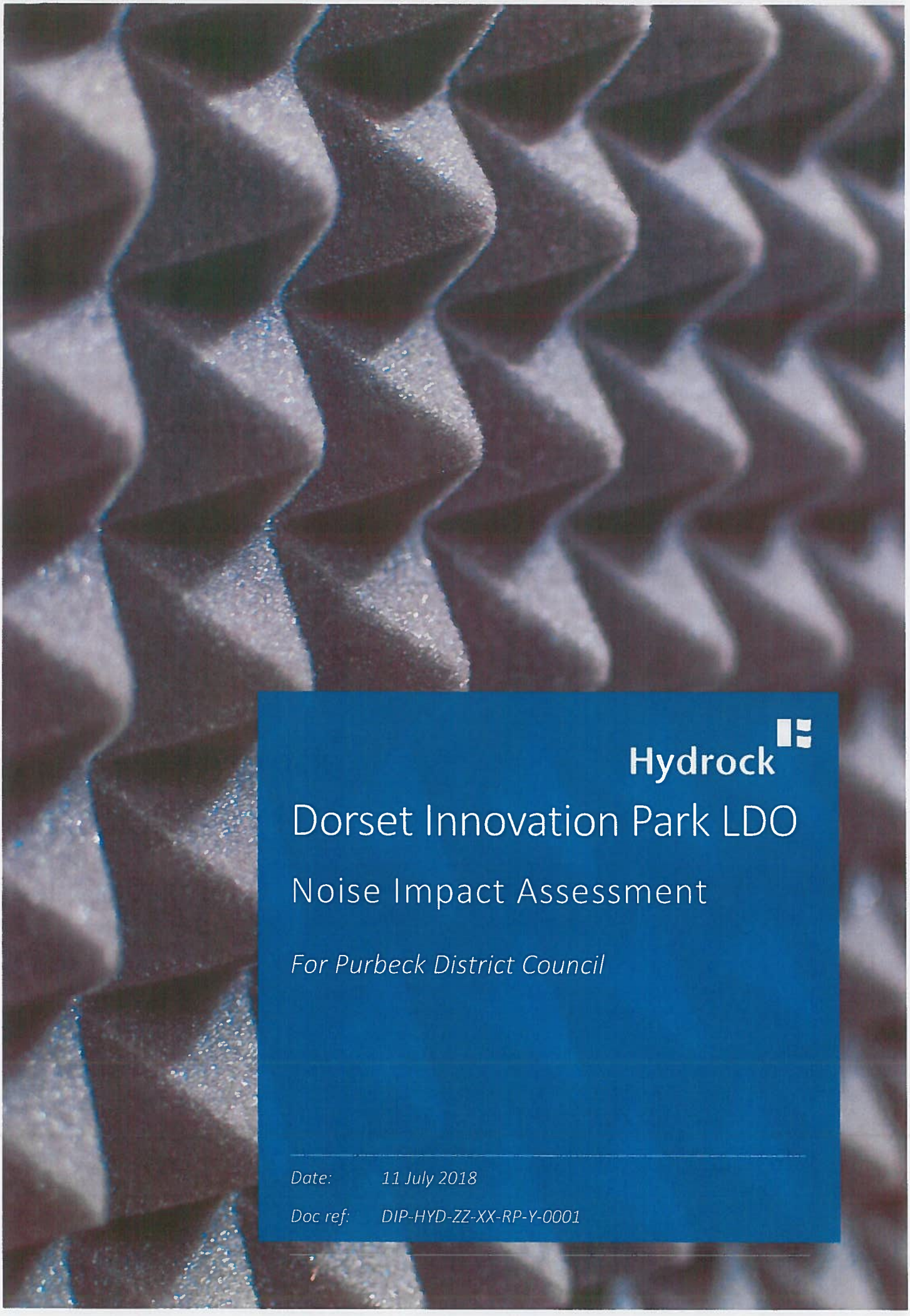

Hydrock

Dorset Innovation Park LDO

Noise Impact Assessment

For Purbeck District Council

Date: *11 July 2018*

Doc ref: *DIP-HYD-ZZ-XX-RP-Y-0001*

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1. INTRODUCTION

Hydrock Consultants have been appointed by Purbeck District Council to provide acoustic consultancy services regarding the design and construction of the proposed Dorset Innovation Park.

A noise impact assessment has been developed in conjunction with the current national planning policies, relevant planning practice guidance and British standards. The purpose of the assessment is to protect the existing local residents from the impact of the development, and to protect the development from existing noise sources at the site.

This report presents details of computer noise modelling undertaken to assess and predict the noise impact of the proposed development on nearby noise sensitive receptors within the vicinity of the proposed site.

2. OUTLINE DESCRIPTION OF THE DEVELOPMENT

Technical assessments relating to the proposed development are based upon an Illustrative Masterplan. This is presented in Appendix A and is also appended to the Statement of Reasons. The Illustrative Masterplan presents one potential development scenarios and is reflective of the urban design and development plot principles set out within the Design Guide.

3. PLANNING POLICY

3.1 National Planning Policy Framework

The 'National Planning Policy Framework, July 2018, Ministry of Housing, Communities and Local Government' (NPPF) sets out the United Kingdom Government's planning policies for adoption in England and how they should be applied.

The main aims of the NPPF are set out in section 11, as stated below.

'Planning policies and decisions should:

- *Encourage multiple benefits from both urban and rural land, including through mixed use schemes and taking opportunities to achieve net environmental gains – such as developments that would enable new habitat creation or improve public access to the countryside;*
- *recognise that some undeveloped land can perform many functions, such as for wildlife, recreation, flood risk mitigation, cooling/shading, carbon storage or food production;*
- *give substantial weight to the value of using suitable brownfield land within settlements for homes and other identified needs, and support appropriate opportunities to remediate despoiled, degraded, derelict, contaminated or unstable land;*
- *promote and support the development of under-utilised land and buildings, especially if this would help to meet identified needs for housing where land supply is constrained and available sites could be used more effectively (for example converting space above shops, and building on or above service yards, car parks, lock-ups and railway infrastructure); and*
- *support opportunities to use the airspace above existing residential and commercial premises for new homes. In particular, they should allow upward extensions where the development would be consistent with the prevailing height and form of neighbouring properties and the overall street scene, is well designed (including complying with any local design policies and standards), and can maintain safe access and egress for occupiers.'*

The NPPF makes reference to guidance contained in 'Noise Policy Statement for England (NPSE), March 2010, Department for Environmental, Food and Rural Affairs' (NPSE). The NPSE is intended to apply to all forms of noise, other than noise occurring in the workplace and includes environmental noise and neighbourhood noise of all forms.

