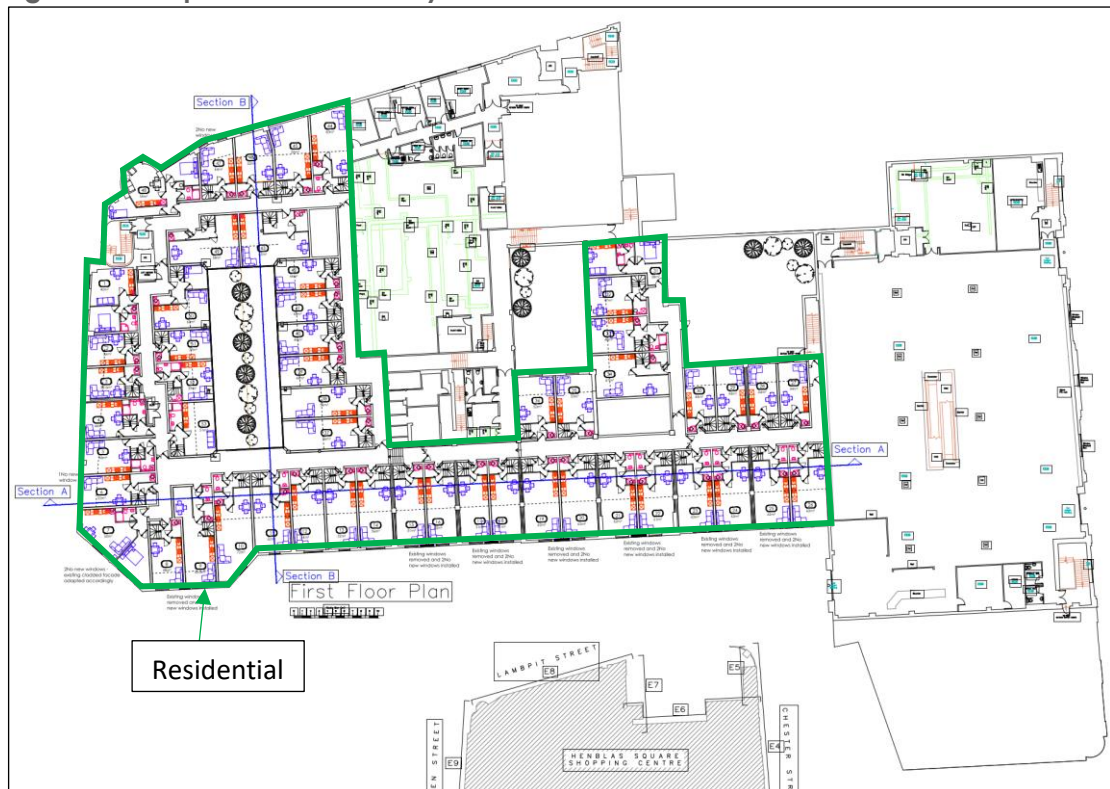


Figure 2.3: Proposed First Floor Layout



3. STANDARDS AND GUIDANCE

Welsh Government: Technical Advice Note (TAN) 11: Noise (1997)

- 3.1 This note provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business. It outlines some of the main considerations which local planning authorities should take into account in drawing-up development plan policies and when determining planning applications for development which will either generate noise or will be exposed to existing noise sources.
- 3.2 The note derives Noise Exposure Categories (NECs) to assist local planning authorities in their consideration of planning applications for residential development near transport related noise sources in a similar way to the now superseded Planning Policy Guidance 24: *Planning and Noise* 1994. There are four NECs A to D, as detailed in **Table 3.1** below.

Table 3.1: Noise Exposure Categories from TAN11

Noise Exposure Categories	
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example, because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

- 3.3 Recommended numerical values are assigned to the NEC categories in Annex A of TAN11, as detailed in **Table 3.2** below.

Table 3.2: Recommended Numerical Values for Noise Exposure Categories

Noise Levels ⁽¹⁾ corresponding to the Noise Exposure Categories for New Dwellings L _{Aeq,T} dB					
Noise Source	Time Period	Noise Exposure Category			
		A	B	C	D
road traffic	0700-2300	<55	55-63	63-72	>72
	2300-0700 ⁽²⁾	<45	45-57	57-66	>66
rail traffic	0700-2300	<55	55-66	66-74	>74
	2300-0700 ⁽²⁾	<45	45-59	59-66	>66
air traffic ⁽³⁾	0700-2300	<57	57-66	66-72	>72
	2300-0700 ⁽²⁾	<48	48-57	57-66	>66

