Cwmrhydderch Court, Cwm, Ebbw Vale

Noise Assessment

17th October 2024

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Contents

Figures

Tables

1. INTRODUCTION

1.1. Overview

inacoustic has been commissioned to assess the impact of noise at the site of the former Cwmrhydderch Court residential retirement facility in Cwm, Ebbw Vale, in respect of the site's suitability for residential development and likely acoustic mitigation requirements.

The following technical noise assessment has been produced to provide supporting information to accompany a planning application to Blaenau Gwent County Borough Council and is based upon environmental noise measurements undertaken at the site.

This noise assessment is necessarily technical in nature; therefore a glossary of terms is included in Appendix A to assist the reader.

1.2. Scope and Objectives

The scope of the noise assessment can be summarised as follows:

- A sound monitoring survey was undertaken at discrete locations around the Site;
- A detailed assessment of the suitability of the Site, in accordance with relevant standards in respect of sound from the existing sources; and
- Recommendation of mitigation measures, where necessary, to comply with the requirements of TAN11[1] and BS8233:2014[2].

[1] Planning Guidance (Wales), Technical Advice Note (TAN) 11: Noise – October 1997.
[2] British Standard Institution. BS 8233:2014: Guidance on noise reduction and sound insulation for buildings.

2. PLANNING POLICY FRAMEWORK

The development proposals for the Site are guided by the following policy directives and guidance:

2.1. National Policy

2.1.1. Planning Policy Wales

The Government's planning policies for Wales are contained in Planning Policy Wales (Edition 12, 7th February 2024). The policy provides overarching requirements for developments to adequately control noise pollution, to provide appropriate soundscapes and to incorporate good acoustic design.

The policy is supplemented by the Noise and Soundscape Action Plan 2018-2023, which provides more detailed guidance on planning for a new development, but does not set out specific assessment methods or criteria. The guidance in this document has been used to inform a qualitative assessment of the effect the proposed development could have on the local soundscape.

2.1.2. Technical Advice Note (Wales) 11 – Noise

Technical Advice Note (Wales) 11 (TAN11) has been referenced in determining the suitability of the Site for residential development. TAN11 sets out the Welsh Assembly Government's policies on noise-related planning issues. It sets out the overarching policy context for the management of noise within the planning system, in terms of how both noise-generating developments and noise-sensitive developments should be considered.

TAN11 gives guidance to local authorities in Wales guidance on the use of their planning powers to minimise the adverse impact of noise. Specifically, TAN11:

- outlines the considerations to be taken into account when determining planning applications for both noise-sensitive developments and for those activities which will generate noise;
- sets out noise exposure categories for residential development, encourages their use and recommends appropriate levels for exposure to different sources of noise; and
- advises on the use of planning conditions to minimise the impact of noise.

The four noise exposure category bands set out in TAN11 (or NECs) are designed to assist local planning authorities in evaluating applications for residential development in noisy areas. Table 1 summarises the noise levels that correspond to each NEC band for mixed noise sources, which are the most relevant to this development.

TABLE 1: NOISE LEVELS CORRESPONDING TO NECS FOR NEW DWELLINGS – $L_{AEQ,T}$ dB

Time Period	Noise Exposure Category (NEC) – Road Traffic			
	A	B	C	D
07:00-23:00	<55	55 – 63	63 – 72	>72
23:00-07:00	<45	45 – 57	57 – 66	>66
N.B. Additionally, during night-time (2300 – 0700), sites where individual noise events exceed 82 dB L_{Amax} (slow time weighting) more than twice in any hour during this period 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).				

The relevant planning advice to the local authority with respect to each NEC is presented in Table 2.

TABLE 2: PLANNING ADVICE CORRESPONDING TO NECS FOR NEW DWELLINGS

NEC	Advice to Local Planning Authority
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 a desirable level.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
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.

In addition to the above, TAN11 also states that during the night, (23:00 to 07:00 hours):

"*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 $L_{Aeq,8hr}$ (except where the $L_{Aeq,8hr}$ already puts the site into NEC D).*"

The advice within TAN 11 is useful as a planning tool; however, it is quite blunt, so reference is primarily made within this report to British Standards, which offer a greater degree of objective analysis.

2.2. British Standards

2.2.1. BS8233:2014

BS 8233:2014 draws on the results of research and experience to provide information on achieving internal acoustic environments appropriate to their functions. The guideline values provided are in terms of an average (L_{Aeq}) level.

The standard advises that, for steady external noise sources, it is desirable for internal ambient noise levels to not exceed the guidance values, as detailed below in Table 3.

TABLE 3: BS8233:2014 AMBIENT NOISE LEVELS

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room	40 dB $L_{Aeq,16hour}$	-
Sleeping	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

BS8233:2014 goes on to suggest that where development is considered necessary or desirable, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions will still be achieved.

With regard to maximum noise levels, the standard identifies that regular individual noise events (such as passing trains or scheduled aircraft etc) can cause sleep disturbance. The standard does not provide a guideline design target, but simply goes on to suggest that a guideline value may be set in terms of SEL or $L_{Amax,F}$, depending upon the character and number of events per night. It goes on to suggest that more sporadic noise events could require separate values.

In respect of external noise levels, the guidance in BS8233:2014 suggests that "*it is desirable that the external noise level does not exceed 50dB $L_{Aeq,T}$, with an upper guideline value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments*".

BS8233:2014 provides a much more detailed narrative on noise levels in external amenity areas and acknowledges that it may not always be necessary or feasible to ensure that noise levels remain within these guideline values.

In respect of gardens and patios, BS8233:2014 states;

"...it is *also recognized that these guideline values are not achievable in all circumstances where development might be desirable."*

BS8233: 2014 goes on to state, for 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".

In respect of balconies, roof gardens and terraces, BS8233:2014 states; *"Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal*

external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses; however, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space".

It is clear from the narrative of BS8233:2014, that proposed development within noisy environments should be designed to ensure that the recommended internal design standards are achieved, and that noise levels in external amenity areas are designed to effectively control and reduce noise levels, although it acknowledges that in certain circumstance meeting the external design recommendations may not be feasible, or necessary, especially where the provision of such spaces is desirable for other technical, planning or policy reasons.

3. Site Description

3.1. Site and Surrounding Area

The Proposed Development site is the former Cwmrhydderch Court residential retirement facility (now demolished), which was constructed in 1977 and included 30 flats over two storeys. Consequently, the residential use of the site has already been established.

The Proposed Development area can be seen in Figure 1.

Since the site was constructed, the area has changed significantly, specifically with regard to the opening of the Ebbw Valley Rail Line to passenger traffic and the construction of the A4046 Cwm Bypass road, which runs immediately to the western side of the site and relocated much of the village's through traffic from School Terrace, to the east of the site to the west.

