Noise Impact Assessment:

GAP Hire Solutions - Whitehaven

June 2022






Experts in noise and vibration assessment and management

Document Control

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Job Number	J20-13331A-20

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Document Status and Review Schedule

Report No.	Date	Status	Reviewed by
J20-13331A-20/F1	1 June 2022	Final	Will Martin (Associate Director)

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1 Introduction

1.1 Noise Consultants Limited (NCL) have been commissioned by Copeland Borough Council (CBC) to undertake a noise assessment of GAP Hire ('this Site') at Whitehaven Commercial Park, 2 Joe McBain Ave, Moresby Parks, Whitehaven CA28 8EA (the 'Site), a commercial premises that falls within the administrative boundary of CBC.

1.2 GAP Hire is an equipment and plant hire company, which operates during the daytime (07:30-17:00hrs) on weekdays only.

1.3 The GAP plant hire site has recently been subject to a retrospective planning application for the retention of a new, lightweight building to be used as a workshop and store and surfacing of the yard with concrete. As the site lies immediately to the south of dwellings on Whinrigg Drive, a noise impact assessment (JPM Acoustics Ltd, Project Ref: 1982021, Version 1, dated 22 Dec 2021) submitted in support of the retrospective planning application.

1.4 The JPM noise assessment has used operational and background sound levels measured at the northern site boundary to predict operational noise levels at the dwellings to the north using a simplified computer noise modelling approach, and the results assessed against the background sound levels in the absence of activity from the site.

1.5 This assessment of noise from the site has been requested to be carried out in accordance with the methodology set out in BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' (BS 4142) and includes objective and qualitative analysis to inform contextual considerations to determine the overall impact from the site.

1.6 To assist with the understanding of this report, a glossary of acoustic terms is provided in **Appendix .**

2 Site and Proposed Development

2.1 The site location and layout are shown in **Figure 1** and **Figure 2** respectively.

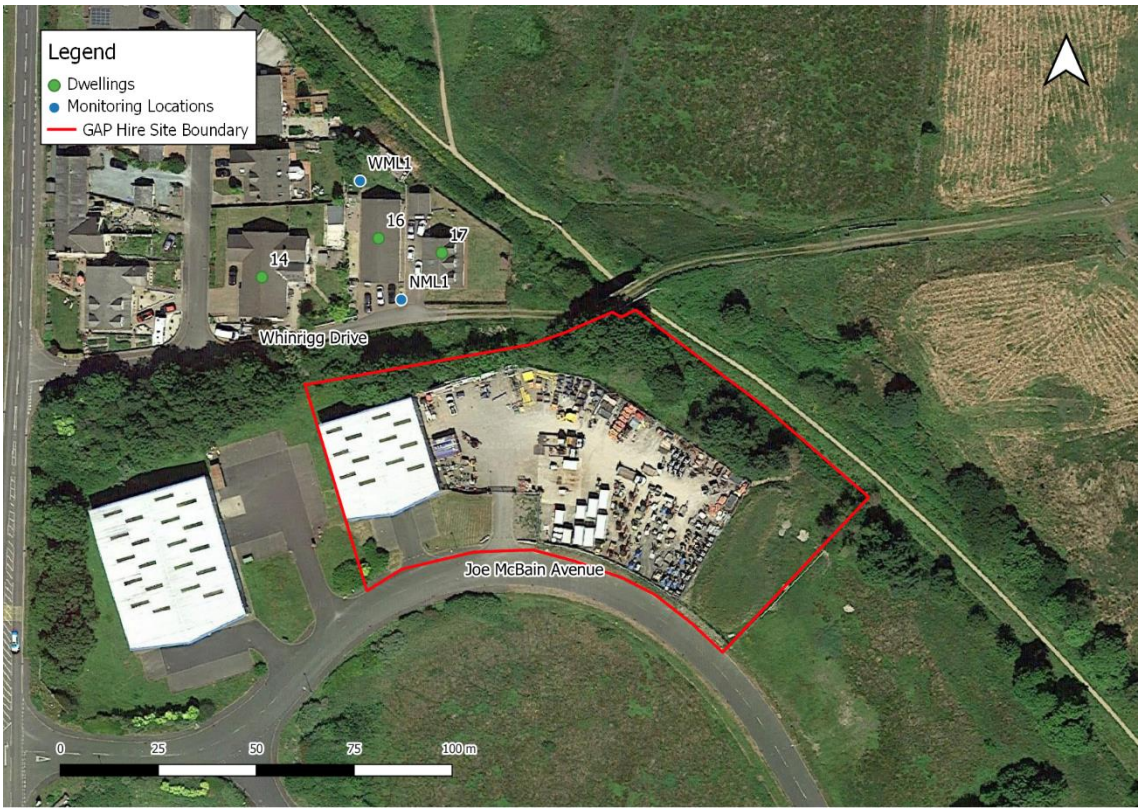
2.2 The site is bounded by Joe McBain Avenue to the south, an existing industrial/commercial unit to the west, a small access road and dwellings on Whinrigg Drive to the north, and open grassland to the east. The site is generally at grade with dwellings to the north.

2.3 The existing building on the western site boundary of the site (that is not the subject of the retrospective planning application), appears to be a steel portal frame type building with a mixture of brick and cladded exterior walls, lightweight cladded roof, has a steel roller shutter door on its eastern facing elevation, and is understood to be used for the storage and maintenance of plant and equipment.

2.4 The open yard is used for various purposes, including the storage of equipment (such as lighting rigs, and welfare units), un/loading of hire plant and jetwashing of equipment.

2.5 The nearest noise sensitive receptors (NSRs) to the site are two-storey dwellings at 14, 16 and 17 Whinrigg Drive, as shown in **Figure 1**, and were built well before Whitehaven Commercial Park. Numbers 14 and 17 have external amenity spaces that have a clear line of sight to the GAP site.

Figure 1: Site Location and Monitoring Positions



(Imagery: ©2022 Google.com)

Figure 2: Proposed Site Layout

(Site Plan: ©2021 HYPOSTYLE Architects)

3 Assessment Approach

Local Authority Consultation

3.1 NCL consulted with CBC and agreed in outline terms on the noise monitoring locations, survey duration and the approach to the assessment in advance of any site survey work.

Scope

3.2 This report includes an assessment of the noise from operational activities from the site. The assessment has been limited to the daytime weekday period, as the site is not permitted to operate, or expected to generate significant levels of noise emission at night. Noise increases resulting from site generated traffic on the wider road network has not been considered. The assessment has been carried out at a location representative of residential NSRs that are most exposed to noise from the site.

3.3 A review of the survey results, calculations, and assessment methodology, contained in the JPM report is not within the scope of this report.

Existing Noise Levels

3.4 To quantify existing levels of noise around the site, an environmental noise survey has been undertaken, and the resulting noise levels used to;

- determine existing noise levels attributable to operational activities at the GAP site; and
- existing noise levels in the absence of noise from the GAP site during the 'shoulder' hours (17:00-18:00) as AM residual levels were significantly affected by morning birdsong.

Assessment Methodology and Criteria

3.5 Assessment criteria have been selected in accordance with the National legislation, policies, and guidance and by reference to appropriate British and International standards outlined in **Appendix A3**.

Selection of LOAEL and SOAEL

A1.1 The setting of LOAELs and SOAELs for industrial noise to determine impact is not well-rehearsed. Because the recognised assessment of these types of sources is based on the prominence of the sound source relative to baseline levels, it does not readily lend itself to a single threshold value.

A1.2 The assessment of noise impact at residential receptors therefore follows the procedure described in British Standard 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' (BS 4142:2014), which is the most appropriate methodology to be used when considering noise of an industrial nature.

A1.3 Table 1 summarises the proposed threshold effect levels relating to operational sound from GAP with reference to the impact thresholds contained in BS 4142:2014.

Table 1: Proposed LOAEL and SOAEL Criteria by reference to BS 4142:2014+A1:2019

Period	LOAEL	SOAEL
Daytime (0700-2300hrs)	Rating level ($L_{Ar,Tr}$) less than or equal to background sound level, $L_{A90,T}$ (with consideration of context)	Rating level ($L_{Ar,Tr}$) +10 dB above background sound level, $L_{A90,T}$ (with consideration of context)
Night-time (2300-0700hrs)	GAP Close. Night-time assessment is not required	

A1.4 Data obtained during the survey has been used to determine specific, ambient and background daytime sound levels and any relevant corrections in accordance with the methodology outline in BS 4142. As required by BS 4142, the assessment of noise from the site has been undertaken for a sample of 1hr periods.