Noise Levels ⁽¹⁾ corresponding to the Noise Exposure Categories for New Dwellings					
L _{Aeq,T} dB					
Noise Source	Time Period	Noise Exposure Category			
		A	B	C	D
mixed sources ⁽⁴⁾	0700-2300	<55	55-63	63-72	>72
	2300-0700 ⁽²⁾	<45	45-57	57-66	>66
Notes ⁽¹⁾ Noise levels: the noise level(s) (L_{Aeq,T}) used when deciding the NEC of a site should be representatives of typical conditions. ⁽²⁾ Night-time noise levels (2300-0700): sites where individual noise events regularly exceed 82dB_{L_{Amax}} (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the L_{Aeq,8H} (except where the L_{Aeq,8H} already puts the site in NEC D). ⁽³⁾ Aircraft noise: daytime values accord with the contour values adopted by the Department of Transport which relate to levels measured 1.2m above open ground. For the same amount of noise energy, contour values can be up to 2 dB(A) higher than those of other sources because of ground reflection effects. ⁽⁴⁾ Mixed sources: this refers to any combination of road, rail, air and industrial noise sources. The "mixed source" values are based on the lowest numerical values of the single source limits in the table. The "mixed source" NECs should only be used where no individual noise source is dominant. To check if any individual noise source is dominant (for the purposes of this assessment) the noise level from the individual sources should be determined and then combined by decibel addition (remembering first to subtract 2 dB(A) from any aircraft noise contour values). If the level of any one source then lies within 2 dB(A) of the calculated combined value, that source should be taken as the dominant one and the site assessed against the appropriate NEC for that source, rather than using the "mixed source" NECs. If the dominant source is industrial noise see paragraph B17 of Annex B. If the contribution of the individual noise sources to the overall noise level cannot be determined by measurement and/or calculation, then the overall measured level should be used and the site assessed against the NECs for "mixed sources".					

BS 8233:2014: Guidance on Sound Insulation and Noise Reduction for Buildings (BS 8233)

- 3.4 This standard provides guidance for the control of noise in and around buildings. The guidance provided within the document is applicable to the design of new buildings, or refurbished buildings undergoing a change of use.
- 3.5 The guidance provided in BS 8233 includes "desirable" internal and external noise level criteria which are applicable to dwellings for steady external noise sources. It is stated that it is desirable that the internal ambient noise level does not exceed the following criteria set out in **Table 3.3**.

Table 3.3: Summary of Internal Ambient Noise Levels to be achieved in Habitable Rooms when Assessed in Accordance with BS 8233

Activity	Location	Period	
		07:00 to 23:00 Hours, i.e. Daytime	23:00 to 07:00 Hours, i.e. Night-time
Resting	Living Room	35 dB L _{Aeq} , 16 Hour	-
Dining	Dining Room/area	40 dB L _{Aeq} , 16 Hour	-
Sleeping (daytime resting)	Bedroom	35 dB L _{Aeq} , 16 Hour	30 dB L _{Aeq} , 8 Hour

- 3.6 With respect to external amenity space such as gardens and patios it is stated that it is desirable that the 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. It is then confirmed that higher external noise criteria may be appropriate under certain circumstances such

as within urban areas, and locations adjoining the strategic transportation network, where it may be necessary to compromise between elevated noise levels and other factors such as convenience of living, and efficient use of land resource.

BS 4142: 2014 Methods for Rating and Assessing Industrial and Commercial Sound (BS 4142)

- 3.7 The BS 4142 Standard describes methods for rating and assessing the following:
- Sound from industrial and manufacturing processes;
 - Sound from fixed installations which comprise mechanical and electrical plant and equipment;
 - Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
 - 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 movements on or around an industrial and/or commercial site.
- 3.8 The methods 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. The Standard advises the purpose of the methodology includes the assessment of sound from any plant and activities associated with existing industrial and/or commercial uses at proposed residential dwellings.
- 3.9 If appropriate, the specific sound level of the source ($L_{Aeq,T}$) is corrected, by the application of one or more corrections for acoustic features such as tonal qualities and/or distinct impulses, to give a 'rating' level ($L_{Ar,Tr}$). The Standard effectively compares and rates the difference between the rating level of the specific sound and the typical background sound level ($L_{A90,T}$) in the absence of the specific sound.
- 3.10 The Standard advises that the time interval ('T') of the background sound measurement should be sufficient to obtain a representative or typical value of the background sound level at the time(s) the source in question operates or is proposed to operate in the future.
- 3.11 Comparing the rating level with the background sound level, BS 4142 states:

"Typically, the greater this difference, the greater the magnitude of impact.

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."

Consultation with Wrexham Council

- 3.12 Consultation was undertaken with Wrexham Council, first by phone and then by e-mail on the 16th November 2018. The consultation e-mail included the following survey and assessment methodology:

"Baseline Noise Survey

A baseline noise survey has been undertaken on the site during periods representative of the daytime and night-time. Measurements were taken around the site perimeter to ensure that noise levels were determined across the entire site. The locations identified in the image below were adopted during the baseline noise survey [replicated in Figure 4.1].