The NPSE provides advice regarding the impact of noise which should be assessed on the basis of adverse and significant adverse effect. However, the NPSE does not provide any specific guidance on assessment methods or the noise levels at which different effects would be applicable. Moreover, the document advises that it is not possible to have '*a single objective noise-based measure…that is applicable to all sources of noise in all situations*'. It further advises that the sound level at which an adverse effect occurs is '*likely to be different for different noise sources, for different receptors and at different times*.'

3.2 Planning Practice Guidance

The Ministry of Housing, Communities and Local Government publishes guidance on the internet in the form of the 'Planning Practice Guidance' (PPG). The guidance of PPG provides greater level of details in relation to the relevance of noise for planning following the introduction of the NPPF and NPSE.

The Planning practice guidance will be updated in due course to reflect changes to the National Planning Policy Framework. The most recent version of the noise guidance is from March 2018. Should this guidance be updated, the 2014 version will be superseded.

It is stated under the heading 'How to Determine the Noise Impact' that the following should be considered by local authorities:

- *'whether or not a significant adverse effect is occurring or likely to occur;*
- *whether or not an adverse effect is occurring or likely to occur; and*
- *whether or not a good standard of amenity can be achieved.'*

The assessed noise should include the overall effect of the development, inclusive of the construction stage once completed.

The guidance process includes identifying where noise exposure is above or below the significant observed adverse effect level and the lowest observed adverse effect level for a given situation as required by the NPSE.

The observed effects are defined in Table 1 which is taken from the section headed '*How to Recognise when Noise could be a concern?*'

Table 1: PPG Noise Guidance

Perception	Examples of Outcome	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows for some of the time because of the noise. Potential for non-awakening sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. having to keep windows closed most	Significant Observed Adverse Effect	Avoid

	of the time, avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	

Under the section heading '*What factors influence whether noise could be a Concern?*' the subjective nature of noise is discussed. It is stated that there is no simple relationship between noise levels and the impact on those affected. It is all dependent on how various factors combine in particular situations, which include:

- 'The source and absolute level of the noise together with the time of day it occurs. Some types and level of noise will cause a greater adverse effect at night than if they occurred during the day – this is because people tend to be more sensitive to noise at night as they are trying to sleep. The adverse effect can also be greater simply because there is less background noise at night;
- For non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise;
- The spectral content of the noise (i.e. whether or not the noise contained particular high or low frequency content) and the general character of the noise (i.e. whether or not the noise contains particular tonal characteristics or other particular features). The local topology and topography should also be taken into account along with the existing and, where appropriate, the planned character of the area.'
- 'Consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases a suitable alternative means of ventilation can be found in the Building Regulations;
- In cases where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in noise may result in a significant adverse effect occurring even though little to no change in behaviour would be likely to occur.
- If external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended.'

Similarly, to the NPSE, no specific noise parameters are defined in the guidance or target noise levels established for comparison.

4. GUIDANCE DOCUMENTS

In order to establish satisfactory noise parameters for design purposes and assessment, other guidance sources are necessary to be considered as there is nothing specific in the Planning Legislation.

4.1 British Standard 4142:2014

Guidance on measurement of prevailing background noise and rating methods of external building services noise can be taken from:

'*British Standard 4142:2014 Methods for rating and assessing industrial and commercial sound*'

The methods described in BS4142:2014 provide an objective method for assessing the likelihood of disturbance caused by industrial or commercial noise. It can be used to determine the following levels at external locations:

1. rating levels for sources of sound of an industrial and/or commercial nature; and
2. ambient, background and residual sound levels,

for the purposes of:

1. investigating complaints;
2. assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and
3. assessing sound at proposed new dwellings or premises used for residential purposes.

Certain acoustic features can increase the perceived impact of a specific noise source. Where such features are present at the assessment location, a character correction is added to the specific sound level to obtain the rating level.

The significance of noise impact is initially estimated for the specific sound by subtracting the measured background sound level from the rating level, and the following considered.

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.

Where the initial estimate of the impact needs to be modified due to the context, all pertinent factors should be taken into consideration.

4.2 Calculation of Road Traffic Noise

The '*Department of Transport: Calculation of Road Traffic Noise: 1988 Section 43-44.*' shortened measurement procedure has been used to calculate the predicted noise emissions of road traffic noise emanating from surrounding roads.

The shortened measurement procedure outlined in section 43 provides the following guidance:

'Measurements of L10 are made over any three consecutive hours between 10:00-17:00 hours. Using L_{10} (3-hour) as the arithmetic mean of the three consecutive values of hourly L_{10}, the current value of L_{10} (18-hour) can be calculated from the relation:

$$L10\ (18-hour) = L10\ (3-hour) - 1\ dB(A)$$

The Transport Research Laboratory (TRL) document '*Converting the UK traffic noise index L_{A10} (18-Hour) to EU noise indices for noise mapping*' PR/SE/451/02, outlines calculation methodology to calculate the L_{day}, $L_{evening}$, L_{night} and L_{den} using the L_{A10} (18-Hour) noise index.

Calculation Method 3 for non-motorway traffic is shown below:

$$Lday\ =\ 0.95\ x\ LA10\ (18-Hour)\ +\ 1.44\ dB$$

$$Levening\ =\ 0.97\ x\ LA10\ (18-Hour)\ -\ 2.87\ dB$$

$$Lnight\ =\ 0.90\ x\ LA10\ (18-Hour)\ -\ 3.77\ dB$$

$$Lden\ =\ 0.92\ x\ LA10\ (18-Hour)\ +\ 4.20\ dB$$

5. BASELINE NOISE AND VIBRATION SURVEY

To enable an assessment of the baseline ambient noise levels in the area, environmental noise measurements where undertaken on site between Monday 22 January 2018 and Thursday 25 January 2018.