A1.5 Where the predicted rating levels for the initial assessment are between the LOAEL and the SOAEL thresholds, some additional quantitative and qualitative considerations.

A1.6 For additional context and consideration of internal noise levels within the nearby dwellings the measured noise levels have been compared to the guideline noise levels thresholds of BS 8233:2014, reproduced in **Table A.3.4** which are considered to represent the LOAEL, but in the absence of any correction that ought be applied to account for the non-anonymous character of noise from the GAP site. Internal threshold noise levels that represent the SOAEL are also not well-rehearsed, but for the purposes of this assessment have been taken as being 10dB above the guideline values in **Table A.3.4.**

4 Noise Survey

Survey Details

4.1 A part attended baseline sound survey was undertaken from approximately 07:30hrs on Thursday 21st April until 13:45hrs on Friday 29th April October 2022. The purpose of the survey was to capture environmental sound levels both with (both the permitted and non-permitted uses) and without the GAP site operating to the nearest NSRs to facilitate the required assessment. GAP were not informed of the dates/times of the survey.

4.2 All measurements were conducted, where possible, in accordance with BS 7445-1:*2003 'Description and measurement of environmental noise. Guide to quantities and procedures'* (BS 7445, 2003) and BS 4142:2014.

Survey Instrumentation

4.3 Noise levels were measured at NML1 (**Figure 1**) that for the purposes of this assessment is considered broadly representative of the dwellings and external amenity areas that are most exposed to any noise from the site.

4.4 The baseline noise survey was undertaken using a 'Class 1' sound level meter (SLM) calibrated within the preceding 12 months. The calibration level of the SLM was checked before and after the measurement using an acoustic calibrator calibrated within the preceding 12 months, with no significant drift in level observed. Calibration details of the instrumentation used can be provided upon request.

4.5 The SLM was located in a free-field position (i.e., it was positioned at least 3.5 m from all surrounding reflective surfaces other than the ground), with a microphone at a height of 1.4 m above local ground.

4.6 A suitable windshield was fitted to the microphone to minimise the effects of any wind-induced sound. The calibration levels of the SLM was checked before and after the measurement, with no significant drift in level recorded. Calibration details of the monitoring instrumentation can be provided upon request.

4.7 The instrumentation was configured to report $L_{Aeq,T}$, $L_{A90,T}$, and $L_{Amax,F}$ parameters in 1/3rd octave bands in 100ms intervals with audio recording to facilitate post-processing and data analysis.

Meteorological Conditions

4.8 A Davis Vantage Vue weather station was installed in the rear garden of 16 Whinnrig Drive (**Figure 1**, WML1) to capture the prevailing weather conditions during the survey to ensure that any noise data measured during unacceptable weather conditions could be excluded from the assessment. **Table A 4.1** shows that the prevailing weather conditions during the survey were mild, and calm with wind speeds less than 2 ms^{-1}. Some turbulent noise around the SLM windshield was audible in the

recorded audio on 22/04/2022, and noise measurements during this period have not been included in the assessment.

4.9 The ambient temperature during the approved operating hours of the site and the 'shoulder' hour was above 2°C at all times. The dominant wind direction during the survey was from the East and South-East. There were no Covid-related or known road traffic restrictions in place during the survey, and the prevailing local environmental conditions are therefore considered acceptable for the purpose of the assessment.

Survey Observations

4.10 During the installation and decommissioning of the survey instrumentation, observations of activities at the GAP site and wider environment were made by the surveyors.

4.11 Activities at the GAP site that were audible at NML1 included:

- Idling plant engines in the eastern area of the GAP site that were audible at a low level;
- Jetwashing of portable toilets undertaken at the south-western corner of the new lightweight building that was clearly audible;
- Clearly audible tonal reverse warning alarms of forklift trucks; and,
- Occasional shouting of variable audibility and intelligibility.

4.12 Extraneous noise sources included;

- Distant road traffic and birdsong; and,
- Distant and faintly audible aircraft.

Survey Results – Background Sound Levels, L_{A90}

4.13 Background sound levels during the PM shoulder hour (17:00-18:00hrs) of GAP's operating hours have been quantified from the measured noise data.

4.14 A total of 20 15-minute measurements were obtained from the weekday data, excluding the 22/04/2022 when turbulent wind conditions were noted in the recorded audio. BS 4142[1] requires a representative background sound level determined through *'a series of either sequential or disaggregated measurements carried out during the period of interest'* and that *'A representative level should account for the range of background sound levels and should not automatically be assumed to be either the minimum or modal value.'*

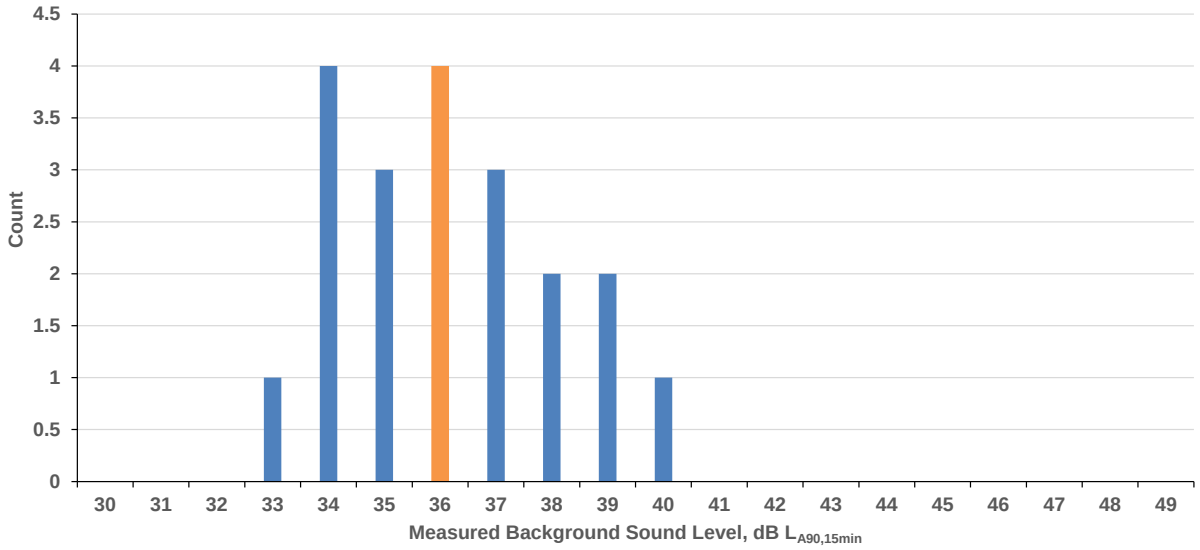
4.15 Therefore statistical analysis of the measured background sound levels has been undertaken and is summarised in **Table 2**. A histogram of the same data is provided in **Figure 3.**

[1] BS 4124:2014, Clause 8.1.4, Note 1.

Table 2: Analysis of Background Sound Levels, dB $L_{A90,15min}$, 17:00-18:00

Range	Lowest Mode	Median	Mean
33 - 40	34	36	36

Figure 3: Histogram of Measured Background Sound Levels, dB $L_{A90,15min}$, 17:00-18:00



4.16 Given the data in the above, a **representative background sound level of 36dB $L_{A90,1hr}$** has been adopted for the purposes of this assessment. It is noted that the background sound level adopted in the JPM report, uses a lower value of 31dB L_{A90}, which is low in absolute terms, significantly lower than has been adopted in this assessment, but is likely due to the JPM survey being undertaken under partial lockdown conditions (schools and non-essential shops were closed).