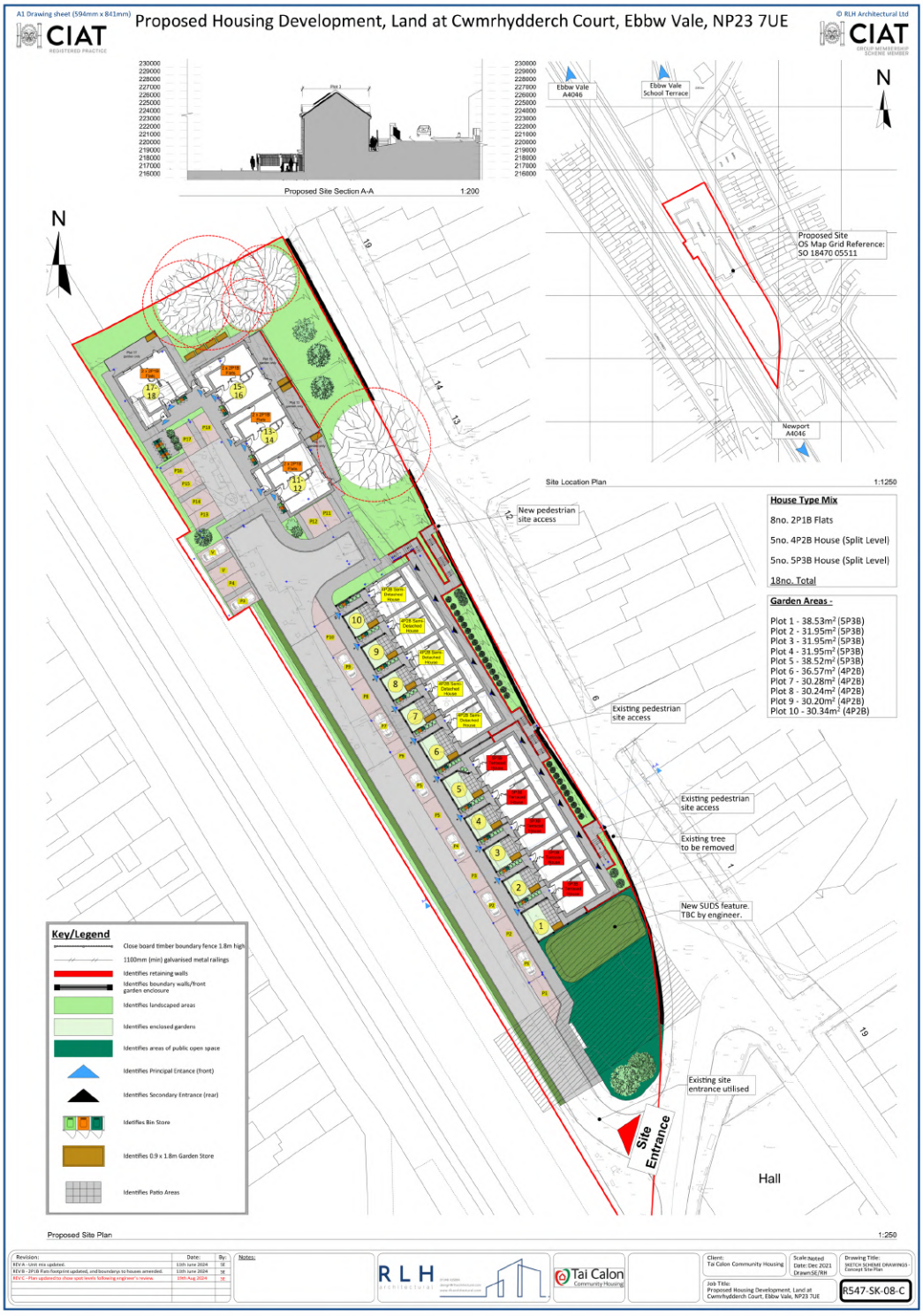
The site is entirely acoustically influenced by road traffic, primarily vehicles travelling along the A4046 Cwm Bypass Road. Occasional, but notably less significant acoustic contributions are experienced from vehicles passing the site on School Terrace and DMU trains on the Ebbw Valley Railway Line.

Figure 1: Proposed Development Site and Surrounding Area

3.2. Proposed Development Overview

The proposals currently comprise the redevelopment of the site to accommodate 10 No. split-level houses and 8 No. flats/apartments. The currently proposed development layout is shown on Figure 2.

FIGURE 2: PROPOSED DEVELOPMENT LAYOUT



4. Measurement Methodology

4.1. General

The prevailing noise conditions in the area have been determined by an environmental noise survey conducted from Tuesday 14th September to Thursday 16th September 2021.

4.2. Measurement Details

All noise measurements were undertaken by a consultant certified as competent in environmental noise monitoring, and, in accordance with the principles of BS 7445[3].

All acoustic measurement equipment used during the noise survey conformed to Type 1 specification of British Standard 61672[4]. A full inventory of this equipment is shown in Table 4 below.

Table 4: Inventory of Sound Measurement Equipment

Measurement Position	Make, Model & Description	Serial Number
MP1	Rion NL-52 Sound Level Meter	00965159
	Rion NH-25 Preamplifier	65386
	Rion UC-59 Microphone	10288
MP2	Rion NL-52 Sound Level Meter	01009671
	Rion NH-25 Preamplifier	09976
	Rion UC-59 Microphone	18146
All	Cirrus CR:515 Acoustic Calibrator	72886

The sound measurement equipment used during the survey was field calibrated at the start and end of the measurement period. A calibration laboratory has calibrated the field calibrator used within the twelve months preceding the measurements. A drift of less than 0.2 dB in the field calibration was found to have occurred on all sound level meters.

The weather conditions during the survey were conducive with environmental noise measurement, with no precipitation and low wind speeds.

[3] British Standard 7445: 2003: Description and measurement of environmental noise. BSI
[4] British Standard 61672: 2013: Electroacoustics. Sound level meters. Part 1 Specifications. BSI.

The microphones were fitted with protective windshields for the measurements, which are described in Table 5, with an aerial photograph illustrating their locations shown on Figure 3 and site photographs under Appendix C.

TABLE 5: MEASUREMENT POSITION DESCRIPTIONS

Measurement Position	Description
MP1	A largely unattended measurement of sound overlooking the A4046 route corridor. The microphone was located under free-field conditions, at a height of 1.5 metres above the single storey flat roof level, and 7.5 metres from the edge of the A4046 Cwm Bypass Road, to which a direct line of sight was achieved. The prevailing sound environment at the site was influenced by road traffic noise.
MP2	A largely unattended measurement of sound at the eastern façade of the existing building. The microphone was located under facade-field conditions, at a height of 4.5 metres above ground level, and 18 metres from the edge of the School Terrace. This position was screened from noise arising from the Cwm Bypass, so has been used to isolate road traffic noise attributable to School Terrace. The prevailing sound environment at the site was influenced by road traffic noise.

FIGURE 3: NOISE MEASUREMENT POSITIONS

4.3. Results Summary

The summarised results of the noise measurement exercise are presented in Table 6 and Table 7 with full, measured time histories presented under Appendix B.

TABLE 6: SUMMARY OF NOISE MEASUREMENT RESULTS

Measurement Position	Period	Noise Level, dB			
		$L_{Aeq,T}$	L_{A90}	L_{A10}	L_{AMax}
MP1	Day	69.1	50.7	73.0	82.7
	Night	62.7	30.4	55.6	81.1
MP2*	Day	55.9	45.0	58.3	75.0
	Night	51.1	26.8	45.5	67.3
**denotes that measurement is façade field*					

TABLE 7: SPECTRAL MEASUREMENT RESULTS

Period	dB(A)	Octave Band (Hz) Sound Level (dB)							
		63	125	250	500	1000	2000	4000	8000
MP1									
$L_{eq,T}$									
Day	69.1	63.6	60.1	60.9	62.6	67.5	60.2	49.2	39.5
Night	62.7	56.6	56.1	57.1	57.3	60.9	53.5	42.3	31.9
L_{FMax}									
Night	81.1	72.0	86.0	77.7	78.9	76.0	72.6	61.3	51.2
MP2									
$L_{eq,T}$									
Day	55.9	61.2	52.7	52.7	51.1	52.7	48.1	42.3	39.8
Night	51.1	51.8	45.4	44.5	43.6	45.9	42.0	41.2	45.1
L_{FMax}									
Night	67.3	59.0	55.5	57.4	59.6	64.6	61.7	53.2	45.1

5. Noise Assessment

5.1. Noise Modelling

The baseline noise measurement results presented in Table 6 and Table 7 have been used to predict noise levels across the site.