5.1 Methodology

The measurement locations were selected on and around the proposed development site in order to quantify the necessary noise levels for the Planning Application stage.

Figure 3 shows the measurement locations used.

Figure 1: Measurement Positions

5.2 Environmental Noise Monitoring

During the site visit an assessment of the noise climate of the development location and its surroundings was conducted.

The positions were selected in order to acquire prevailing background noise levels representative of the nearest noise sensitive receptors.

Measurements were undertaken in accordance with the guidance outlined in the relevant British Standards, BS 4142:2014 and BS 7445-1:2003.

The monitoring procedure followed the guidance outlined in BS7445:2003 Part 1, Section 5.2.3 and section 5.2.2. Measurements were undertaken within a 'free field' environment.

A wind shield was fitted to the monitoring equipment at all times.

5.2.1 Position 1

The location chosen as the long-term monitoring Position 1 was the nearest residential receptor to the west of the proposed development.

An unattended environmental noise survey was conducted between 1300hrs on 22 January 2018 and 1300hrs on 25 January 2018.

The microphone was located at a height of approximately 1.6m above ground floor level, 40 meters away from the boundary, and approximately 460 meters from the nearest proposed building.

5.2.2 Position 2

The location chosen as the long-term monitoring Position 2 was the nearest residential receptor to the north of the proposed development.

An unattended environmental noise survey was conducted between 1300hrs on 22 January 2018 and 1300hrs on 25 January 2018.

The microphone was located at a height of approximately 1.6m above ground floor level, 315 meters away from the boundary, and approximately 380 meters from the nearest proposed building.

5.2.3 Position 3

The location chosen as the long-term monitoring Position 3 was the nearest residential receptor to the south of the proposed development.

An unattended environmental noise survey was conducted between 1300hrs on 22 January 2018 and 1300hrs on 25 January 2018.

The microphone was located at a height of approximately 1.6m above ground floor level, 880 meters away from the boundary, and approximately 890 meters from the nearest proposed building.

5.3 CRTN Monitoring Position

CRTN Monitoring positions were selected to acquire data in conformance with the *'shortened measurement procedure'* of the *'Calculation of Road Traffic Noise, Department of Transport Welsh Office, 1988'* (CRTN).

Measurements were undertaken between 1145-1315hrs on 25 January 2018 on the A352.

A class 1 sound level meter was fitted to a tripod at a height of 1.5m above local ground level and distance of approximately 3m from the kerb.

As per guidance outlined in Section 41.1 and paragraph 26.1 of the CRTN document:

'There should be no sound-reflecting surfaces (other than the ground) within 15 metres of the microphone...the façade correction, (Para 26.1, +2.5dBA) should be subtracted from the measured level.'

The measurements were undertaken within a 'free field' environment.

A wind shield was fitted to the monitoring equipment at all times.

5.4 Equipment

Details of the sound monitoring equipment used for the acquisition of the prevailing noise levels are provided in Table 2.

Table 2: Survey Equipment

Monitoring Location	Manufacturer	Instrument	Type	Serial No. / Version	Calibration Certificate Number
Position 1	Rion	Sound Level Meter	NL-52	01254312	UCRT18/1165
Position 1	Rion	Pre-Amplifier	NH-25	54394	UCRT18/1165
Position 1	Rion	Microphone	UC-59	08770	UCRT18/1165
Position 1	Rion	Acoustic Calibrator	NC-74	35157400	UCRT18/1165
Position 2	Rion	Sound Level Meter	NL-52	01254313	UCRT18/1526
Position 2	Rion	Pre-Amplifier	NH-25	76628	UCRT18/1526
Position 2	Rion	Microphone	UC-59	12139	UCRT18/1526
Position 2	Rion	Acoustic Calibrator	NC-74	34536109	UCRT18/1526
Position 3	Rion	Sound Level Meter	NL-52	00775959	UCRT17/2093
Position 3	Rion	Pre-Amplifier	NH-25	76076	UCRT17/2093
Position 3	Rion	Microphone	UC-59	11689	UCRT17/2093
Position 3	Rion	Acoustic Calibrator	NC-74	34536109	UCRT17/2093
Position 4	Brüel & Kjær	Sound Level Meter	2250	3009207	CDK1600424
Position 4	Brüel & Kjær	Pre-Amplifier	ZC 0032	23772	CDK1600424
Position 4	Brüel & Kjær	Microphone	4189	3005149	CDK1600424
Position 4	Brüel & Kjær	Acoustic Calibrator	4231	3015450	CDK1600406

5.5 Weather Conditions

A record of the weather conditions as published by www.timeanddate.com was kept during the measurement survey period from Monday 22 January 2018 to Thursday 25 January 2018.

The outline details of which are presented in Table 3.

Table 3. Weather Data

Period	Mean Temperature Degrees Celsius	Events	Wind Speed m/s	Prominent Wind Direction
Monday, 22 January 2018	10	Cool	> 5	W
Tuesday, 23 January 2018	11	Fog	> 5	SW
Wednesday, 24 January 2018	11	Cloudy	> 5	SW
Thursday, 25 January 2018	9	Overcast	> 5	SW

BS 4142:2014 provides the following guidance with regards to the acquisition of environmental noise measurements and weather conditions:

'An effective windshield should be used to minimize turbulence at the microphone.'

'NOTE Windshields are generally effective up to wind speeds of 5 m/s' and. 'exercise caution when making measurements in poor weather conditions such as wind speeds greater than 5 m/s.'

Average recorded wind speeds during the environmental noise measurement process did exceed 5 m/s but were deemed to be acceptable to carry out the noise survey.

There was no significant rainfall recorded during the survey period.

Measurements are therefore considered to adhere to the guidance of the relevant British Standard and no correction has been applied to prevailing noise levels.

6. RESULTS - BASELINE NOISE SURVEY

6.1 Environmental Noise Surveys

Two environmental noise surveys were undertaken at Positions 1 and 2 on the proposed development site.