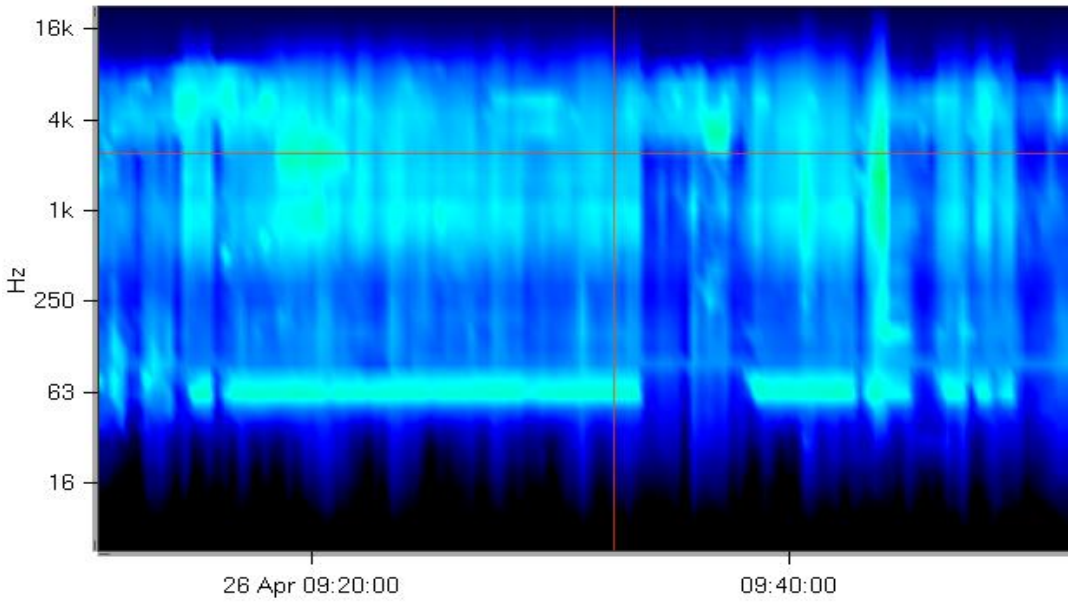
Summary of Noise and Activities at GAP

4.17 An analysis of the noise data and recorded audio has been undertaken, and commentary on the audible noise at NML1 is summarised in **Table A.5.1.** Through analysis of the measured noise data and audio, it was found that;

- noise from the GAP was audible against the underlying noise climate on at least one occasion every weekday day.
- Included;
    - Regular and brief ‘rumble’, potentially noise from engines that was typically louder and perceptible than the underlying noise climate and had a low-frequency component/tonality, and as shown in **Figure 4.**
    - Occasional diesel forklift truck movements (inc. rattling forks & engine noise) and associated tonal warning alarms

- Infrequent but clearly audible forklift truck horns (51-60dB $L_{Amax, F}$)
- Very infrequent metallic impact noise (up to 68dB $L_{Amax, F}$) and shouting within the yard.

Figure 4: Spectral Analysis of Engine Noise, $L_{Aeq, T}$



4.18 Given the baseline survey was carried out over 7 days, In the interests of brevity, the assessment has considered a 1hr period on 4 separate days in which the most regular source of noise from the site (such as discernible 'rumble'/engine sound) was audible. The specific sound levels have been calculated by:

- Selecting sample periods of noise containing the sound/activity being assessed to derive an ambient sound level and operating duration,
- calculating the time corrected specific sound levels (47-49dB $L_{Aeq, T}$) by correcting the measured ambient sound level (49-51dB $L_{Aeq,T}$) for the residual sound level (37-47dB $L_{Aeq ,T}$), and,
- using the reference (Annex D, Clause D.2.6) or subjective method to determine any corrections for tonality

4.19 Example sample periods for the survey are summarised in **Table A.5.2.**

4.20 As the majority of sound from the site is intermittent in nature, a +3dB correction for intermittency has been included. Where tonal noise was subjectively present, the reference method of BS 4142 has been used to determine correction factors (K_t) for tonality has been used. The resulting rating sound level has then been assessed against the adopted background sound level. The results are summarised in **Table 3** and discussed in **Section 5.**

4.21 It should be noted that the measured specific sound levels are of a higher magnitude than those predicted by JPM.

Table 3: Summary of Initial BS 4142 Assessments

Description	25/04/2022		26/04/2022		27/04/2022		28/04/2022	
	Engine / Rumbling	Comment	Engine / Rumbling	Comment	Jet washing	Comment	Engine / Rumbling	Comment
Measured Ambient Sound Level dB $L_{Aeq,T}$	51.3	27/04/2022 09:18 - 09:30	49.4	26/04/2022 08:05-08:28	50.5	27/04/2022 10:54-11:00	49.1	28/04/2022 11:19-11:34 (exc. Pauses, and extraneous noise)
Measured Residual Level dB $L_{Aeq,T}$	47.5	27/04/2022 17:00-18:00	45.9	26/04/2022 17:00-18:00	45.1	27/04/2022 17:00-18:00	37.0	During pause in sound
Calculated Specific Sound Level dB $L_{Aeq,T}$	49.0	-	46.8	-	49.0	-	48.8	-
Time Correction, for 1hr period	-7.0	12min/hr	-6.3	14min/hr	-10.0	6min/hr	-6.0	15min/hr
Adopted Specific Level dB $L_{Aeq,Tr}$	44.3	-	40.5	-	39.0	-	42.8	-
Tonality, dB (K_t)	+6	(K_t from Reference Method, Annex D, Clause D.2.6, f=76Hz)	+6	(K_t from Reference Method, Annex D, Clause D.2.6, f=63Hz)	+6	(K_t from Reference Method, Annex D, Clause D.2.6, f=63Hz)	+3	Subjective corrected as some low freq. rumble audible
Impulsivity, dB (K_i)		Not impulsive		Not impulsive		Not impulsive		Not impulsive
Intermittency	+3	Is Intermittent	+3	Is Intermittent	+3	Is Intermittent	+3	Is Intermittent
Other Character Corrections, dB	0	Corrections already applied	0	Corrections already applied	0	Corrections already applied	0	Corrections already applied
Rating Level calculated at the closest proposed dwelling rounded to nearest dB, dB $L_{Ar,Tr}$	53	-	50	-	48	-	49	-
Background Sound Level, dB L_{A90}	36	-	36	-	36	-	36	-
Rating Level – Background Sound Level & Initial BS 4142 Assessment Outcome	17	Indication of significant adverse impact depending on the context	14	Indication of significant adverse impact depending on the context	12	Indication of significant adverse impact depending on the context	13	Indication of significant adverse impact depending on the context

5 Assessment

BS 4142: 2014 Assessment

Initial Assessment

5.1 **Table 3** summarises the outcome of an initial assessment carried out in accordance with BS 4142, which shows that noise from the site results in ”Significant Adverse Impact”, and in line with the adopted assessment thresholds noise from the site is considered to be above the SOAEL, depending on the context.

5.2 The assessment undertaken by JPM found that the noise from the site would be around 40dB $L_{Aeq,1hr}$, and with a +6dB correction for impulsive noise, would result in an exceedance of the background of +15dB [quoted incorrectly as 16dB]. The outcome of the initial assessment is comparable to that of JPM.

Uncertainty

5.3 The noise levels used in the assessment have been measured at the assessment location, under repeatable conditions, under suitable weather conditions and exclude any erroneous noise. Consequently, any uncertainty in the measured noise levels is not considered significant such that the outcome of the assessment would be different.

5.4 Determination of the background sound level has been carried out using a range of methods. Whilst modal analysis shows that a typical background sound level could be lower (34dB $L_{A90,1hr}$), the adoption of this background sound level would increase the significance of noise from the site and not change the outcome of the assessment.

5.5 The site may be subject to noisier activities that were not measured and could result in the rated sound level exceeding the background by a greater margin than has been found in this assessment. However, the initial outcome shows a significant impact and the associated uncertainty would not change the outcome of the assessment.

Contextual Analysis and Conclusion

5.6 In qualitative and contextual terms;

- Noise from the site is intermittent in nature, not steady nor constant throughout the day, but is of a magnitude and character that can attract attention against the underlying noise climate.
- Contrary to the JPM report, the site has attracted complaints regarding operational noise from the site.
- Specific noise from the site, which is solely attributable to the site, measured by NCL is comparable to, but higher, than the ambient noise level in the absence of site operations.

- Ambient noise levels increase by 4-5dB(A) when assessed over a 1hr period, compared to periods where site noise levels are absent but can increase significantly more when evaluated over a shorter period.

5.7 To provide additional context, internal noise levels within NSRs have been considered in absolute terms assuming 13dB attenuation from outside to inside, for a simple opening window, as advocated in ProPG[2]. **Residual noise levels** (i.e. the level without any site activity) just meet or are just below 35dB $L_{Aeq,T}$ (by 2-3dB(A)) which represents an appropriate design standard by reference to BS8233. This level is considered to be **below the LOAEL**.