The predictions have been carried out using the noise-modelling suite Cadna/A, in accordance with the CRTN prediction methodology for road traffic noise. The overall results in have been processed to determine appropriate noise emission rates for the road affecting the site. The $L_{Aeq,16hour}$ daytime (07:00 to 23:00) and $L_{Aeq,8hour}$ night-time (23:00 to 07:00) noise levels at a distance of 10 metres from the adjacent roads have been derived, as required to populate the noise model.

In addition to the derived road traffic source noise levels used in the predictions, the model also considers the effects of the topographical conditions throughout the area, ground absorption, atmospheric absorption, acoustic reflections, acoustic screening as well as applying a light downwind propagation correction to represent worst case.

The model has been used to determine the daytime $L_{Aeq,16\text{-}hour}$ (07:00 to 23:00) and night-time $L_{Aeq,8\text{-}hour}$ (23:00 to 07:00) noise levels across the site.

To enable an illustration of noise propagation through the site, the output from the daytime and night-time baseline noise models has been presented in the form of noise contours overlaid on a plan of the Proposed Development, as presented below.

5.2. Assessment

Figure 4 and Figure 5 identify the predicted site-wide noise levels for the 16-hour (07:00 to 23:00) daytime, at ground level and 8-hour night-time (23:00 to 07:00) at first floor levels respectively.

Figure 6 and Figure 7 identify the predicted site-wide noise levels for the 16-hour (07:00 to 23:00) daytime, at ground level and 8-hour night-time (23:00 to 07:00) at first floor levels respectively, in the context of the TAN11 Noise Exposure Categories (NECs).

Figure 8 and Figure 9 identify the site-wide L_{Aeq} noise levels in the context of key amenity benchmarking criteria, as set out in BS8233:2014 for the daytime and night-time.

All daytime contours represent a ground floor plane at 1.5m above ground level, while night-time contours represent the 1st floor plane at 4m above ground level. Although primarily intended for illustrative purposes; to place the levels in Figure 8 and Figure 9 in context, they accord to the following factors:

- Daytime levels of below 50 dB(A) and night-time of 45 dB(A) (NEC A) are the threshold for BS8233-compliant internal noise levels achieved with windows open for ventilation. External amenity criteria comfortably met;
- 50 to 55 dB(A) by day (NEC A) and 45 to 50 dB(A) by night (NEC B) are the threshold for BS8233 plus 5dB relaxation internal noise levels achieved with windows open for ventilation. External amenity criteria met;
- 55 to 60 dB(A) by day (NEC B) and 50 to 55 dB(A) by night (NEC B) identify BS8233-compliant internal noise levels achieved with standard thermally insulating windows shut and ventilation provided by an alternative means to an open window. External amenity criteria marginally exceeded; and

- Over 60 dB(A) by day (NEC B and higher) and 55 dB(A) by night (NEC B and higher) requires detailed consideration. Detailed facade consideration and design may be required in order to achieve BS8233-compliant internal noise levels and Part F (UK Building Regulations) compliance.