Calculations of the measured noise data were undertaken as per guidance outlined in Section 5.

The periods of measurement were between 1300hrs on 22 January 2018 and 1300hrs on 25 January 2018.

Three main acoustic parameters were measured using a time interval of 5 minutes as described below.

- $L_{Aeq,T}$ dB, defined as the 'A' weighted equivalent continuous sound pressure level. Over a defined time period 'T', it is the sound pressure level equivalent to the acoustic energy of the fluctuating sound signal. It is often referred to as the 'ambient noise level'.
- $L_{Amax,F,T}$ dB, defined as the 'A' weighted maximum sound pressure level that occurred during the time period 'T' acquired using a 'fast' time weighting (i.e. a sample every 125ms). It is commonly used to describe the highest noise level that occurred during an event such as a vehicle pass-by.
- $L_{A90,T}$ dB, defined as the 'A' weighted sound pressure level exceeded for 90% of the measurement period 'T'. It is a statistical parameter and cannot be directly combined with other acoustic parameters. It is generally used to describe the prevailing background noise level.

The noise character of the site is largely to be expected of a rural area. There is some low-level noise from the nearby road network, some non-descript noise from the existing commercial premises to the East of the site. However, the noise levels at the site are dictated by the railway line. The maximum noise events are all attributable to the trains passing at speed. Near to the existing residential to the North, the noise impacting this area are dominated completely by the rail traffic, as captured by the logger at Position 2.

A noise level time history over the full measurement period on Position 1 is presented in Figure 3, which demonstrates the variability of noise on the proposed development site.

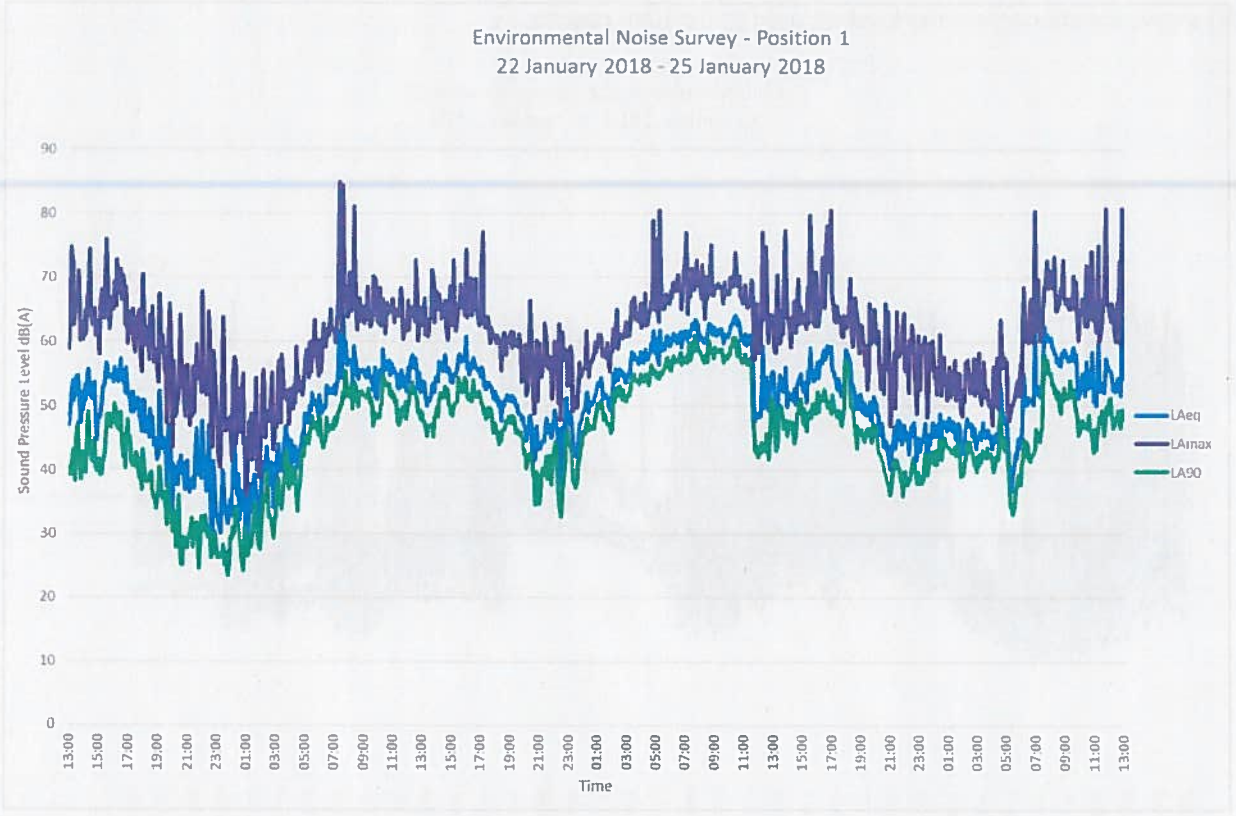

Figure 2: Environmental Noise Survey Measurement Graph - Position 1

The full dataset of noise levels measured is not presented in tabular form as it is too large.

A summary of the 16-hour daytime (0700hrs to 2300hrs) and 8-hour night time (2300hrs to 0700hrs) $L_{Aeq,T}$ for Position 1 are presented in Table 4:

Table 4: Summary Noise Levels – Position 1

Period	Monday, 22 January 2018	Tuesday, 23 January 2018	Wednesday, 24 January 2018	Thursday, 25 June 2018	Overall
Daytime $L_{Aeq\ (16hour)}$ dB	50.5	54.6	57.6	57.0	56
Night time $L_{Aeq\ (8hour)}$ dB	45.5	56.9	47.1	-	53

A noise level time history over the full measurement period on Position 2 is presented in Figure 4, which demonstrates the variability of noise on the proposed development site.

This shows the change in noise levels related to the train pass-by.