Measurements were undertaken at Measurement Location 1 continuously for the entire night-time period (23:00 – 07:00), daytime measurements were not possible at this location during the daytime as workers on the site were using the service yard, affecting the measured levels. Rotational 15-minute measurements were made at locations 2 – 6 between 1:30 am and 03:00 am (quietest night-time period), 06:45 am and 08:00 am (worst case night-time/early morning) and in the middle of the day starting at circa 12:00 and a further round of measurements starting at 15:00 (typical daytime levels).

In addition to the above measurements, a further measurement location was adopted adjacent to Chester Road to allow a 3-hour CRTN measurement to be undertaken where traffic was free-flowing. The location adopted is labelled on the image below [No longer relevant, see comments below].

The survey therefore included measurements surrounding the site during the daytime and night-time and a 3-hour measurement of the only significant road traffic noise source in the area.

Assessment Methodology

It was requested that the assessment be undertaken in accordance with Technical Advice Note (TAN) 11: Noise 1997. The assessment will therefore be undertaken in full accordance with the TAN11 guidance and NEC categories will be determined for the site.

It was mentioned that noise from the public houses adjacent to the site should be considered in the assessment, and Measurement Location 1 captured noise from patrons leaving the adjacent pubs and walking up Lambpit Road. Therefore, an assessment will be included based on the measured levels.

It was mentioned that there have been no noise complaints from residents surrounding the site, with the exception of complaints during temporary construction works to install new road furniture on Lambpit Street.

It was raised by BWB that there may be an occasional market on Queens Square near to a small section of the site. It was agreed that, as the market only occurs during the day, infrequently and is unlikely to significantly affect residents of the proposed development, that this source should be scoped out of the assessment."

- 3.13 A response was received from Wrexham Council on the 20th November the comments from which were as follows:

"1) Assuming that there is some form of residential development at monitoring location 2, this would be the area most likely to experience noise from both the Seven Stars (Saith Seren) and Welsh Fusilier and therefore a more appropriate location for night time noise monitoring.

2) As discussed, I checked the frequency of the outdoor markets at Queens Square and been advised that they are every Monday. This may cause early morning noise to residents and therefore should be assessed.

3) I have checked and confirmed that the third public house I mentioned (The Talbot) on Queens Street has ceased operation.

4) A minor point that will not have any bearing on the report, but in the interest of accuracy, the noise complaint I referred to was for the street works (resurfacing on the pedestrianised streets) on Queen Street and Hope Street."

- 3.14 The consultation was undertaken before the areas proposed for residential development were known. As the closest receptors to the Seven Stars and Welsh Fusilier will be approximately 100 m away, and fully screened from the establishments, it is now considered that an assessment of impact from these sources is unwarranted. This is also the case for Chester Road, which is approximately 100 m from the worst affected residential receptors and will be fully screened from them. Therefore, the 3-hour CRTN measurement adjacent to Chester Road is no longer considered relevant to the assessment.

- 3.15 Measurements were undertaken on a Monday market day, so that point 2 can be properly addressed.