FIGURE 4: DAYTIME $L_{AEQ,16\text{-}HOUR}$ NOISE LEVELS

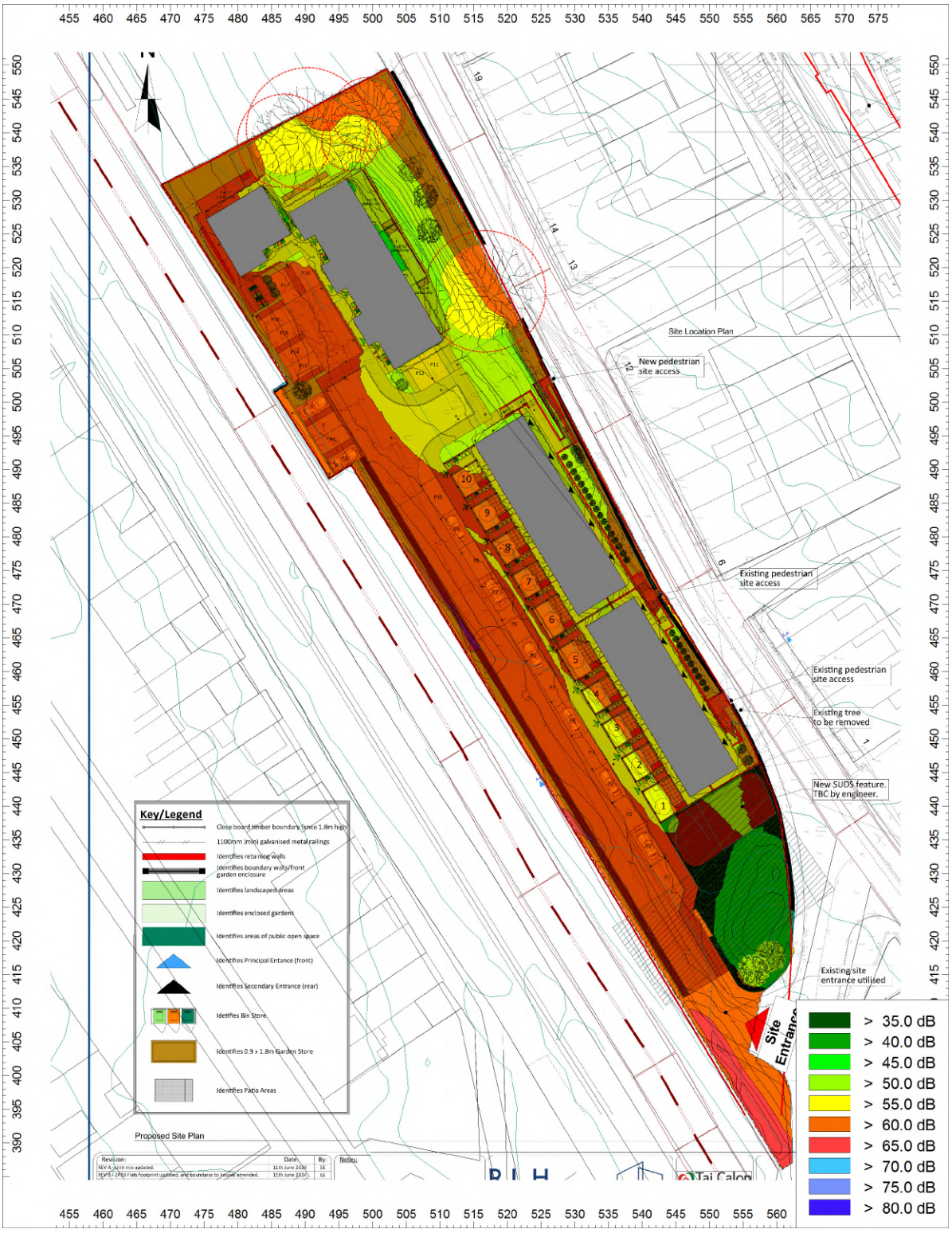


FIGURE 5: NIGHT-TIME $L_{AEQ,8\text{-HOUR}}$ NOISE LEVELS

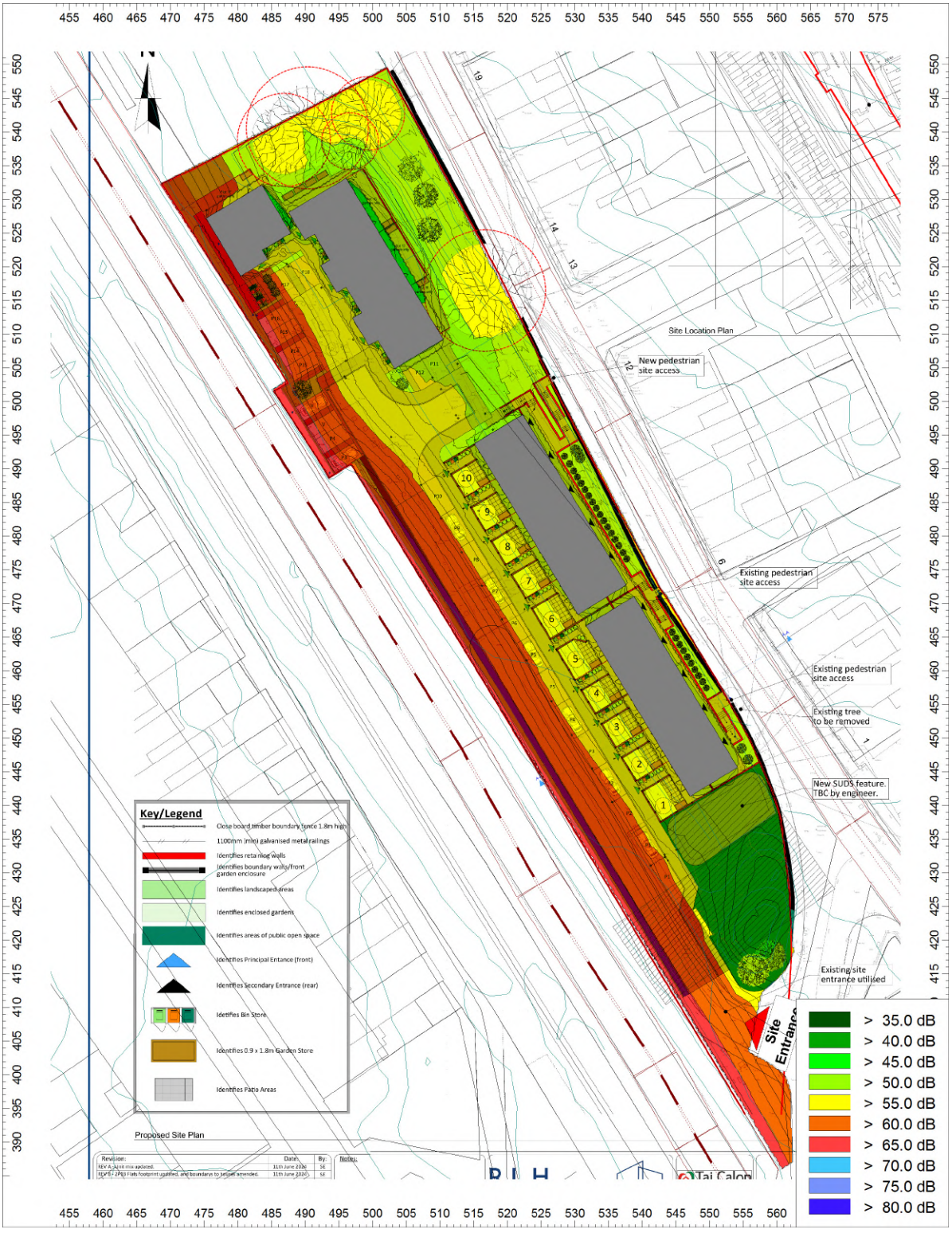


FIGURE 6: DAYTIME TAN11 NEC S