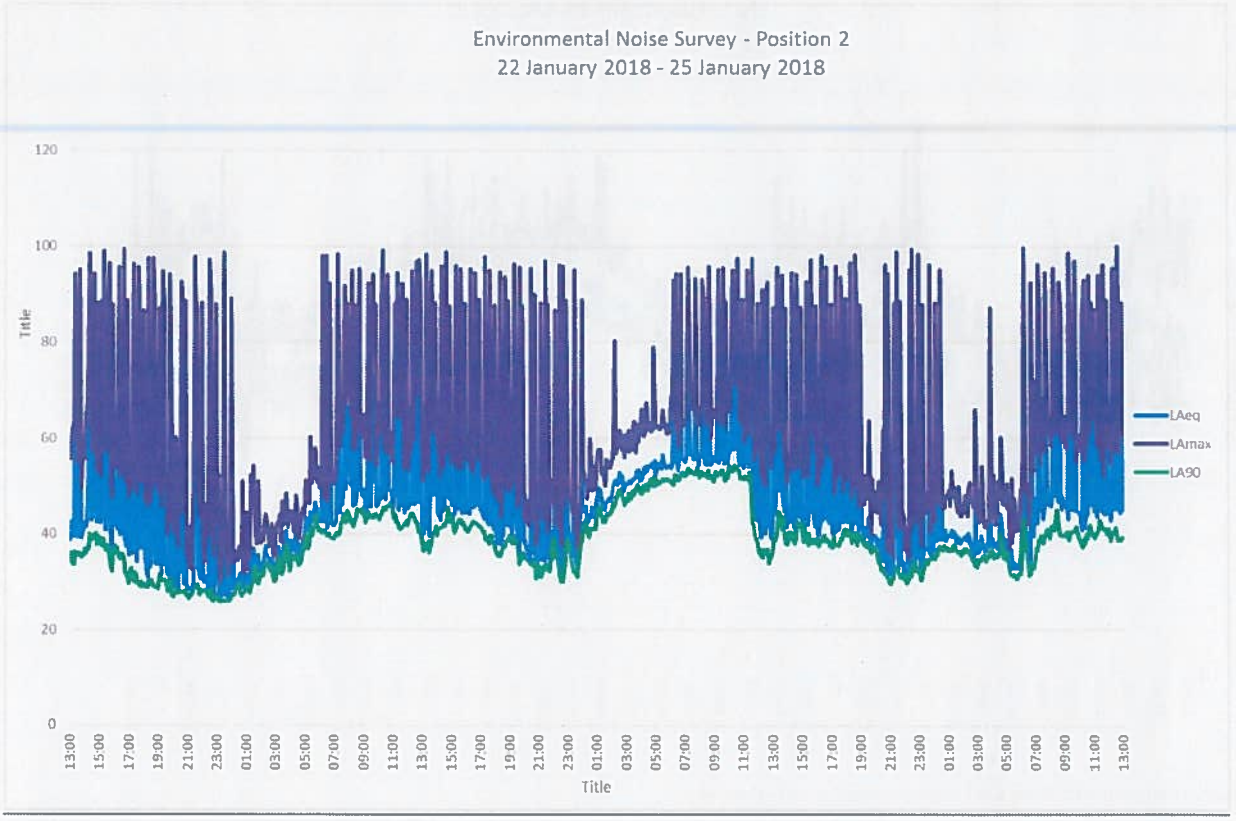

Figure 3: Environmental Noise Survey Measurement Graph - Position 2

The full dataset of noise levels measured is not presented in tabular form as it is too large.

A summary of the 16-hour daytime (0700hrs to 2300hrs) and 8-hour night time (2300hrs to 0700hrs) $L_{Aeq,T}$ for Position 1 are presented in Table 5:

Table 5: Summary Noise Levels – Position 2

Period	Monday, 22 January 2018	Tuesday, 23 January 2018	Wednesday, 24 January 2018	Thursday, 25 June 2018	Overall
Daytime $L_{Aeq\ (16hour)}$ dB	67.3	66.9	66.7	67.2	67
Night time $L_{Aeq\ (8hour)}$ dB	61.2	60.6	62.3	-	61

A noise level time history over the full measurement period on Position 3 is presented in Figure 5, which demonstrates the variability of noise on the proposed development site.