4. BASELINE NOISE SURVEY

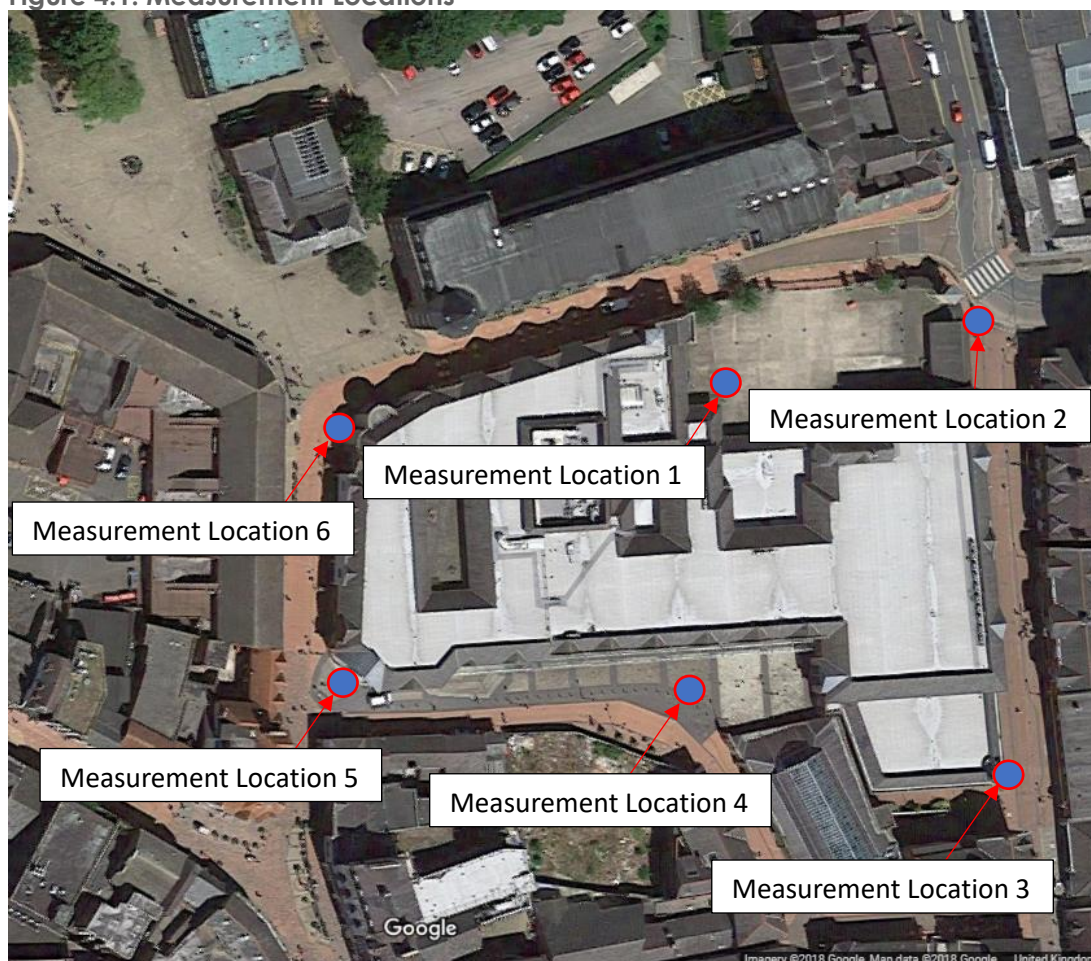
Summary

- 4.1 To inform the assessment a baseline noise survey was undertaken on the site in November 2018.
- 4.2 There were no significant noise sources identified in the vicinity of the proposed residential receptors. Therefore, rotational measurements were undertaken at locations representative of each elevation of the proposed development, in free-field conditions, to benchmark current noise levels incident on each elevation.
- 4.3 A summary of the baseline noise survey methodology and relevant results is included below.

Survey Methodology

- 4.4 A survey comprising a series of attended short-term measurements and one unattended long-term location, was undertaken between approximately 23:00 on the 12th November and 16:00 on the 13th November 2018 at the locations identified in **Figure 4.1**.

Figure 4.1: Measurement Locations



Measurement Location 1

- 4.5 Monitoring was undertaken in the service yard of the development at a position which was screened from surrounding noise sources. This location was used to monitor background noise levels over the entire night-time period (23:00 – 07:00). Daytime measurements at this location were not possible due to workers on site using the service yard.
- 4.6 The microphone was at 1.5 m above local ground in free-field conditions.

Measurement Locations 2 to 6

- 4.7 Rotational 15-minute measurements were made at locations 2 – 6 between 1:30 am and 03:00 am (night-time period) and 06:45 am and 08:00 am (early morning).
- 4.8 Further measurements were undertaken at locations 2,3,4 and 6 in the middle of the day starting at circa 12:00 and a further round of measurements starting at circa 15:00 (typical daytime levels).
- 4.9 Measurement Locations 1 to 3 have been used to determine typical background noise levels to derive noise level limits for any fixed plant items. Measurement Locations 4 to 6 are representative of the proposed residential receptors and have been used to determine site suitability for residential development.
- 4.10 Further measurements were undertaken at Measurement Location 6 on Monday 19th November between 13:18 and 14:18 to determine noise levels during activities at the Monday market in Queens Square.
- 4.11 All measurement positions were at 1.5 m above local ground in free-field conditions.

Measurement Equipment

- 4.12 The Class 1 measurement equipment used during the baseline noise survey is detailed in **Table 4.1**.
- 4.13 Measurement equipment was calibrated using a portable calibrator immediately before and after the measurements with no significant drift in calibration observed. The sound level meter, pre-amplifier and microphone were calibrated to traceable standards within the 24 months prior to the measurements. The portable calibrator was calibrated within 12 months of the date of the survey.