5.8 Considering site noise levels (i.e. including noise from GAP activities); the **ambient** (cumulative) sound is **above the LOAEL, by 1-3dB(A) over a 1hr period.** The **specific and rated** (that might account for some character of the noise from the site) sound levels (excluding the residual sound) are also **above the LOAEL, by 1dB(A) and 1-5dB(A) respectively**.

5.9 In summary, internal noise levels at NSRs resulting from the site, on an open windows basis are therefore considered to fall somewhere between the LOAEL and SOAEL.

5.10 Based on the measured noise levels and a quantitative and qualitative analysis, it is considered that noise from the GAP site results in a significant adverse impact on the amenity of nearby dwellings.

[2] ProPG: Planning & Noise, Professional Practice Guidance on Planning & Noise, New Residential Development, may 2017

6 Conclusion

6.1 Noise Consultants Limited (NCL) have been commissioned by Copeland Borough Council (CBC) to undertake noise assessment of an existing GAP Hire premises at Whitehaven Commercial Park, 2 Joe McBain Ave, Moresby Parks, Whitehaven CA28 8EA (the 'Site') that falls within the administrative boundary of CBC.

6.2 The noise assessment has considered operational and background noise levels measured at the location of the nearest noise-sensitive receptors under suitable and repeatable conditions.

6.3 This assessment of noise from the site has been requested to be carried out in accordance with the methodology set out in BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' and includes objective and qualitative analysis to inform contextual considerations to determine the overall impact from the site.

6.4 Importantly, the data analysis shows that noise from the site contains tonal noise from regular idling engines, and can be impulsive in nature, sufficient to attract relevant penalties for its character.

6.5 A BS 4142 assessment of external noise has been conducted at the nearest residential receptors to the north which results in an "Indication of Significant Adverse Impact depending on the context".

6.6 Noise from activities at the GAP site results in the internal noise from the site being above the LOAEL but is likely to be below the SOAEL, based on a simple opening window.

6.7 The outcome of the BS 4142 assessment once contextual factors have been considered, shows a significant adverse impact on the amenity of nearby dwellings which, under National Policy, must be avoided. Whilst we are unable to confirm beyond reasonable doubt, it is likely that noise from the GAP that has been assessed is associated with the permitted, rather than non-permitted development.

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A2 Glossary

dB	Decibel. The logarithmically scaled measurement unit of sound.
A-weighting	Frequency weighting applied to measured sound in order to account for the relative loudness perceived by the human ear.
$L_{Aeq,T}$	A-weighted equivalent continuous residual sound level over a given time period. It is the sound level of a steady sound that has the same energy as a fluctuating sound over the same time period.
$L_{Aeq,Tr}$	A-weighted equivalent continuous sound pressure level at the assessment position produced by the specific noise source over a given reference time interval, Tr.
$L_{A90,T}$	The A-weighted sound level exceeded for 90% of the measurement period. Often referred to as the background sound level.
L_{Amax}	The A-weighted maximum recorded noise level during a measurement period.
$L_{Ar,Tr}$	The rating level at the assessment position. This is the specific level plus any adjustment for characteristic features of the sound.
R_w	The weighted Sound Reduction Index which characterises the airborne sound insulation of a building element over a range of frequencies with a single number quantity.

A3 Relevant Policy and Guidance

National Noise Policy

Noise Policy Statement for England (NPSE, 2010)

A3.1 The Noise Policy Statement for England (NPSE, 2010) sets out the Government's Noise Policy Vision to:

"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development".

A3.2 This long-term vision is supported by three Noise Policy Aims that can be delivered through effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development. These aims are to:

1. *avoid significant adverse impacts on health and quality of life;*
2. *mitigate and minimise adverse impacts on health and quality of life; and*
3. *where possible, contribute to the improvement of health and quality of life.*

A3.3 The explanatory note to the NPSE sets out 'effect levels' which are aligned to the Policy Aims. Drawing upon established concepts from toxicology, the NPSE defines the following noise effect levels:

- NOEL - 'No Observed Effect Level';
- LOAEL - 'Lowest Observed Adverse Effect Level'; and
- SOAEL - 'Significant Observed Adverse Effect Level'.

A3.4 The explanatory note describes SOAEL as the effect level above which significant adverse effects on health and quality of life occur, aligning this level with the first policy aim.

A3.5 LOAEL is described as the level at which adverse effects begin and the second aim of the NPSE refers to a situation where the effect lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8 of the NPSE) however this does not mean that such adverse effects cannot occur.

A3.6 NOEL is described as a level of noise exposure below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life.

A3.7 The third aim seeks, where possible, to positively improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society.

A3.8 The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.

A3.9 NPSE states that it is not possible have a single, numerical definition of the SOAEL that is applicable to all sources of noise in all situations, since the SOAEL is likely to be different for different noise sources, for different receptors and at different times.

National Planning Policy Framework (NPPF, 2019)

A3.10 The National Planning Policy Framework (NPPF, 2021) sets out the Government's planning policies for England and how these should be applied. The NPPF provides a framework within which locally-prepared plans for housing and other development can be produced.

A3.11 In relation to noise, it states:

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

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

A3.12 The NPPF includes policy which makes reference to 'significant adverse impacts on health and quality of life', as per the NPSE. NPPF policy states:

"185. Planning policies and decisions should aim to ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and…"*

Planning Practice Guidance – Noise (PPG-Noise, 2019)

A3.1 The Planning Practice Guidance (PPG-Noise, 2019) provides further detail about how the effects of noise can be described in terms of perception and outcomes. It aligns this to increasing effect levels as defined in the NPSE. In addition, the PPG-Noise adds a fourth term and corresponding effect level:

- UAEL – 'Unacceptable Adverse Effect Level'.

A3.2 This effect level is higher than the significant adverse effect on health and quality of life (SOAEL) and requires that unacceptable adverse effects are prevented.

A3.3 Error! Reference source not found. presents the noise exposure hierarchy described in PPG-Noise, and is based on the principle that once noise or vibration becomes perceptible, the effect on people and other receptors increases as the level increases. PPG-Noise presents example outcomes to help characterise these This noise exposure hierarchy is based on the principle that once noise or vibration becomes perceptible, the effect on people and other receptors increases as the level increases. PPG-Noise presents example outcomes to help characterise these effects using non-technical language. In general terms, an observed adverse effect is characterised as a perceived change in quality of life for occupants of a building or a perceived change in the acoustic character of an area, whereas a significant observed adverse effect disrupts activities.

Table A.3.1: Planning Practice Guidance – Noise Exposure Hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level (NOAEL)			
Present 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 (LOAEL)			
Present and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			

Perception	Examples of Outcomes	Increasing Effect Level	Action
Present and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

A3.4 PPG-N does not provide numerical values for the effect levels, instead PPG-N recognises that "*the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation*".

A3.5 These factors include:

- *"The source and absolute level of the noise together with the time of day it occurs. Some types and levels 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 contains 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 any 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 (and the effect this may have on living conditions)"*

A3.6 PPG-Noise also provides guidance in terms of what factors may influence whether noise could become a concern, and how adverse effects of noise can be mitigated. Examples of mitigation provided include:

- *"engineering: reducing the noise generated at source and/or containing the noise generated;*
- *layout: where possible, optimising the distance between the source and noise-sensitive receptors and/or incorporating good design to minimise noise transmission through the use of screening by natural or purpose built barriers, or other buildings;*
- *using planning conditions/obligations to restrict activities allowed on the site at certain times and/or specifying permissible noise levels differentiating as appropriate between different times of day, such as evenings and late at night, and;*
- *mitigating the impact on areas likely to be affected by noise including through noise insulation when the impact is on a building".*

British Standard 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

A3.7 BS 4142:2014+A1:2019 is used to rate and assess sound of an industrial nature including but not limited to assessing sound from proposed, new, modified or additional sources of industrial sound. It contains guidance on the monitoring and assessment of industrial and commercial sound sources (including fixed installations comprising mechanical and electrical plant and equipment) affecting sensitive receptors.

A3.8 The methodology relies on comparing the operational rating level, $L_{Ar,Tr}$, with the background sound level, $L_{A90,T}$ (i.e. the level that would be present without the development) over a representative time period. BS 4142:2014+A1:2019 provides guidance on the measurement of background sound, the determination of specific sound and calculation of the rating level.