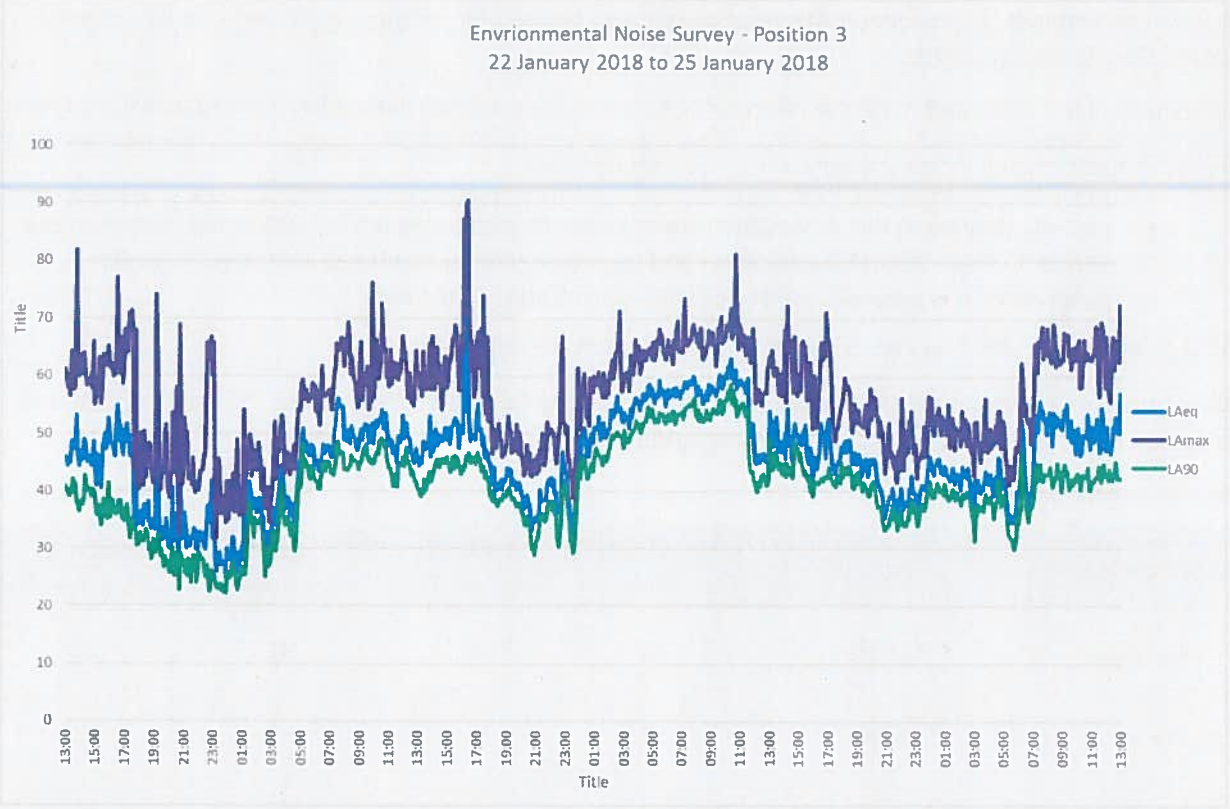

Figure 4: Environmental Noise Survey Measurement Graph - Position 3

The full dataset of noise levels measured is not presented in tabular form as it is too large.

A summary of the 16-hour daytime (0700hrs to 2300hrs) and 8-hour night time (2300hrs to 0700hrs) $L_{Aeq,T}$ for Position 1 are presented in Table 6.

Table 6: Summary Noise Levels – Position 2

Period	Monday, 22 January 2018	Tuesday, 23 January 2018	Wednesday, 24 January 2018	Thursday, 25 June 2018	Overall
Daytime $L_{Aeq\ (16hour)}$ dB	46.0	53.3	54.2	51.5	53
Night time $L_{Aeq\ (8hour)}$ dB	42.2	54.4	42.8	-	50

6.2 CRTN Measurement

Attended measurements were taken at the CRTN Monitoring Position 4 in order to provide base noise level data for use in noise mapping prediction software. Data will also be used for setting criteria limits for the relevant guidance and British standards.

Calculations of the measured noise data were undertaken as per guidance outlined in the guidance documents.

The key acoustic parameter measured was $L_{A10,T}$ as defined below.

- $L_{A10,T}$ dB, defined as the 'A' weighted sound pressure level exceeded for 10% of the measurement period 'T'. It is a statistical parameter and cannot be directly combined with other acoustic parameters. It is generally used to describe road traffic noise levels.

The $L_{Aeq,T}$ and $L_{Amax,F,T}$ and $L_{A90,T}$ were also recorded to inform the detailed design.

Table 7 provides a summary of the measured levels at Positions 4 and demonstrate the CRTN assessment and estimation of the L_{day}, $L_{evening}$ and L_{night} levels using calculation method 3 of the TRL methodology.

Table 7: CRTN Assessment (A352)

Acoustic Parameter	Process	Sound Level dB(A)	Measured $L_{Aeq\ (15mins)}$ dB	Measured $L_{Amax,F\ (15mins)}$ dB	Measured $L_{A90\ (15mins)}$ dB
$L_{A10,\ (15mins)}$	Sample 1	83	78	98	52
$L_{A10,\ (15mins)}$	Sample 2	83	78	97	52
$L_{A10,\ (15mins)}$	Sample 3	83	78	97	52
$L_{A10(3hour)}$	Avg. 1, 2 and 3	83	-	-	-
$L_{A10(18hour)}$	$L_{A10(3hour)}$ - 1	82	-	-	-
L_{Day}	$0.95*L_{A10(18hour)}+1.44$	79	-	-	-
$L_{Evening}$	$0.97*L_{A10(18hour)}-2.87$	77	-	-	-
L_{Night}	$0.90*L_{A10(18hour)}-3.77$	70	-	-	-

6.3 Typical Background Noise Levels

A statistical approach has been adopted in line with the guidance of BS 4142:2014 in determining the typical background noise levels.

The approach is to undertake a statistical analysis of the resulting daytime (0700-2300) and operational hours (0830-1630) measurement periods in order to determine the representative and most commonly occurring values to determine the typical background noise level.

The figures outlined in Table 8 should be adopted for use in the noise impact assessment.

Table 8. Typical Measured Background Noise Level L_{A90}

Period	Position 1 Typical Background Noise Level $L_{A90,T}$ dB(A)	Position 2 Typical Background Noise Level $L_{A90,T}$ dB(A)	Position 3 Typical Background Noise Level $L_{A90,T}$ dB(A)
Daytime $L_{A90,16hour}$ dB	46	39	42
Night Time 0830-1630hrs $L_{A90,8hour}$ dB	43	37	39

7. VIBRATION

A vibration measurement was undertaken at 1 Position, the results are presented in Table 9.

Table 9: Vibration Measurement Result

Time	X	Y	Z
21/01/2018 (16hr)	0.216	0.248	0.512
21/01/2018 (8hr)	0.027	0.046	0.266
22/01/2018 (16hr)	0.208	0.252	0.504
22/01/2018 (8hr)	0.028	0.049	0.276
23/01/2018 (16hr)	0.296	0.242	0.512
23/01/2018 (8hr)	0.183	0.212	0.360
24/01/2018 (16hr)	0.282	0.228	0.456

The guidance *"BS 6472 2008 - Guide to evaluation of human exposure to vibration in buildings Part 1"* sets out vibration dose value ranges to establish the probability of adverse comment by those who experience it. These are presented in Table 10.

Table 10: Vibration dose value ranges which might result in various probabilities of adverse comment within residential buildings

Place and Time	Low Probability of Adverse Comment	Adverse Comment Possible	Adverse Comment Probable
Residential Buildings 16 h Day	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential Buildings 8 h night	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

Note: For offices and workshops, multiplying factors of 2 and 4 respectively should be applied to the above vibration dose value ranges for a 16 hour day.