Table 4.1 – Noise Measurement Equipment

Equipment	Make & Model	Serial Number	Calibration due Date
Sound Level Meter	01 dB Fusion	11327	April 2019
Pre-amplifier	01 dB PRE 22	1605201	
Microphone	Grass 40CE	259479	
Sound Level Meter	Svantek 958	59187	May 2019

Equipment	Make & Model	Serial Number	Calibration due Date
Pre-Amplifier	Svantek SV12L	49917	
Microphone	GRAS 40AE	266455	
Calibrator	01dB-Stell CAL21	34675335	August 2020

Meteorological Conditions

- 4.14 The weather throughout attended measurement periods remained conducive to environmental noise measurement, it being dry with negligible winds (<5ms⁻¹).

Measurement Results

- 4.15 **Tables 4.2 to 4.4** present a summary of the measured noise levels from Measurement Locations 1 to 6. Full measurement results from Measurement Location 1 are included in **Appendix B**.

Table 4.2 – Summary of Measured Noise levels at Measurement Location 1, dB, Free-field

Start time and date	Period	L _{Aeq}	L _{AFmax}	L _{A90}
23:00 13/11/2018	Night-time (23:00 – 07:00)	44.5	70.1 ¹	36.0 ²

¹ Taken to be the 90th percentile of measured L_{AFmax,15m} periods during the night-time.
² Taken to be the average of measured L_{A90,15m} noise levels during the measurement period.

Table 4.3 – Summary of Measured Noise levels at Measurement Locations 2 to 6, dB, Free-field

Period	Start Date and Time	Sound Pressure Levels		
		L _{Aeq}	L _{Afmax}	L _{A90}
Measurement Location 2				
Night-time	11/13/2018 1:34:17 AM	51.8	70.2	36.5
Early morning	11/13/2018 6:42:02 AM	57.1	70.3	44.7
Middle of the day	11/13/2018 11:49:25 AM	54.7	-	49.9
Afternoon	11/13/2018 14:53:56 PM	58.7	-	50.7
Measurement Location 3				
Night-time	11/13/2018 1:51:18 AM	37.2	51.7	31.5
Early morning	11/13/2018 6:58:48 AM	56.7	-	45.3
Middle of the day	11/13/2018 12:05:44 PM	50.2	-	46.0
Afternoon	11/13/2018 15:10:44 PM	55.6	-	45.2
Measurement Location 4				
Night-time	11/13/2018 2:08:39 AM	36.6	57.8	34.2
Early Morning	11/13/2018 7:21:45 AM	49.0	-	46.9
Middle of the day	11/13/2018 12:22:57 PM	58.3	-	53.8
Afternoon	11/13/2018 3:29:42 PM	54.3	-	48.7
Measurement Location 5				
Night-time	11/13/2018 2:25:16 AM	34.3	50.7	31.8
Early Morning	11/13/2018 7:37:47 AM	51.9	-	45.8
Measurement Location 6				

Period	Start Date and Time	Sound Pressure Levels		
		L _{Aeq}	L _{Afmax}	L _{A90}
Night-time	11/13/2018 2:41:32 AM	35.1	48.4	31.3
Early morning	11/13/2018 8:24:35 AM	54.0	-	49.6
Middle of the day	11/13/2018 12:38:55 PM	54.7	-	51.1
Afternoon	11/13/2018 3:46:30 PM	55.7	-	48.4

4.16 **Table 4.4** details the noise levels at Measurement Location 6 during activities at the Monday market in Queens Square.

Table 4.4 – Summary of measured noise levels at Measurement Location 6 on Market Day, dB, Free-field

Start time and date	Period	L _{Aeq}
13:18 19/11/2018	1-hour	60.2

5. ASSESSMENT

Site Suitability

- 5.1 Noise levels measured at Measurement Locations 4 to 6 are considered representative of noise levels incident on the residential elements of the development, and therefore this section of the assessment uses the data from these locations to determine the suitability of the site for residential development.
- 5.2 During the survey it was noted that the dominant noise sources at Measurement Locations 4 to 6 were noise from pedestrians and natural sounds (mainly seagulls in the morning periods). Therefore, it is considered appropriate to use the Mixed Sources NEC values for this assessment. These are the most stringent values from TAN11.
- 5.3 The assessment of site suitability for residential development in accordance with TAN11 should be undertaken based on typical conditions (see note 1 of **Table 3.2**), therefore the daytime and night-time L_{Aeq} measurements have been averaged to determine typical daytime and night-time noise levels at Measurement Locations 4 to 6, as detailed in **Table 5.1** below. The table also includes the corresponding NECs. Consideration of noise from market days has not been included in this section, as the market only occurs once a week (on Monday mornings) and is therefore not typical.