A3.9 Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. A character correction should be added to the specific sound level to obtain the rating level, where such features are present at the assessment location. This can be approached in three ways, however the subjective method is considered appropriate for this assessment. This states that the specific sound level should be corrected if a tone, impulse or other characteristic occurs, or is expected to be present for new sound sources.

Tonality

A3.10 A tonal correction between 0 and +6 dB can be applied for sounds that range from not tonal to prominently tonal. Several methodologies are presented in BS 4142:2014+A1:2019 in order to determine the appropriate correction to be applied.

A3.11 Annex D provides an objective (Reference) method for assessing the audibility of tones in sound where the presence of audible tones is in dispute, and based on the prominence of the tones. *The* aim of the reference method is to assess the prominence of tones in the same way as listeners do on average, and this procedure provides recommended level adjustments (K_t) and provides a graduated 0 dB to +6 dB adjustment. This is known as is known as the Joint Nordic Method 2 and is to be found in ISO 1996-2:2017: *'Acoustics — Description, measurement and assessment of environmental noise — Part 2: Determination of sound pressure levels'.*

A3.12 Subjectively, the Joint Nordic Method can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible. **Table A.3.2** presents the subjective assessment method corrections for tonal sounds.

Table A.3.2: Subjective Method – Rating Level Corrections for Tonal Sounds

Subjective assessment of sound source at the receptor	Correction
The tone is just perceptible at the receptor	+2 dB
The tone is clearly perceptible at the receptor	+4 dB
The tone is highly perceptible at the receptor	+6 dB

A3.13 For the purposes of this assessment, where subjectively tonal noise was audible in the recorded audio, the Reference Method (Annex D) has been used.

Impulsivity

A3.14 An impulsivity correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Several methodologies are presented in BS 4142:2014+A1:2019 in order to determine the appropriate correction to be applied.

A3.15 Annex E provides an objective method for measuring the prominence of impulsive sounds that correspond to average subjective judgements made by listeners. Based on the prominence, *P*, of the impulsive noise, a graduated adjustment, K_I, can be determined

A3.16 **Table A.3.3** presents the subjective method corrections for impulsive sounds.

Table A.3.3: Subjective Method – Rating Level Corrections for Impulsive Sounds

Subjective assessment of sound source at the receptor	Correction
Impulsivity is just perceptible at the receptor	+3 dB
Impulsivity is clearly perceptible at the receptor	+6 dB
Impulsivity is highly perceptible at the receptor	+9 dB

A3.17 For the purposes of this assessment, the subjective method has been applied.

Intermittency and Other Sound Characteristics

A3.18 Where the specific sound level features characteristics that are neither tonal nor impulsive, though otherwise are of an intermittent character, a penalty of +3 dB can be applied. Assuming that the proposed plant is kept well maintained and serviced regularly, no penalty is considered appropriate for other sound characteristics.

Assessment of Impacts

A3.19 BS 4142:2014+A1:2019 states *"The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."*

A3.20 BS 4142:2014+A1:2019 assessment methodology also states that:

- *"Typically, the higher the rating level is above the background sound level 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; and*
- *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."*

British Standard 8233:2014 'Guidance on sound insulation and noise reduction for buildings'

A3.21 BS 8233 carries the full weight of an adopted British Standard and is supported by other guidance. It provides acoustic design criteria guidance for the control of noise in and around buildings, and applies to new buildings, or refurbished buildings undergoing a change of use.

A3.22 The guideline noise design criteria of BS 8233 apply to external noise '*without a specific character*' (previously and sometimes termed or referred to as 'anonymous noise') such as that associated with road and states that it under these conditions, it is desirable that the internal ambient noise level does not exceed the guideline values shown in Table 2.1 of this report.

A3.23 The guideline noise design criteria of BS 8233 apply to external noise '*without a specific character*' (previously and sometimes termed or referred to as 'anonymous noise') such as that associated with road traffic and states that under these conditions, it is desirable that the internal ambient noise level does not exceed the guideline values shown in **Table A.3.4**.

Table A.3.4: BS 8233:2014 Guideline Internal Noise Level Limits – Anonymous Noise

Room / Internal Space	Daytime (07:00-23:00hrs)	Night-time (23:00-07:00hrs)
Lounge	35 dB $L_{Aeq,16hr}$	-
Dining room	40 dB $L_{Aeq,16hr}$	-
Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ and not regularly exceeding 45dB L_{AFmax}

A3.24 The internal noise requirements are not intended to be met with open windows, although BS 8223:2014 states that the internal noise levels should take the ventilation strategy into account.

A3.25 If partially open windows were relied upon for background ventilation, the standard states that the noise ingress would be reduced by approximately 15 dB, but can *'vary significantly depending on the window type and the frequency content of the external noise. If the specific details of the window and external noise are known the value for insulation may be adjusted accordingly*[3].

A3.26 BS 8233 states that *"Where* (new or refurbished) *development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up* to 5 dB and reasonable internal conditions still achieved".

[3] BS 8233:2014 Annex G.1 Note 3

Professional Practice Guidance (ProPG) on Planning & Noise – '*New Residential Development*' , 2017)

A3.27 Professional Practice Guidance: Planning & Noise – 'New Residential Development' (ProPG, 2017) is a joint publication by the Chartered Institute of Environmental Health (CIEH), the Association of Noise Consultants (ANC) and the Institute of Acoustics (IoA).

A3.28 The primary goal of ProPG is "to assist the delivery of sustainable development by promoting good health and wellbeing through the effective management of noise".

A3.29 The guidance has been produced to assist practitioners in matters relating to noise and new residential development. It focuses on existing transportation noise sources and has been developed to consider the Government's overarching noise policy, planning policy and policy guidance. It has also been developed to take into account other authoritative sources of guidance such as British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' (BS 8233:2014).

A3.30 The guidance provides advice for Local Planning Authorities (LPAs) and developers, and practitioners. ProPG aims to:

- Advocate the full consideration of the acoustic environment from the earliest possible stage of the development control process;
- Promote and encourage the process of good acoustic design in and around new residential developments;
- Set out the considerations which should be taken into account in deciding planning applications for new noise-sensitive developments;
- Promoting the use of appropriate noise exposure standards and policies in assessment; and
- Provide assistance in the delivery of sustainable development.

A3.31 Some caution to the application of PROPG is recommended as sites where industrial and/or commercial noise is present on the site and is considered to be "dominant" fall outside the scope of ProPG and regard should be had to the guidance in BS 4142:2014.

Acoustics Ventilation and Overheating: Residential Design Guide (2020)

A3.32 The Acoustics Ventilation and Overheating: Residential Design Guide (AVO Guide, 2020) has been prepared with contributions from members of the ANC's AVO Group and committee members.

A3.33 For a partially open window, Appendix B of the AVO Guide states that the noise insulation can be assumed to be approximately 13 dB and applied to an external free-field level. It is also noted that the value of 13 dB is not appropriate for all situations.

Local and Regional Policy

Copeland Local Plan 2013-2028 (Adopted December 2013)