The recorded levels of vibrations show that adverse comments are possible at the measurement location. However, the measurements were taken at about 20m from the railway line whereas the closest 3 buildings are located between 30 and 50m from the to the railway line and most other buildings are at least 100m away from the railway line. As vibration levels decrease with distance it can be assumed that adverse comments are unlikely for most buildings within this development.

With regards to the 3 closest buildings (DIM-02, ZEB-01 and ALT-02), there is a low likelihood of adverse comments, hence if the future tenants of these proposed buildings have specific vibration requirements, it should be made the responsibility of the incoming tenant to ensure that the levels of vibration are acceptable or that the necessary mitigation measures are put in place.

8. NOISE MAPPPING

In order to predict the external noise levels present at each façade a noise map has been created using CadnaA environmental noise prediction and mapping software.

The noise map will be used in part to determine a suitable ventilation and glazing strategy.

A noise map has been generated of the proposed site using measurements logged at all the long and short-term measurement positions and includes road traffic noise from surrounding roads.

This model was calibrated for daytime equivalent noise levels ($L_{Aeq,16hr}$).

A noise map was generated of the site with the proposed development in-situ.

Figure 5 displays the noise level map of the proposed development during the daytime ($L_{Aeq,16hr}$) period.

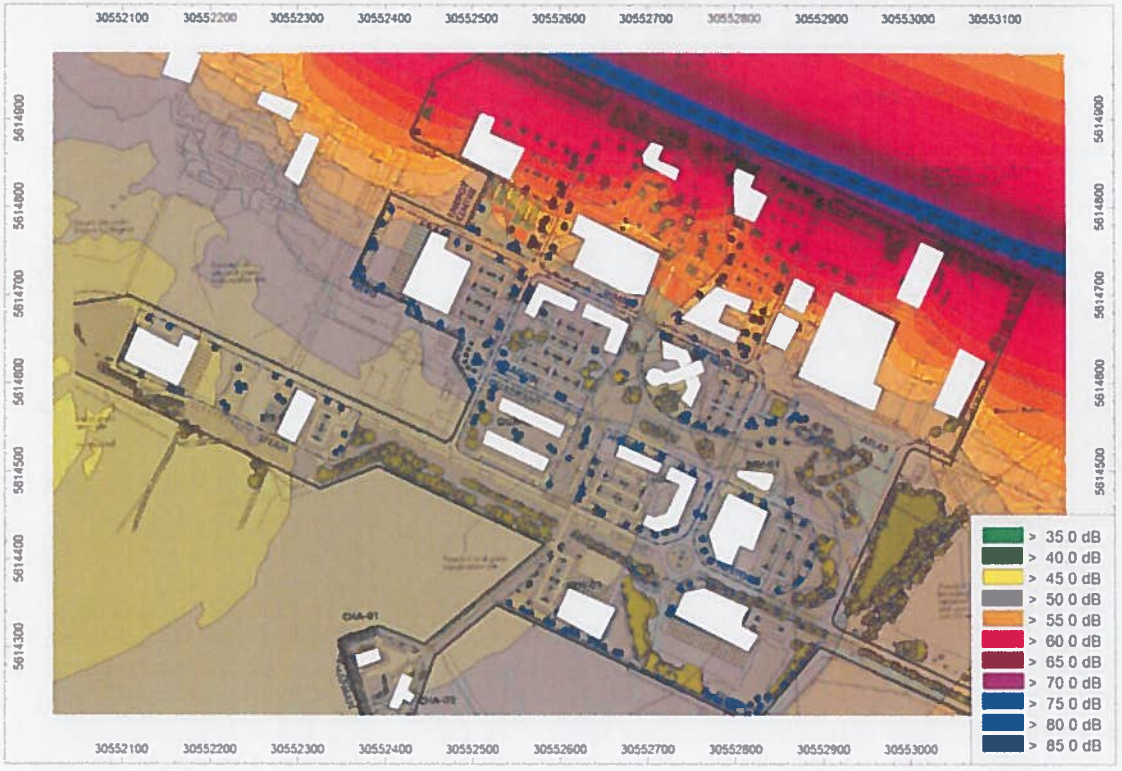

Figure 5: Noise Map (Daytime 0700-2300)

8.1 Outline Guidance for Building Envelope and Ventilation Strategy

The sound insulation properties of the building envelope depend upon the external noise levels present at each façade.

We would therefore advise that the development be designed to ensure internal noise levels in accordance with the guidance of BS 8233:2014.

Table 11 assumes compliance with BS 8233:2014's internal noise criterion and shows the level differences for varying spaces within the proposed development.

The assessment has taken into account noise levels from all identified sources.

The examples shown represent the highest-level differences required for each façade as identified in Figures 7, based on the predicted data from the noise maps, environmental noise survey and manual noise measurements.

It should be noted that the highest-level difference (D) shown for bedrooms within Table 11 takes precedence.

Simple natural ventilation through the use of opening windows will provide a level difference (D) in the order of 10-15 dB.

As shown in Figure 6 facades have been colour-coded to demonstrate the level of noise exposure and required ventilation strategy.

The defining exposure level and relevant ventilation strategies can be defined as follows:

'Low Noise Exposure' – Suitable for natural ventilation, e.g. windows may remain open

'Medium Noise Exposure' – Suitable ventilation strategies may include; passive acoustic ventilation, acoustically treated ventilation with constantly running extract fans or whole house ventilation (MVHR).

'High Noise Exposure' - Suitable ventilation strategies are likely to be restricted to mechanical whole house ventilation (MVHR).