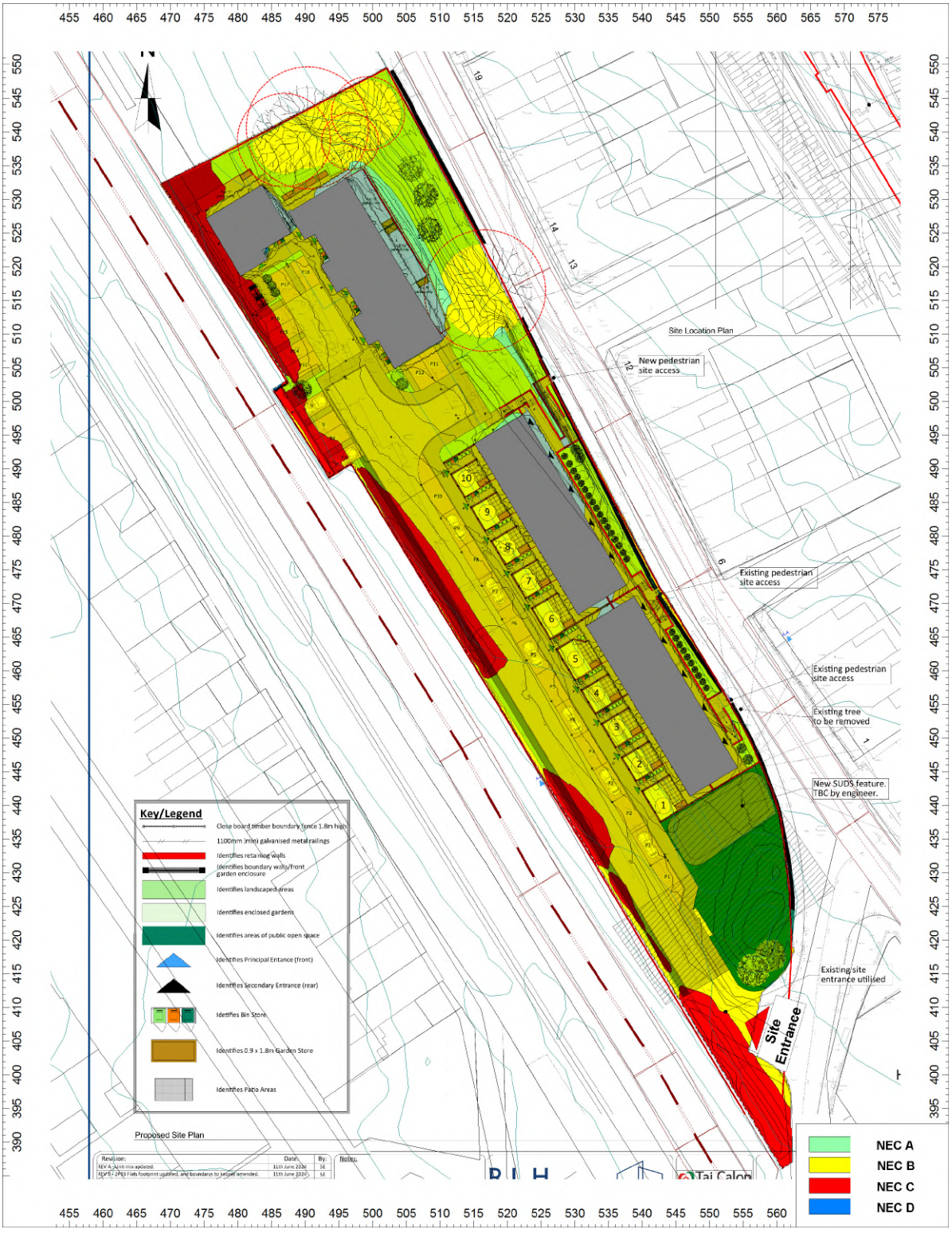


FIGURE 7: NIGHT-TIME TAN11 NEC S

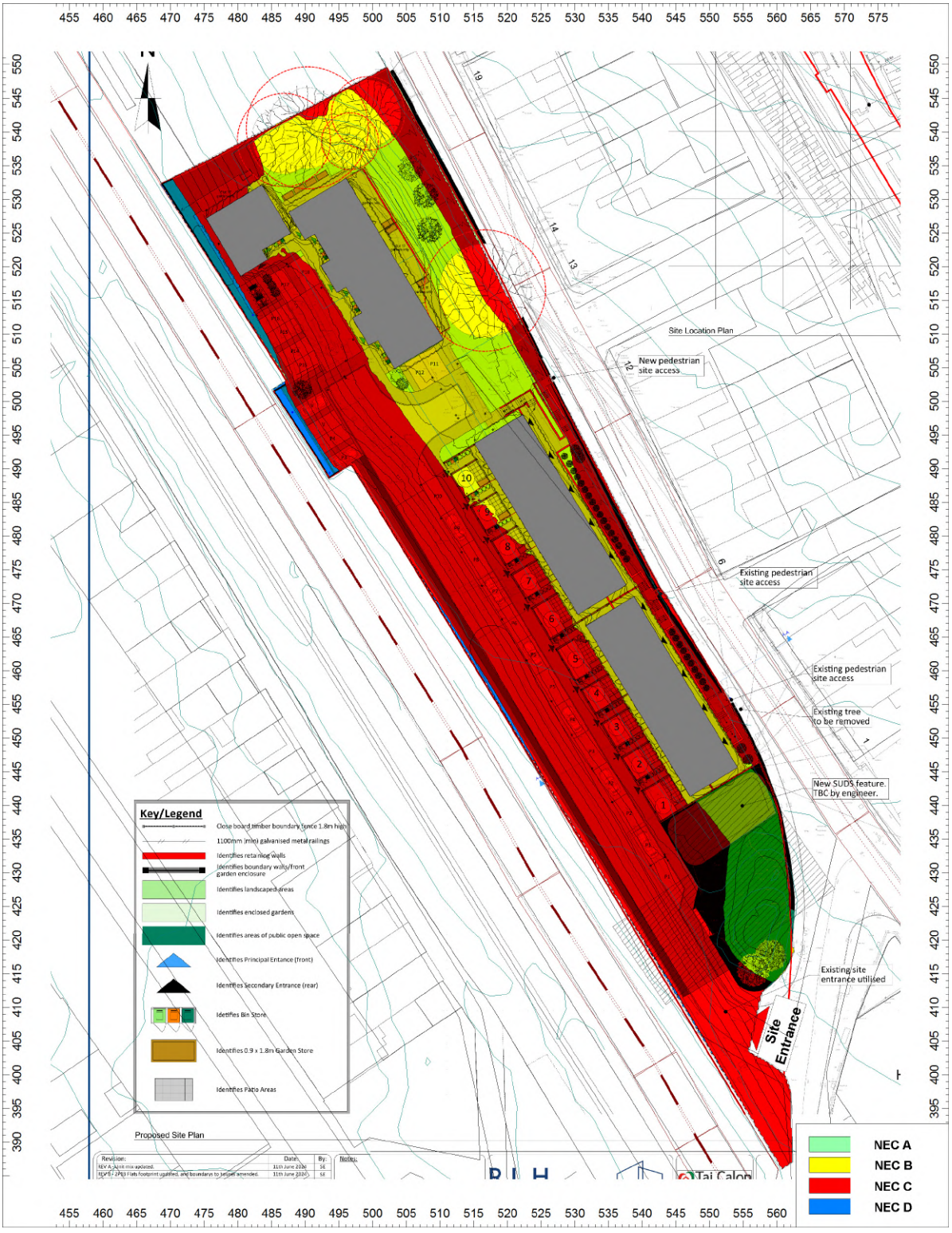


FIGURE 8: DAYTIME $L_{AEQ,16\text{-HOUR}}$ BS8233: 2014 CONTEXT

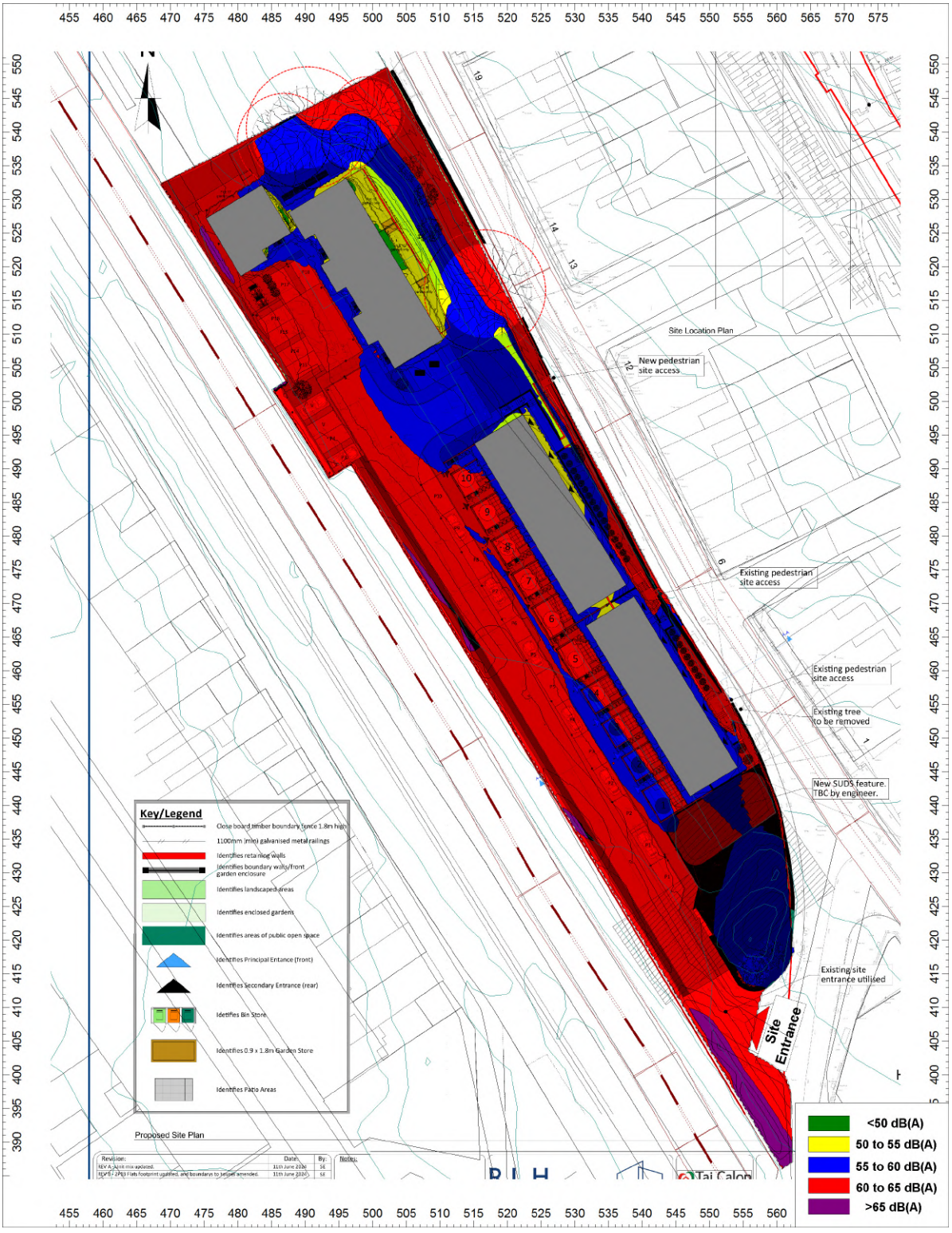
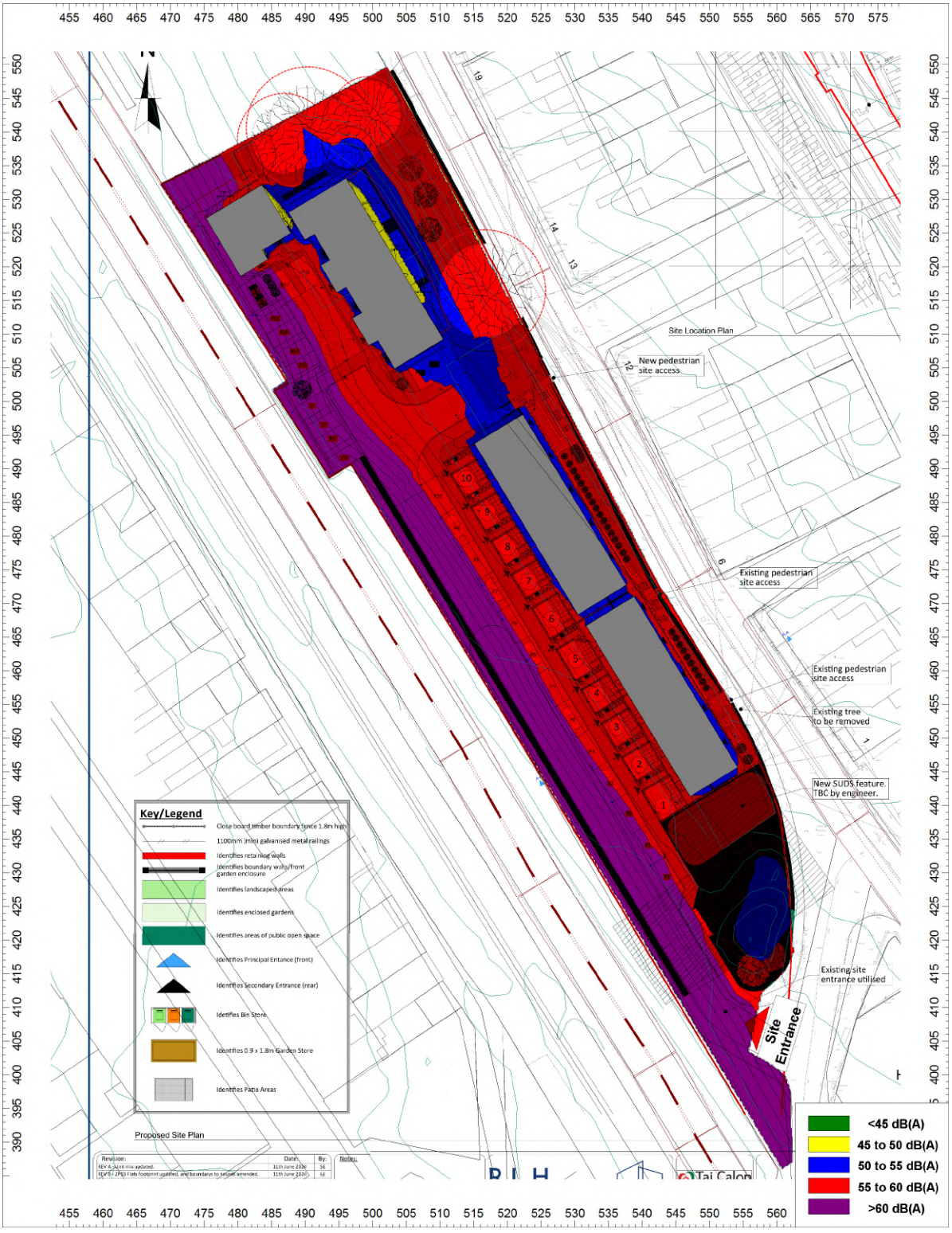