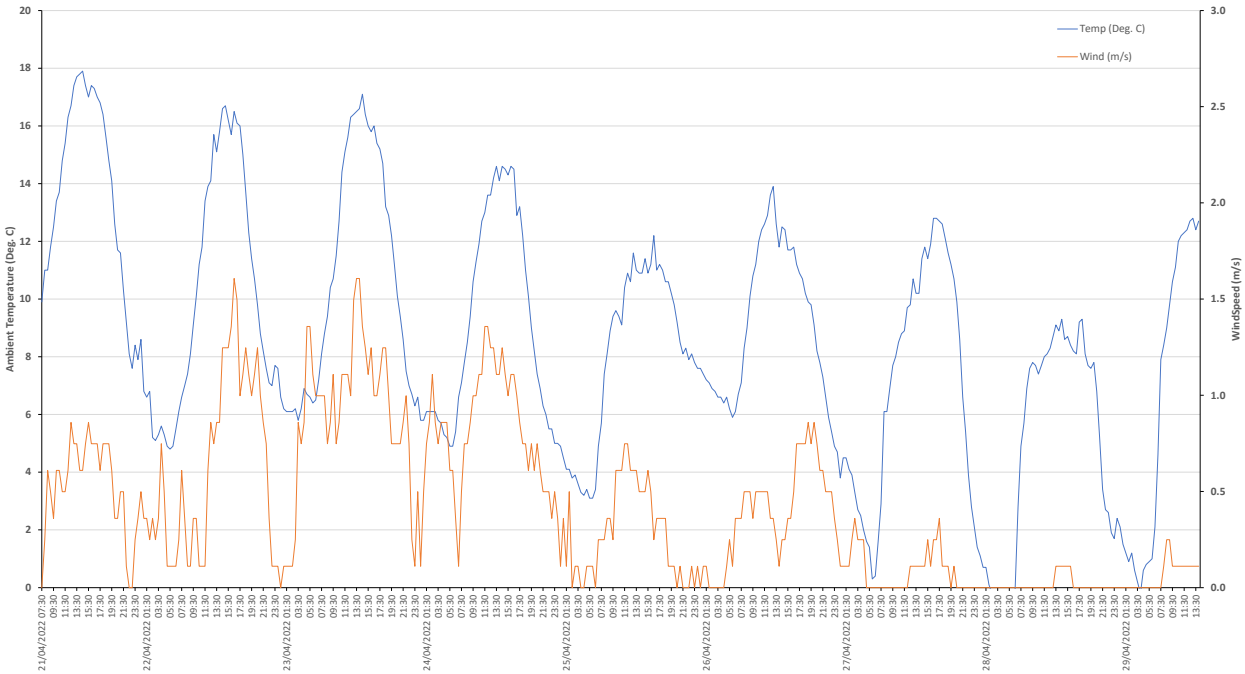
A3.34 This document provides the Council's policies and proposals for the Core Strategy and Development Management, and together with the Site Allocations and Policies Plan, form the principal components of the Copeland Local Plan.

A3.35 Note that the Development Plan Documents (DPDs) are the statutory parts of the Plan, requiring Public Examination, while the Supplementary Planning Documents (SPDs) and Neighbourhood Plans apply the statutory Borough-wide planning policies in more detail.

A3.36 There are no specific policy or SPD's that contain noise related guidance.

A4 Measured Weather Data

Table A 4.1: Measured Weather Data



A5 Measured Sound Levels

Table A.5.1: Summary of the Measured Baseline Survey Data at NML1

Date	Start	Duration	dB $L_{Aeq,15min}$	dB $L_{AFmax,15min}$	dB $L_{A90,15min}$	Residual/Background Noise Sources	GAP Noise Sources / Activities
21/04/2022 07:00	07:00	0:32:54	51.7	79.6	36.7	Birdsong. Distant road traffic. Consultants.	Faint idling engine
21/04/2022 08:00	08:00	0:51:48	45.4	63.0	35.8	Residents talking. Birdsong. Distant road traffic. Consultants.	Engine from 08:00-08:08, and 08:09-08:11 (46.3 dB(A)) , 08:22-08:24 (47.8dB(A)),
21/04/2022 09:00	09:00	0:59:51	46.2	72.4	35.8	Residents talking. Birdsong. Distant road traffic. Consultants.	FLT Horns (60dB LAFmax), Metallic Impact (64dB LAFmax)
21/04/2022 10:00	10:00	1:00:00	44.2	67.8	33.8	Residents talking. Birdsong. Distant road traffic.	
21/04/2022 11:00	11:00	1:00:00	45.9	74.1	35.9	Birdsong. Distant road traffic.	
21/04/2022 12:00	12:00	1:00:00	45.3	72.5	38.0	Birdsong. Distant road traffic.	
21/04/2022 13:00	13:00	0:59:38	46.8	78.1	33.6	Birdsong. Distant road traffic.	Brief engine idling in yard (46.5dB (A)).
21/04/2022 14:00	14:00	1:00:00	42.8	65.6	34.2	Birdsong. Distant road traffic. Distant alarm	Brief faint engine.
21/04/2022 15:00	15:00	1:00:00	44.9	65.3	36.9	Birdsong. Distant road traffic.	
21/04/2022 16:00	16:00	0:58:24	45.5	65.7	38.2	Birdsong. Distant road traffic.	Brief idling engine.
21/04/2022 17:00	17:00	1:00:00	45.6	65.8	35.5	Birdsong. Distant road traffic.	
25/04/2022 07:00	07:00	1:00:00	48.9	74.4	35.6	Birdsong. Distant road traffic.	
25/04/2022 08:00	08:00	1:00:00	45.9	73.5	34.6	Birdsong. Distant road traffic.	
25/04/2022 09:00	09:00	0:57:10	46.8	73.5	35.6	Birdsong. Distant road traffic.	Idling Engine (49.1 dB Laeq,11min)
25/04/2022 10:00	10:00	1:00:00	44.2	63.3	34.3	Birdsong. Distant road traffic.	
25/04/2022 11:00	11:00	0:51:00	44.3	64.7	36.9	Birdsong. Distant road traffic.	
25/04/2022 12:00	12:00	1:00:00	45.3	68.1	37.2	Birdsong. Distant road traffic.	
25/04/2022 13:00	13:00	1:00:00	43.4	61.1	34.7	Birdsong. Distant road traffic.	
25/04/2022 14:00	14:00	1:00:00	46.3	69.8	37.5	Birdsong. Distant road traffic.	
25/04/2022 15:00	15:00	1:00:00	46.5	70.6	38.5	Birdsong. Distant road traffic.	Idling Engine (47.8 dB Laeq,11min)
25/04/2022 16:00	16:00	0:58:10	46.8	67.9	38.5	Birdsong. Distant road traffic.	
25/04/2022 17:00	17:00	1:00:00	47.3	70.0	35.7	Birdsong. Distant road traffic.	
26/04/2022 07:00	07:00	1:00:00	49.1	70.5	37.3	Birdsong. Distant road traffic.	Idling engine.
26/04/2022 08:00	08:00	1:00:00	47.4	64.3	38.6	Birdsong. Distant road traffic.	Idling engine.
26/04/2022 09:00	09:00	1:00:00	47.9	63.4	37.6	Birdsong. Distant road traffic.	Steady 'rumble' from GAP (08:00-08:20, 50dB(A)), likely jet washing activities.
26/04/2022 10:00	10:00	1:00:00	45.9	66.8	35.7	Birdsong. Distant road traffic.	Steady 'rumble' from GAP (09:14-09:33, 49dB(A)), likely jet washing activities.

Date	Start	Duration	dB $L_{Aeq,15min}$	dB $L_{AFmax,15min}$	dB $L_{A90,15min}$	Residual/Background Noise Sources	GAP Noise Sources / Activities
26/04/2022 11:00	11:00	0:58:16	50.9	68.6	38.8	Birdsong. Distant road traffic. Lawn mowing (10:55-11:00)	
26/04/2022 12:00	12:00	1:00:00	44.1	70.4	32.5	Birdsong. Distant road traffic. Lawn mowing (11:00-11:07)	Jetwashing, FLT horns, metallic impacts, and relatively busy period (11:10-12:00)
26/04/2022 13:00	13:00	0:58:26	45.4	65.4	33.2	Birdsong. Distant road traffic.	
26/04/2022 14:00	14:00	1:00:00	47.1	70.2	35.4	Birdsong. Distant road traffic.	Brief Steady 'rumble' from GAP, likely jet washing activities.
26/04/2022 15:00	15:00	1:00:00	45.9	65.3	36.2	Birdsong. Distant road traffic.	
26/04/2022 16:00	16:00	0:56:30	47.9	67.0	39.8	Birdsong. Distant road traffic.	Jetwashing, idling engine, FLT movements and Tonal RWA
26/04/2022 17:00	17:00	1:00:00	45.9	63.9	38.9	Birdsong. Distant road traffic.	
27/04/2022 07:00	07:00	0:58:52	49.0	76.7	39.1	Birdsong. Distant road traffic.	
27/04/2022 08:00	08:00	1:00:00	47.3	64.5	38.8	Birdsong. Distant road traffic and aircraft	Brief periods of jetwashing
27/04/2022 09:00	09:00	1:00:00	48.0	76.3	36.3	Birdsong. Distant road traffic.	
27/04/2022 10:00	10:00	1:00:00	46.9	69.8	36.0	Birdsong. Distant road traffic.	Brief period of jetwashing (10:55-11:00)
27/04/2022 11:00	11:00	1:00:00	48.7	71.1	38.2	Birdsong. Distant road traffic.	
27/04/2022 12:00	12:00	1:00:00	45.2	63.6	35.5	Birdsong. Distant road traffic.	
27/04/2022 13:00	13:00	1:00:00	45.7	66.2	36.9	Birdsong. Distant road traffic.	
27/04/2022 14:00	14:00	0:57:36.8	46.9	63.5	41.9	Birdsong. Distant road traffic.	FLT movements, TWA and horns, idling engine
27/04/2022 15:00	15:00	0:59:24	47.0	62.0	42.0	Birdsong. Distant road traffic.	Brief steady 'rumble' from GAP, likely jet washing activities.
27/04/2022 16:00	16:00	0:58:08	45.8	63.6	38.2	Birdsong. Distant road traffic.	Brief (1min) steady 'rumble' from GAP, likely jet washing activities.
27/04/2022 17:00	17:00	0:59:24	45.1	66.2	35.0	Birdsong. Distant road traffic. Distant aircraft.	
28/04/2022 07:00	07:00	1:00:00	48.0	70.9	35.1	Birdsong. Distant road traffic.	
28/04/2022 08:00	08:00	0:58:38	46.7	70.0	36.7	Birdsong. Distant road traffic.	Idling engine (47.2dB LAeq,5min) with a residual after of 41.6dB LAeq,5min
28/04/2022 09:00	09:00	1:00:00	47.1	69.3	36.2	Birdsong. Distant road traffic.	
28/04/2022 10:00	10:00	1:00:00	46.2	64.8	35.5	Birdsong. Distant road traffic.	
28/04/2022 11:00	11:00	0:55:49	47.9	68.8	38.1	Birdsong. Distant road traffic.	Idling engine (49.3dB LAeq,15min) with an intermediate residual (pause in GAP noise) of 37dB Laeq,1min
28/04/2022 12:00	12:00	1:00:00	45.0	69.9	35.0	Birdsong. Distant road traffic.	Brief periods of engines idling
28/04/2022 13:00	13:00	1:00:00	44.4	62.5	36.3	Birdsong. Distant road traffic.	
28/04/2022 14:00	14:00	1:00:00	44.4	64.9	37.1	Birdsong. Distant road traffic.	
28/04/2022 15:00	15:00	1:00:00	45.1	65.5	36.7	Birdsong. Distant road traffic.	Brief periods of engines idling