Table 11: Façade Noise Assessment

Façade	Room Use	Predicted External ('free-field' corrected)	Proposed Internal (Maximum)	Minimum Level Difference (D)
High Noise Exposure	Office	> 65	40	25+
	Meeting Room	> 65	45	20+
Medium Noise Exposure	Office	55-65	40	15-25
	Meeting Room	55-65	45	15-25
Low Noise Exposure	Office	< 55	40	< 15
	Meeting Room	< 55	45	< 15

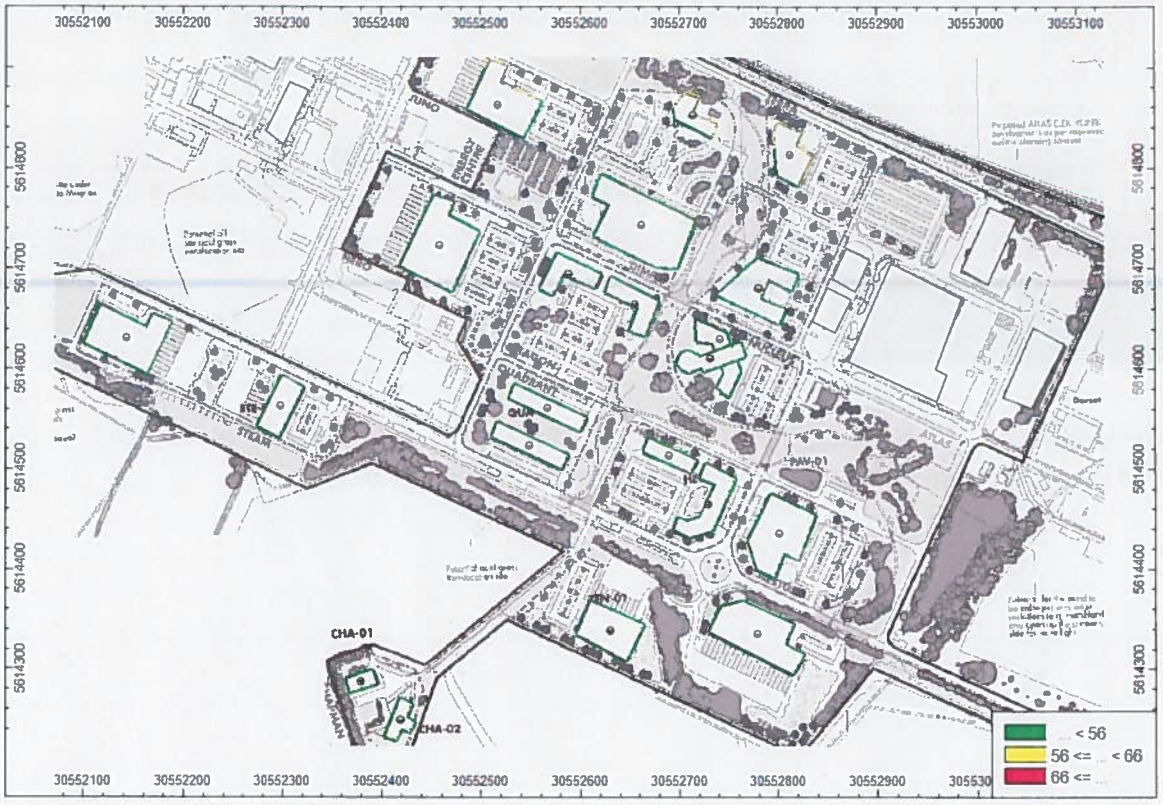

Figure 6: Façade Assessment (Day)

A detailed mark-up is included in Appendix B at the end of this report.

8.2 Building Fabric and Glazing Sound Insulation Requirements

Preliminary calculations have been undertaken to provide guidance on the sound insulation requirements of the building envelope.

A suggested minimum sound insulation performance of the non-glazed elements of the building façade is outlined in Table 12.

Table 12: Non-Glazed Façade Element

Product Description	Sound Insulation Values per Octave Band Frequency (Hz) dB							Rw + Ctr
	63	125	250	500	1000	2000	4000	
Non-Glazed Element	30	39	50	60	65	65	65	55

A proposed minimum sound insulation performance for the glazed elements of the building façade are as follows in Table 13.

Table 13: Required Attenuation – Glazed Façade Element

Façade	Minimum Required R_{w+Ctr}	
	Office	Executive Office
Medium Noise Exposure	25	25
Low Noise Exposure	15	15

As the development design progresses, qualified comment should be sought on acoustic suitability and evidence of lab performance values should be made available by manufacturers.

9. NOISE LIMITS

The proposed development may incorporate building services plant which can potentially vent to external locations or have externally located plant and machinery items, which are capable of producing audible noise and may require noise control measures (and potentially vibration control dependent on location).

The nearest noise sensitive properties have been identified as:

- Broomhill Farm, located to the north of the proposed development

A statistical assessment of background noise levels has been undertaken in accordance with BS 4142:2014.

The typical background daytime and night-time noise levels at each of the long-term monitoring locations are shown below:

Typical background noise levels at Position 2, closest to the nearest sensitive receptor, are:

- L_{A90} 39 dB daytime (0700hrs to 2300hrs)
- L_{A90} 37 dB night time (2300hrs to 0700hrs)

Typically, a proposed noise limit of prevailing background noise (as above) minus 5 dB(A) is advised for design purposes in accordance with the procedures of BS 4142:2014. The proposed limits are shown below.

Table 14: Proposed Plant Limits

Parameter	Period	Noise Levels, dB
$L_{Ar,1hour}$	Daytime (0700hrs to 2300hrs)	34
$L_{Ar,15mins}$	Night Time (2300hrs to 0700hrs)	32

The noise limits above are 'free-field' levels at any height above ground and 1.0m from the nearest noise sensitive property façade. It applies to the overall combined operation of building services plant without any specific tone or character.

If the plant noise will contain specific tones or intermittent character, then a further 6 dB(A) penalty should be applied.

Each submission for the individual plots of the development must comply with the limits presented in this section.

10. SUMMARY AND CONCLUSIONS

Hydrock Consultants have been appointed by Purbeck District Council to provide acoustic consultancy services regarding the design and construction of the proposed Dorset Innovation Park.

Guidance standards have been referenced to establish satisfactory indoor noise levels, external noise levels and methods for determining prevailing background noise levels using National and Local Planning Policy guidelines.

A noise survey of the site has been undertaken.

External acoustic modelling has been conducted for the purposes of assessing the likely façade levels at the proposed development site.

Preliminary design advice relating to the sound insulation and ventilation design of the façades has been provided based on measured noise levels.

Vibration levels from the railway line were measured in order to assess the likelihood of adverse comments.

In conclusion, assuming the measures outlined in this report are implemented, the development will meet the requirements of the local authority and relevant guidance standards.