FIGURE 9: NIGHT-TIME $L_{AEQ,8\text{-}HOUR}$ BS8233: 2014 CONTEXT



5.2.1. Results

In summary the data presented in Figure 4 to Figure 9 can be interpreted as follows:

- The site is largely categorised as NEC B of TAN11 during the day, with the closest façades of the proposed flats overlooking the A4046 Cwm Bypass reaching NEC C levels of exposure;
- The extent of NEC increases at night, due to the higher receptor height and reduced influence of the roadside barrier;
- The majority of the site will achieve the internal amenity criteria set out in BS8233:2014 with traditional, thermally insulating façade treatments, but that the closest façade of the flats complex overlooking the A4046 Cwm Bypass will require additional mitigation; and
- The majority of the site will exceed the daytime <55 dB(A) criterion for external amenity space, set out in BS8233:2014.

5.3. Façade Requirements

In order to achieve appropriate noise levels within internal living spaces, the dwellings themselves need to be considered with regard to the level of façade mitigation required in order to achieve internal noise levels of <35 dB(A) in habitable rooms during the day and <30 dB(A) during the night. Where likely to be significant, the internal L_{AMax} criterion of <45 dB(A) has been considered.

The glazing and ventilation elements are typically the weakest acoustic link in the construction of a building facade. Therefore, in order to assess the acoustic performance of the proposed dwellings, it is appropriate in the first instance to explore the level of protection that will be afforded by the performance of the glazing and ventilation elements.

Windows do not reduce noise equally across the entire frequency spectrum, so the frequency content of the sound will influence the overall sound reduction performance of a given window and by extension, the resulting noise levels within the receiving room.

In order to achieve the target daytime and night-time internal noise levels, it is necessary to determine the minimum acoustic performance requirements of each façade component. It is typically assumed that the default choice of glazing for the habitable rooms of the proposed development will be thermal double glazing with ventilation provided by background trickle ventilation and openable windows for purge ventilation.

As already stated; in order to provide a robust assessment and a high-quality living environment for future residents, providing internal noise levels of <35 dB(A) by day and <30 dB(A) by night as defined in BS 8233 has been adopted as the design target for the Proposed Development. As already stated, where likely to be significant, the internal L_{AMax} criterion of <45 dB(A) has also been considered.

For robustness, the façade noise levels have been predicted at various heights, with the sound reduction specification determined based on the highest predicted level.

To determine the glazing and ventilation requirements in order to provide an adequate level of protection against external noise intrusion, $L_{Aeq,16hour}$ daytime and $L_{Aeq,8hour}$ night-time noise levels have been predicted at the building façade, via the use of a Cadna/A noise modelling exercise.

Accordingly, the required composite $R_w + C_{tr}$ sound reduction performance for the building facade locations identified in Figure 10, to provide appropriate internal noise levels during both daytime and night-time periods, as described, is identified in Table 8.