Date	Start	Duration	dB $L_{Aeq,15min}$	dB $L_{AFmax,15min}$	dB $L_{A90,15min}$	Residual/Background Noise Sources	GAP Noise Sources / Activities
28/04/2022 16:00	16:00	0:57:05	47.6	72.9	38.8	Birdsong. Distant road traffic.	
28/04/2022 17:00	17:00	1:00:00	45.3	65.7	35.4	Birdsong. Distant road traffic.	
29/04/2022 07:00	07:00	1:00:00	49.4	77.3	36.2	Birdsong. Distant road traffic.	
29/04/2022 08:00	08:00	1:00:00	46.1	68.2	35.5	Birdsong. Distant road traffic.	
29/04/2022 09:00	09:00	1:00:00	60.1	96.8	35.0	Birdsong (LAFmax). Distant road traffic. Local delivery.	
29/04/2022 10:00	10:00	0:58:25	45.7	66.1	36.2	Birdsong. Distant road traffic.	
29/04/2022 11:00	11:00	1:00:00	45.6	72.7	36.1	Birdsong. Distant road traffic.	
29/04/2022 12:00	12:00	0:57:03.2	50.4	84.6	39.7	Birdsong. Distant road traffic. Lawn mower.	
29/04/2022 13:00	13:00	0:42:56.8	47.2	66.7	40.8	Birdsong. Distant road traffic.	Idling engine/plant at GAP (49.8dB LAeq, Kt = 6 @ 64Hz)
21/04/2022 07:00	07:00	0:32:54	51.7	79.6	36.7	Birdsong. Distant road traffic. Consultants.	Faint idling engine
21/04/2022 08:00	08:00	0:51:48	45.4	63.0	35.8	Residents talking. Birdsong. Distant road traffic. Consultants.	Engine from 08:00-08:08, and 08:09-08:11 (46.3 dB(A)) , 08:22-08:24 (47.8dB(A)),
21/04/2022 09:00	09:00	0:59:51	46.2	72.4	35.8	Residents talking. Birdsong. Distant road traffic. Consultants.	FLT Horns (60dB LAFmax), Metallic Impact (64dB LAFmax)
21/04/2022 10:00	10:00	1:00:00	44.2	67.8	33.8	Residents talking. Birdsong. Distant road traffic.	
21/04/2022 11:00	11:00	1:00:00	45.9	74.1	35.9	Birdsong. Distant road traffic.	
21/04/2022 12:00	12:00	1:00:00	45.3	72.5	38.0	Birdsong. Distant road traffic.	
21/04/2022 13:00	13:00	0:59:38	46.8	78.1	33.6	Birdsong. Distant road traffic.	Brief engine idling in yard (46.5dB (A)).
21/04/2022 14:00	14:00	1:00:00	42.8	65.6	34.2	Birdsong. Distant road traffic. Distant alarm	Brief faint engine.
21/04/2022 15:00	15:00	1:00:00	44.9	65.3	36.9	Birdsong. Distant road traffic.	
21/04/2022 16:00	16:00	0:58:24	45.5	65.7	38.2	Birdsong. Distant road traffic.	Brief idling engine.
21/04/2022 17:00	17:00	1:00:00	45.6	65.8	35.5	Birdsong. Distant road traffic.	
25/04/2022 07:00	07:00	1:00:00	48.9	74.4	35.6	Birdsong. Distant road traffic.	
25/04/2022 08:00	08:00	1:00:00	45.9	73.5	34.6	Birdsong. Distant road traffic.	
25/04/2022 09:00	09:00	0:57:10	46.8	73.5	35.6	Birdsong. Distant road traffic.	Idling Engine (49.1 dB Laeq,11min)
25/04/2022 10:00	10:00	1:00:00	44.2	63.3	34.3	Birdsong. Distant road traffic.	
25/04/2022 11:00	11:00	0:51:00	44.3	64.7	36.9	Birdsong. Distant road traffic.	
25/04/2022 12:00	12:00	1:00:00	45.3	68.1	37.2	Birdsong. Distant road traffic.	
25/04/2022 13:00	13:00	1:00:00	43.4	61.1	34.7	Birdsong. Distant road traffic.	
25/04/2022 14:00	14:00	1:00:00	46.3	69.8	37.5	Birdsong. Distant road traffic.	
25/04/2022 15:00	15:00	1:00:00	46.5	70.6	38.5	Birdsong. Distant road traffic.	Idling Engine (47.8 dB Laeq,11min)