Table 5.1: Typical L_{Aeq} noise levels at Measurement Locations 4 to 6

Measurement Location	Period	$L_{Aeq,T}$	NEC
4	Night-time (23:00 – 07:00)	36.6	A
	Daytime (07:00 – 23:00)	53.9	A
5	Night-time (23:00 – 07:00)	34.3	A
	Daytime (07:00 – 23:00)	51.9	A
6	Night-time (23:00 – 07:00)	35.1	A
	Daytime (07:00 – 23:00)	54.8	A

- 5.4 From **Table 5.1**, it can be seen that the site falls into NEC A. The guidance from TAN11 regarding NEC A states the following:

“Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as desirable.”

- 5.5 It is therefore considered that noise need not be a determining factor in granting planning permission for the residential development.

Internal Noise Levels

- 5.6 This section predicts internal noise levels within the proposed residential development based on the results of the baseline noise survey.
- 5.7 In the first instance, consideration has been given to internal noise levels with partially open windows, as a worst case. However, it should be noted that internal noise sensitive spaces will be ventilated using trickle ventilators, therefore windows are not required to remain open for background ventilation purposes, only for rapid or purge ventilation or occupant's choice.
- 5.8 Internal noise levels can be estimated by applying a -15 dB correction to external free-field noise levels in accordance with Section G.1 of BS 8233. **Table 5.2** below details estimated internal noise levels with windows open on elevations represented by Measurement Locations 4, 5 and 6. Internal noise level predictions during a Monday market day at Measurement Location 6 are also included based on the measured noise level from **Table 4.4**.

Table 5.2 – Estimated Internal Noise Levels with Windows Open, dB

Measurement Location	Period	External $L_{Aeq,T}$	Internal $L_{Aeq,T}$
4	Night-time (23:00 – 07:00)	36.6	21.6
	Daytime (07:00 – 23:00)	53.9	38.9
5	Night-time (23:00 – 07:00)	34.3	19.3
	Daytime (07:00 – 23:00)	51.9	36.9
6	Night-time (23:00 – 07:00)	35.1	20.1
	Daytime (07:00 – 23:00)	54.8	39.8
6 (Market day)	Daytime (07:00 – 23:00)	60.2	45.2

- 5.9 It can be seen from **Table 5.2** above, that the 35 dB $L_{Aeq,16h}$ desirable guideline value from BS 8233 is predicted to be exceeded with partially open windows during the daytime. The 30 dB $L_{Aeq,8h}$ night-time desirable guideline value is predicted to be achieved with partially open windows. Consideration has been given to internal noise levels during a more typical scenario of windows being closed and trickle ventilators open below.
- 5.10 Typical internal noise levels have been predicted assuming standard thermal double glazing (4 mm glass/ 16 mm air gap/ 4 mm glass or similar) and standard trickle ventilators in accordance with the simple calculation method from Section G.1 of BS 8233:2014, assuming a sound insulation performance of 33 dB R_w for standard double glazing and 32 dB $D_{n,e,w}$ for standard open trickle ventilators.
- 5.11 The predicted internal noise levels with windows closed and vents open are included in **Table 5.3**.

Table 5.3 – Estimated Internal Noise Levels with Windows Closed and Vents Open, dB

Measurement Location	Period	External $L_{Aeq,T}$	Internal $L_{Aeq,T}$
4	Night-time (23:00 – 07:00)	36.6	3.6
	Daytime (07:00 – 23:00)	53.9	20.9
5	Night-time (23:00 – 07:00)	34.3	1.3
	Daytime (07:00 – 23:00)	51.9	18.9
6	Night-time (23:00 – 07:00)	35.1	2.1
	Daytime (07:00 – 23:00)	54.8	21.8
6 (Market day)	Daytime (07:00 – 23:00)	60.2	27.2

- 5.12 BS 8233 states the following regarding the limitations of the simple calculation method used to determine the internal noise levels in **Table 5.3**:

*“Strictly, the insulation values used here relate to a pink noise spectrum, and actual values achieved are lower for traffic noise. Furthermore, the method does not take account of the absorption (e.g. furnishings) in the room. However, the R_w values suffice for a rough calculation, although it is likely to underestimate the level in the room by up to 5 dBA. Where the estimate is within 5 dBA of the target noise level, a more rigorous calculation needs to be carried out using octave bands, as explained in **G.2**.”*

- 5.13 Based on the above statement, where the simplified method predicts noise levels more than 5 dB(A) below the desirable internal guideline values from BS 8233, there is no need to undertake a more rigorous calculation, as the internal values will be achieved regardless of the exact arrangement of the room being considered.
- 5.14 The desirable internal guideline values are 35 dB $L_{Aeq,16h}$ during the daytime and 30 dB $L_{Aeq,8h}$ during the night-time. The highest predicted internal noise levels from **Table 5.3** are 27 dB $L_{Aeq,16h}$ during daytime and 3.6 dB $L_{Aeq,8h}$ during the night-time, 8 dB and 26 dB below the desirable guideline values during the daytime and night-time respectively.
- 5.15 Therefore, the desirable internal noise level criteria are predicted to be achieved by a margin of at least 3 dB, assuming a worst-case underestimation of 5 dB(A) by the simplified method.
- 5.16 It is considered therefore that desirable internal conditions are achieved with standard double glazing and trickle ventilators and no acoustic mitigation measures are required.