FIGURE 10: FAÇADE ASSESSMENT LOCATIONS

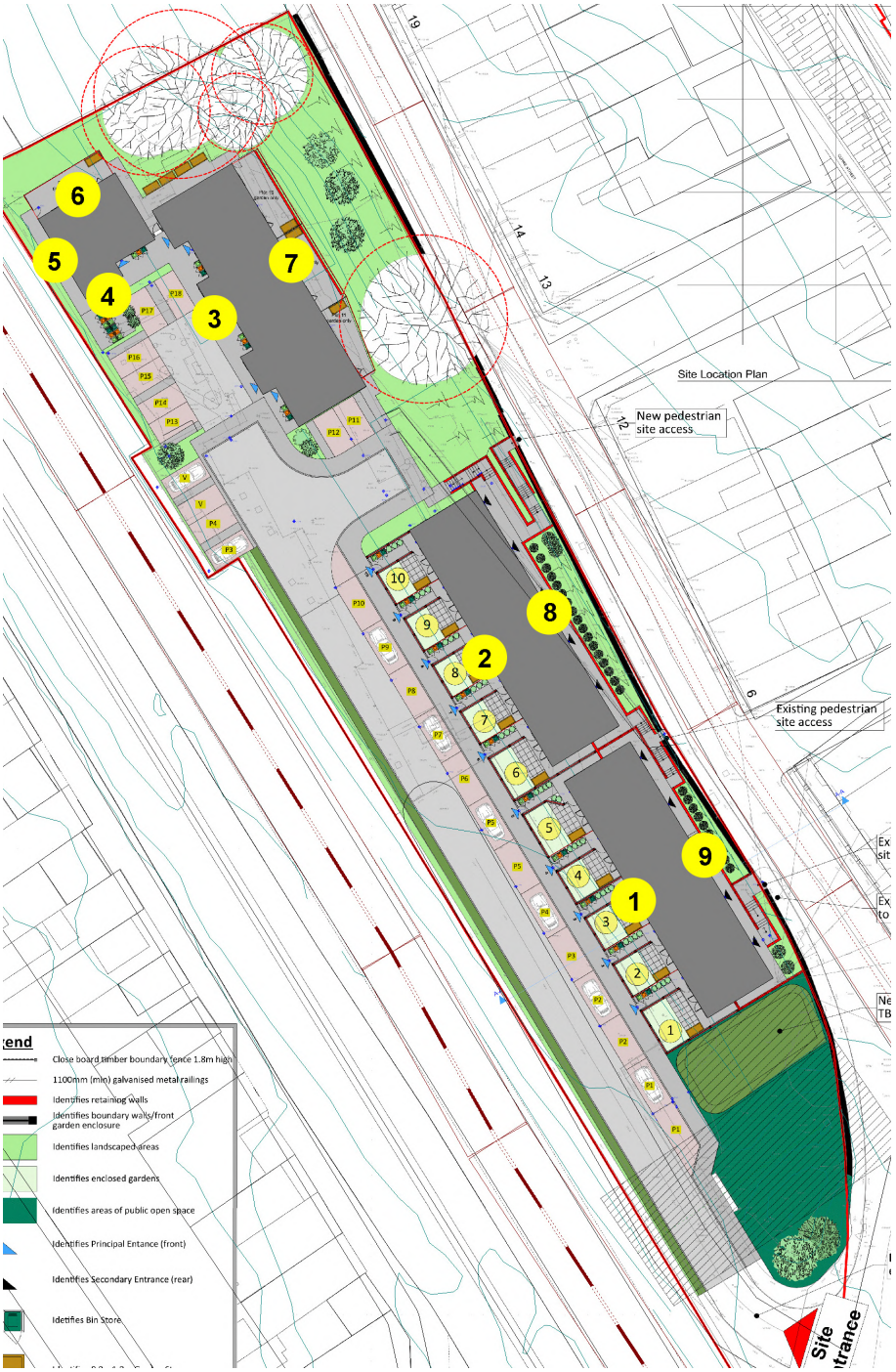


TABLE 8: REQUIRED SOUND LEVEL DIFFERENCE OUTSIDE TO INSIDE

Location	Predicted Free-field Noise Level, $L_{Aeq,T}$ dB		Target Internal Noise Level - dB		Required Sound Level Difference, dB
	Day	Night	Day	Night	
1	62	56	35	30	27
2	61	55	35	30	26
3	61	55	35	30	26
4	66	60	35	30	31
*5	72	65	35	30	37
6	65	59	35	30	30
7	54	49	35	30	19
8	59	54	35	30	24
9	59	55	35	30	24
Location	Derived Free-field Noise Level, $L_{AMax,T}$ dB		Target Internal Noise Level - dB		Required Sound Level Difference, dB
	Day	Night	Day	Night	
1	-	69	-	45	24
2	-	69	-	45	24
3	-	69	-	45	24
4	-	76	-	45	31
6	-	76	-	45	31
7	-	64	-	45	19
8	-	70	-	45	25
9	-	70	-	45	25
*denotes no façade apertures					

It should be noted that the sound reductions detailed in Table 8 apply to habitable rooms such as living rooms, dining rooms and bedrooms only. For non-habitable rooms such as kitchens, bathrooms, stairways, halls, landings, lower performance standards would be permissible.

Based upon the latest layout proposals and robust assumptions of up to 30% of a room façade being glazed and a room volume of $30m^3$, calculations have been carried out to determine the likely required acoustic performances for the external façade elements, in order to provide appropriate internal noise levels in rooms during both the daytime and night-time periods.

The outline performance requirements are presented in Table 9.

TABLE 9: MINIMUM ACOUSTIC PERFORMANCES FOR GLAZING AND VENTILATION

Example Glazing	Octave Band (Hz) Sound Level (dB)							
	63	125	250	500	1000	2000	4000	R_w
	Sound Reduction Performance, R dB							
Location 4 & 6								
4/12/8 Double Glazing	19	26	22	28	38	41	42	34
All Other Locations								
4/12/4 Double Glazing	20	24	20	25	35	38	35	31
Example Ventilation	Octave Band (Hz) Sound Level (dB)							
	63	125	250	500	1000	2000	4000	$D_{n,e,w}$
	Element Normalised Level Difference (D,n,e) dB							
Location 4 & 6								
MVHR System with Summer Boost Function								
All Other Locations								
Hit and Miss Trickle Ventilator	27	31	36	31	38	28	28	32
Example Walls	Octave Band (Hz) Sound Level (dB)							
	63	125	250	500	1000	2000	4000	R_w
	Sound Reduction Performance, R dB							
Brick / Block Cavity	36	41	45	45	54	58	58	52

Other units may be suitable and it is the responsibility of the glazing manufacturer to recommend and provide appropriate systems. The above analysis is provided to demonstrate that a design solution is feasible at the site for the purposes of a planning application and not necessarily for the purposes of detailed design or glazing procurement.

The detailed design of the proposed properties may affect both the required sound reduction performance and the appropriate selection of glazing units. The aspects of the detailed design that are important are the room dimensions, room finishes, window dimensions and the sound reduction performance of non-glazing elements

5.4. Discussion

It should be noted that the above represents a closed window scenario, with background ventilation provision via a window-mounted trickle passive ventilation system, unless otherwise stated. In the event of windows being opened for periods of purge or comfort cooling ventilation provision, the internal noise level criteria will be exceeded.

5.5. External Amenity Spaces

Noise levels throughout the majority of the site will exceed the <55 dB(A) criterion, with only the area formed in the lea of the flats complex meeting this requirement.

BS8233:2014 states the following, for 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".

It is clear from the narrative of BS8233:2014, that proposed development within noisy environments should ensure external amenity areas are designed to effectively control and reduce noise levels, although it acknowledges that in certain circumstance meeting the external design recommendations may not be feasible, or necessary, especially where the provision of such spaces is desirable for other technical, planning or policy reasons.

The residential use of this site has already been established by the now-disused Cwmrhydderch Court complex and the design approach for the scheme has sought to optimise sustainability by working with the topography of the site, thus minimising cut and fill requirements. Furthermore, the road traffic noise effects associated with the A4046 Cwm Bypass have been responded to during the design process, with the emphasis placed on minimising noise effects upon the dwellings themselves. The net result of that is that the gardens of the dwelling houses, which although benefit from the screening effects of the existing (to be repaired where necessary) concrete acoustic fence along the A4046 route corridor, will be necessarily exposed to more noise.

The village of Cwm does contain several public spaces where quiet amenity can be enjoyed, within a short walk from the application site, meaning that the principle of offsetting is satisfied in this regard. These spaces include the hillside area, accessed via Emlyn Road; the playing fields adjacent to Canning Street, accessed via the A4046 footbridge; and the woodland walks and lake areas leading up to Festival Park.

Consequently, it is felt that the significance of external amenity area noise exposure is reduced at the site and that the design satisfies the principles of BS8233:2014.

6. CONCLUSION

inacoustic has been commissioned to assess the impact of noise at the site of the former Cwmrhydderch Court residential retirement facility in Cwm, Ebbw Vale, in respect of the site's suitability for residential development and likely acoustic mitigation requirements.

This technical noise assessment has been produced to provide supporting information to accompany a planning application to Blaenau Gwent County Borough Council and is based upon environmental noise measurements undertaken at the site.

The residential use of the site has already been established; however, the acoustic requirements of the proposed development have been assessed, based on the current development proposals and the measured and predicted noise levels. Where the levels indicate that noise may be a determining factor in the granting of planning permission, mitigation measures have been proposed to ensure satisfactory acoustic conditions are met.

Specific consideration has been given to the internal noise criteria for the proposed residential properties, as quoted within BS8233:2014, with additional consideration given to the provision of outdoor amenity.

In light of the above, which demonstrates that the site is predicted to meet the requirements of the relevant British Standard and planning guidance, it is considered that noise does not present a constraint to the residential development of the site.