Date	Start	Duration	dB $L_{Aeq,15min}$	dB $L_{AFmax,15min}$	dB $L_{A90,15min}$	Residual/Background Noise Sources	GAP Noise Sources / Activities
25/04/2022 16:00	16:00	0:58:10	46.8	67.9	38.5	Birdsong. Distant road traffic.	
25/04/2022 17:00	17:00	1:00:00	47.3	70.0	35.7	Birdsong. Distant road traffic.	
26/04/2022 07:00	07:00	1:00:00	49.1	70.5	37.3	Birdsong. Distant road traffic.	Idling engine.
26/04/2022 08:00	08:00	1:00:00	47.4	64.3	38.6	Birdsong. Distant road traffic.	Idling engine.
26/04/2022 09:00	09:00	1:00:00	47.9	63.4	37.6	Birdsong. Distant road traffic.	Steady 'rumble' from GAP (08:00-08:20, 50dB(A)), likely jet washing activities.
26/04/2022 10:00	10:00	1:00:00	45.9	66.8	35.7	Birdsong. Distant road traffic.	Steady 'rumble' from GAP (09:14-09:33, 49dB(A)), likely jet washing activities.
26/04/2022 11:00	11:00	0:58:16	50.9	68.6	38.8	Birdsong. Distant road traffic. Lawmowing (10:55-11:00)	
26/04/2022 12:00	12:00	1:00:00	44.1	70.4	32.5	Birdsong. Distant road traffic. Lawmowing (11:00-11:07)	Jetwashing, FLT horns, metallic impacts, and relatively busy period (11:10-12:00)
26/04/2022 13:00	13:00	0:58:26	45.4	65.4	33.2	Birdsong. Distant road traffic.	
26/04/2022 14:00	14:00	1:00:00	47.1	70.2	35.4	Birdsong. Distant road traffic.	Brief Steady 'rumble' from GAP, likely jet washing activities.
26/04/2022 15:00	15:00	1:00:00	45.9	65.3	36.2	Birdsong. Distant road traffic.	
26/04/2022 16:00	16:00	0:56:30	47.9	67.0	39.8	Birdsong. Distant road traffic.	Jetwashing, idling engine, FLT movements and Tonal RWA
26/04/2022 17:00	17:00	1:00:00	45.9	63.9	38.9	Birdsong. Distant road traffic.	
27/04/2022 07:00	07:00	0:58:52	49.0	76.7	39.1	Birdsong. Distant road traffic.	
27/04/2022 08:00	08:00	1:00:00	47.3	64.5	38.8	Birdsong. Distant road traffic and aircraft	Brief periods of jetwashing
27/04/2022 09:00	09:00	1:00:00	48.0	76.3	36.3	Birdsong. Distant road traffic.	
27/04/2022 10:00	10:00	1:00:00	46.9	69.8	36.0	Birdsong. Distant road traffic.	Brief period of jetwashing (10:55-11:00)
27/04/2022 11:00	11:00	1:00:00	48.7	71.1	38.2	Birdsong. Distant road traffic.	
27/04/2022 12:00	12:00	1:00:00	45.2	63.6	35.5	Birdsong. Distant road traffic.	
27/04/2022 13:00	13:00	1:00:00	45.7	66.2	36.9	Birdsong. Distant road traffic.	
27/04/2022 14:00	14:00	0:57:36.8	46.9	63.5	41.9	Birdsong. Distant road traffic.	FLT movements, TWA and horns, idling engine
27/04/2022 15:00	15:00	0:59:24	47.0	62.0	42.0	Birdsong. Distant road traffic.	Brief steady 'rumble' from GAP, likely jet washing activities.
27/04/2022 16:00	16:00	0:58:08	45.8	63.6	38.2	Birdsong. Distant road traffic.	Brief (1min) steady 'rumble' from GAP, likely jet washing activities.
27/04/2022 17:00	17:00	0:59:24	45.1	66.2	35.0	Birdsong. Distant road traffic. Distant aircraft.	
28/04/2022 07:00	07:00	1:00:00	48.0	70.9	35.1	Birdsong. Distant road traffic.	
28/04/2022 08:00	08:00	0:58:38	46.7	70.0	36.7	Birdsong. Distant road traffic.	Idling engine (47.2dB LAeq,5min) with a residual after of 41.6dB LAeq,5min
28/04/2022 09:00	09:00	1:00:00	47.1	69.3	36.2	Birdsong. Distant road traffic.	

Date	Start	Duration	dB $L_{Aeq,15min}$	dB $L_{AFmax,15min}$	dB $L_{A90,15min}$	Residual/Background Noise Sources	GAP Noise Sources / Activities
28/04/2022 10:00	10:00	1:00:00	46.2	64.8	35.5	Birdsong. Distant road traffic.	
28/04/2022 11:00	11:00	0:55:49	47.9	68.8	38.1	Birdsong. Distant road traffic.	Idling engine (49.3dB LAeq,15min) with an intermediate residual (pause in GAP noise) of 37dB Laeq,1min
28/04/2022 12:00	12:00	1:00:00	45.0	69.9	35.0	Birdsong. Distant road traffic.	Brief periods of engines idling
28/04/2022 13:00	13:00	1:00:00	44.4	62.5	36.3	Birdsong. Distant road traffic.	
28/04/2022 14:00	14:00	1:00:00	44.4	64.9	37.1	Birdsong. Distant road traffic.	
28/04/2022 15:00	15:00	1:00:00	45.1	65.5	36.7	Birdsong. Distant road traffic.	Brief periods of engines idling
28/04/2022 16:00	16:00	0:57:05	47.6	72.9	38.8	Birdsong. Distant road traffic.	
28/04/2022 17:00	17:00	1:00:00	45.3	65.7	35.4	Birdsong. Distant road traffic.	
29/04/2022 07:00	07:00	1:00:00	49.4	77.3	36.2	Birdsong. Distant road traffic.	
29/04/2022 08:00	08:00	1:00:00	46.1	68.2	35.5	Birdsong. Distant road traffic.	
29/04/2022 09:00	09:00	1:00:00	60.1	96.8	35.0	Birdsong (LAFmax). Distant road traffic. Local delivery.	
29/04/2022 10:00	10:00	0:58:25	45.7	66.1	36.2	Birdsong. Distant road traffic.	
29/04/2022 11:00	11:00	1:00:00	45.6	72.7	36.1	Birdsong. Distant road traffic.	
29/04/2022 12:00	12:00	0:57:03.2	50.4	84.6	39.7	Birdsong. Distant road traffic. Lawn mower.	
29/04/2022 13:00	13:00	0:42:56.8	47.2	66.7	40.8	Birdsong. Distant road traffic.	Idling engine/plant at GAP (49.8dB LAeq, Kt = 6 @ 64Hz)

Table A.5.2: Sample Noise Data, NML1

Date	Start	Duration	dB $L_{Aeq,15min}$	dB $L_{AFmax,15min}$	dB $L_{A90,15min}$	Comment
FLT / Shout / Impact (3)						
Overall		**0:00:54.2**	**53.8**	**68.6**	**45.2**	
21/04/2022	09:04	0:00:06	52.1	62.4		Metallic Impact
26/04/2022	11:14	0:00:16	56.8	68.6		
26/04/2022	16:42	0:00:32.2	51.2	58.2		FLT movement
Jetwashing (4)						
Overall		**0:08:22**	**50.8**	**62.6**	**46.3**	
27/04/2022	08:42	0:01:33	52.6	62.6		
27/04/2022	10:54	0:02:43	51.5	62.1		dB $L_{Aeq,t}$ = 50.5 dB. Used in Assessment, See Table 3
27/04/2022	10:57	0:03:00	49.1	55.4		
27/04/2022	16:29	0:01:06	49.4	57.4		
FLT Horn(s) (5)						
Overall		**0:00:25.4**	**51.7**	**60.3**	**42.5**	
21/04/2022	09:01	0:00:10	52.3	60.3		
26/04/2022	11:33	0:00:10.7	51.9	54.4		
27/04/2022	14:40	0:00:02.2	48.0	51.6		
27/04/2022	14:40	0:00:01.3	48.4	50.9		
27/04/2022	14:40	0:00:01.2	51.0	54.3		
Engine / Rumble (16)						
Overall		**1:37:31.3**	**49.2**	**61**	**45.2**	
21/04/2022	08:10	0:00:10	46.3	48.7		
21/04/2022	08:23	0:00:49	47.8	51.4		
21/04/2022	13:29	0:01:43	46.5	49.1		
25/04/2022	09:18	0:11:50	49.1	57.2		
25/04/2022	15:57	0:01:15	47.8	55.0		
26/04/2022	08:05	0:17:09	49.4	59.5		Used in Assessment, See Table 3
26/04/2022	09:14	0:18:50	48.7	60.2		
26/04/2022	11:31	0:12:54	49.1	60.0		
26/04/2022	12:05	0:00:43	51.0	57.2		
26/04/2022	16:07	0:05:09	49.4	60.9		
26/04/2022	16:35	0:02:08	52.8	60.3		Compressor
27/04/2022	08:11	0:04:15	51.3	60.4		Used in Assessment, See Table 3
27/04/2022	14:39	0:00:27.3	44.9	48.8		Engine idling (steady, no extraneous noise)
28/04/2022	08:38	0:05:00	47.2	60.6		Idling engine (Kt =+6, @75Hz), impulsive metallic impact sounds (Ki = +4 to +6), faint noise from FLT.
28/04/2022	11:19	0:12:09	49.1	61.0		Used in Assessment, See Table 3
29/04/2022	13:20	0:03:00	49.8	54.4		Idling engine/plant at GAP (49.8dB LAeq, Kt = 6 @ 64Hz)

Date	Start	Duration	dB $L_{Aeq,15min}$	dB $L_{AFmax,15min}$	dB $L_{A90,15min}$	Comment
Tonal reverse warning alarm						
Overall		**0:00:20**	**54.1**	**60.9**	**45.6**	
27/04/2022	14:22	0:00:18.6	54.4	60.9		
29/04/2022	12:12	0:00:00.5	43.0	45.4		
29/04/2022	12:12	0:00:00.9	43.6	46.1		

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