Noise from Fixed Plant

- 5.17 It is anticipated that there may be fixed plant and equipment associated with the proposed development that have the potential to generate noise. However, at this

stage of the scheme design, details of the proposed type, number and location of any such plant, or the nature of its operation are not available. In the absence of detailed information, it is appropriate to specify suitable noise level limits to which any plant should conform. These limits should include any appropriate corrections for acoustic characteristics.

- 5.18 Given that a rating level equal to the background sound level is an indication of a 'low' impact in accordance with BS 4142, it is considered appropriate that the cumulative effect of all external plant should be specified so that the rating level is less than or equal to the prevailing background noise levels from **Tables 4.2 and 4.3** at the worst affected receptors. It is also considered prudent to adopt the lowest measured background noise levels from the tables as noise level limits, namely:
- A rating level limit of 45 dB $L_{Ar,1hr}$ during the daytime; and
 - A rating level limit of 31 dB $L_{Ar,15mins}$ during the night-time.
- 5.19 The above rating level limits should apply at least 3.5 metres from the façade of any bedroom, i.e. in free-field conditions.
- 5.20 In accordance with BS 4142, assessments of plant noise emissions should include appropriate rating corrections for tonal, irregular or intermittent plant where applicable, before comparison with the above limits.
- 5.21 Once the detailed nature of such future uses is confirmed, noise from any fixed plant can be considered, to ensure that the above limits can be met. It is unlikely that noise from the existing service yard will have a significant effect on proposed residential receptors, as all proposed receptors are screened from the service yard by the development itself.
- 5.22 It should be noted that the derived rating level limits would be applicable to the total noise from the simultaneous operation of all external plant serving the proposed development. As such, noise emissions from individual items of plant will need to be lower than the given limits, although the exact limit for each individual item of plant will be dependent upon its type, noise characteristics, location etc. This issue is best addressed during the detailed design stage.

6. CONCLUSIONS

- 6.1 A Noise Impact Assessment has been undertaken to support a planning application for a proposed residential development on Henblas Square in Wrexham. The development comprises residential units on the first floor of an existing building with retail units below.
- 6.2 To inform the assessment, a baseline noise survey was undertaken in November 2018 at the Site, to determine the current noise environment on the site.
- 6.3 This assessment considers the effect of the prevailing noise environment on the proposed noise sensitive elements of the development and sets noise level limits for the proposed noise generating elements of the development.
- 6.4 The assessment draws on the guidance within relevant planning policy, guidance documents and British Standards and concludes that the site is suitable for the proposed residential use and that desirable internal conditions can be achieved in proposed residential apartments.
- 6.5 Noise Level limits have been derived for proposed fixed plant items based on the requirements of BS 4142:2014 to ensure there will be a low impact from these noise sources.
- 6.6 It is considered therefore that noise need not be a determining factor in granting planning consent for the proposed development.

APPENDICES

APPENDIX A: Glossary of Terms

Noise

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or LAeq, LA90 etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

Acoustic Terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. Sound pressure level is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10 ⁻⁵ Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
L _{Aeq,T}	L _{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L _{Amax}	L _{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L _{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L _{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L ₁₀ and L ₉₀	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L _n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L ₁₀ is the level exceeded for 10% of the time, and the L ₉₀ is the level exceeded for 90% of the time.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Façade Level	A sound field determined at a distance of 1m in front of a large sound reflecting object such as a building façade.