7. APPENDICES

7.1. Appendix A – Definition of Terms

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20μPa ($20x10^{-6}$ Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1 / s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, 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.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L_{90} can be considered to be the "average minimum" noise level and is often used to describe the background noise.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Facade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Fast Time Weighting	An averaging time used in sound level meters. Defined in BS 5969.

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

TABLE 10: TYPICAL SOUND LEVELS FOUND IN THE ENVIRONMENT

Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

In accordance with logarithmic addition, combining two sources with equal noise levels would result in an increase of 3 dB(A) in the noise level from a single source.

A change of 3 dB(A) is generally regarded as the smallest change in broadband continuous noise which the human ear can detect (although in certain controlled circumstances a change of 1 dB(A) is just perceptible). Therefore, a 2 dB(A) increase would not be normally be perceptible. A 10 dB(A) increase in noise represents a subjective doubling of loudness.

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs.

For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest. In the UK, traffic noise is measured as the L_{A10}, the noise level exceeded for 10% of the measurement period. The L_{A90} is the level exceeded for 90% of the time and has been adopted to represent the background noise level in the absence of discrete events. An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level, L_{Aeq}.

This is a notional steady level that would, over a given period of time, deliver the same sound energy as the actual fluctuating sound.

To put these quantities into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3 dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes of 1 dB in traffic noise levels (assuming no alteration in the mix of traffic or flow speeds).

Note that the time constant and the period of the noise measurement should be specified. For example, BS 4142 specifies background noise measurement periods of 1 hour during the day and 15 minutes during the night. The noise levels are commonly symbolised as $L_{A90,1hour}$ dB and $L_{A90,15mins}$ dB. The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125 ms.

7.2. Appendix B – Measurement Results

FIGURE 11: MEASURED TIME HISTORY – MP1

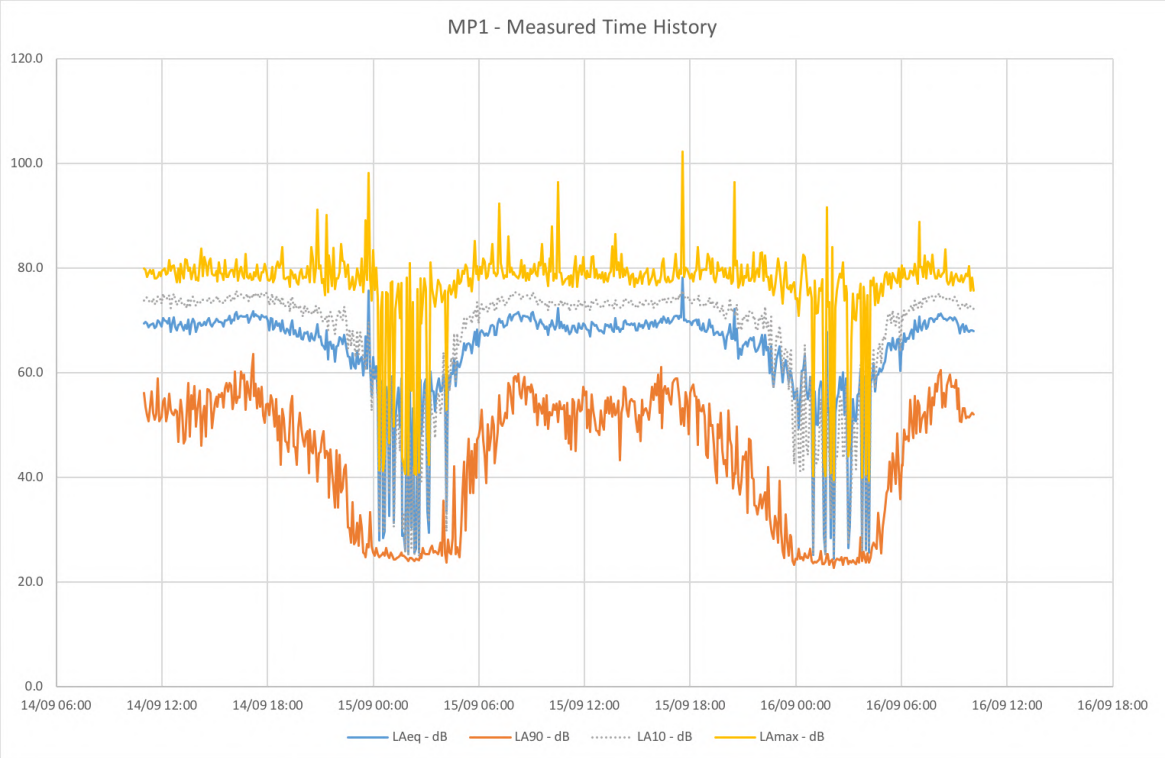
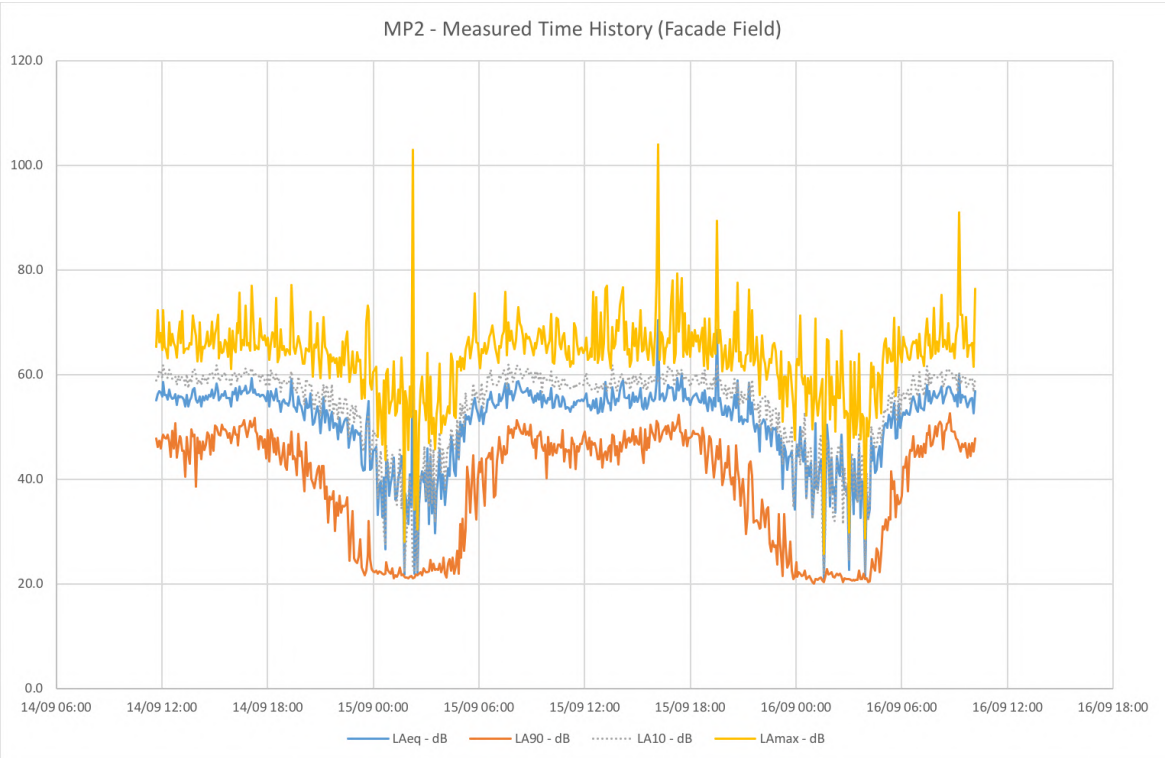


FIGURE 12: MEASURED TIME HISTORY – MP2



7.3. Appendix C – Measurement Position Photographs

Figure 13: Measurement Position 1

Figure 14: Measurement Position 2

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