APPENDIX B: Full Survey Results

Measurement Results from Measurement Location 1

Start Date and Time	Duration (T)	dB LAeq,T	dB LAfmax	dB LA90,T
12/11/2018 23:00	15-minutes	49.2	78.3	38.2
12/11/2018 23:15	15-minutes	47.4	60.4	38.1
12/11/2018 23:30	15-minutes	51.3	72.5	44.6
12/11/2018 23:45	15-minutes	44.9	68.4	39.1
13/11/2018 00:00	15-minutes	41.0	57.6	37.6
13/11/2018 00:15	15-minutes	41.7	63.8	36.7
13/11/2018 00:30	15-minutes	39.5	62.3	35.1
13/11/2018 00:45	15-minutes	43.5	55.3	34.5
13/11/2018 01:00	15-minutes	44.4	59.5	40.5
13/11/2018 01:15	15-minutes	45.5	62.4	39.3
13/11/2018 01:30	15-minutes	41.2	61.7	36.7
13/11/2018 01:45	15-minutes	40.5	59.7	35.5
13/11/2018 02:00	15-minutes	37.0	56.9	34.2
13/11/2018 02:15	15-minutes	37.5	56.9	33.9
13/11/2018 02:30	15-minutes	37.9	58.0	33.1
13/11/2018 02:45	15-minutes	41.5	60.0	32.8
13/11/2018 03:00	15-minutes	41.6	61.8	32.5
13/11/2018 03:15	15-minutes	38.8	61.6	33.0
13/11/2018 03:30	15-minutes	37.4	51.5	33.2
13/11/2018 03:45	15-minutes	38.2	58.6	32.6
13/11/2018 04:00	15-minutes	41.1	63.7	32.2
13/11/2018 04:15	15-minutes	41.5	60.6	32.5
13/11/2018 04:30	15-minutes	37.6	62.1	33.2
13/11/2018 04:45	15-minutes	40.5	56.2	33.6
13/11/2018 05:00	15-minutes	41.4	59.1	35.3
13/11/2018 05:15	15-minutes	48.0	67.0	35.6
13/11/2018 05:30	15-minutes	45.8	64.0	36.4
13/11/2018 05:45	15-minutes	43.6	61.8	36.8
13/11/2018 06:00	15-minutes	42.7	60.4	37.6
13/11/2018 06:15	15-minutes	45.9	62.1	39.7
13/11/2018 06:30	15-minutes	49.6	70.8	41.3
13/11/2018 06:45	15-minutes	47.8	63.9	41.9
13/11/2018 07:00	15-minutes	50.6	73.2	42.6
13/11/2018 07:15	15-minutes	58.4	80.4	48.1
13/11/2018 07:30	15-minutes	63.7	92.1	48.6

Start Date and Time	Duration (T)	dB LAeq,T	dB LAfmax	dB LA90,T
13/11/2018 07:45	15-minutes	65.7	85.1	49.1
13/11/2018 08:00	15-minutes	65.0	91.5	49.4
13/11/2018 08:15	15-minutes	67.7	97.3	30.1
13/11/2018 08:28	15-minutes	55.0	89.9	31.7
12/11/2018 23:00	15-minutes	49.2	78.3	38.2
12/11/2018 23:15	15-minutes	47.4	60.4	38.1
12/11/2018 23:30	15-minutes	51.3	72.5	44.6
12/11/2018 23:45	15-minutes	44.9	68.4	39.1
13/11/2018 00:00	15-minutes	41.0	57.6	37.6
13/11/2018 00:15	15-minutes	41.7	63.8	36.7
13/11/2018 00:30	15-minutes	39.5	62.3	35.1
13/11/2018 00:45	15-minutes	43.5	55.3	34.5
13/11/2018 01:00	15-minutes	44.4	59.5	40.5
13/11/2018 01:15	15-minutes	45.5	62.4	39.3
13/11/2018 01:30	15-minutes	41.2	61.7	36.7
13/11/2018 01:45	15-minutes	40.5	59.7	35.5
13/11/2018 02:00	15-minutes	37.0	56.9	34.2
13/11/2018 02:15	15-minutes	37.5	56.9	33.9
13/11/2018 02:30	15-minutes	37.9	58.0	33.1
13/11/2018 02:45	15-minutes	41.5	60.0	32.8
13/11/2018 03:00	15-minutes	41.6	61.8	32.5
13/11/2018 03:15	15-minutes	38.8	61.6	33.0
13/11/2018 03:30	15-minutes	37.4	51.5	33.2
13/11/2018 03:45	15-minutes	38.2	58.6	32.6
13/11/2018 04:00	15-minutes	41.1	63.7	32.2
13/11/2018 04:15	15-minutes	41.5	60.6	32.5
13/11/2018 04:30	15-minutes	37.6	62.1	33.2
13/11/2018 04:45	15-minutes	40.5	56.2	33.6
13/11/2018 05:00	15-minutes	41.4	59.1	35.3
13/11/2018 05:15	15-minutes	48.0	67.0	35.6
13/11/2018 05:30	15-minutes	45.8	64.0	36.4
13/11/2018 05:45	15-minutes	43.6	61.8	36.8
13/11/2018 06:00	15-minutes	42.7	60.4	37.6
13/11/2018 06:15	15-minutes	45.9	62.1	39.7
13/11/2018 06:30	15-minutes	49.6	70.8	41.3
13/11/2018 06:45	15-minutes	47.8	63.9	41.9

Start Date and Time	Duration (T)	dB LAeq,T	dB LAfmax	dB LA90,T
13/11/2018 07:00	15-minutes	50.6	73.2	42.6



BETTER SOLUTIONS, INTELLIGENTLY ENGINEERED