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Noise and Vibration Consultants

**APPROVED EXTENSION TO THE
MAGELLAN AEROSPACE FACTORY, LLAY:
COMMENTS ON NOISE PLANNING CONDITIONS**

**On behalf of:
Magellan Aerospace Wrexham**

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MAGELLAN AEROSPACE FACTORY, LLAY:**

COMMENTS ON NOISE PLANNING CONDITIONS

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1.0 INTRODUCTION

1.1 Hepworth Acoustics Ltd was commissioned by Magellan Aerospace Wrexham to assess the implications of noise limit conditions attached to a planning permission for an extension to the factory at Llay. The approved extension comprises a 1600m² building in the central area of the site and a smaller building of 320m², shown as Extension B and Extension A respectively in Figure 1. The larger building will effectively form an enclosure of an existing open yard storage area while the smaller building will form an extension to an existing assembly area.

1.2 Planning permission has been granted for the extension (Ref. LLA P/2013/0273) subject to a number of conditions. Conditions 6 and 7 relate to control of noise impact and are as follows:-

“6- The rating level of any noise generated by reason of this development shall not exceed the pre-existing background level by more than 5 dB(A) at any time. The noise levels shall be determined at the nearest noise sensitive premises, and measurements and assessment shall be made in accordance with BS4142:1997 Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas. The assessment shall be carried out, submitted to and approved in writing by the Local Planning Authority prior to the first occupation/use of the development”.

“7- The rating level of any noise generated by air handling plant associated with the development shall not exceed the pre-existing background level by more than 5 dB(A) at any time. The noise levels shall be determined at the nearest noise sensitive premises, and measurements and assessment shall be made in accordance with BS4142:1997 Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas”.

1.3 A brief explanation of BS 4142:1997 is provided here in the context of the approved extension. The background noise level (i.e. the existing noise level measured before implementation of the approved extension development) is measured in terms of L_{A90} . When the extension buildings have been built and are in use any noise emission (the ‘specific’ noise level) should be evaluated in terms of L_{Aeq} . For noise at night, BS 4142 suggests a 5 minute assessment period as being appropriate. A 5 dB ‘acoustic feature’ penalty is added to the specific noise level if the noise from the extension has noticeable intermittent peaks or discrete tones to obtain the ‘Rating Level’.

Where the difference between the Rating Level and the background noise level is no more than +5 dB, BS 4142 states that this is “of marginal significance” in terms of likelihood of complaints.

- 1.4 The nearest residential area is located in Birch Court on the other side of Llay Road. There is also the presbytery next to St Francis of Assisi church which is set back from Llay Road. Behind the church grounds is the residential area of Fair Oaks Crescent. Further north, there is living accommodation at The Crown public house, which is located on a crossroads.
- 1.5 Llay Road is busy with traffic in the daytime and evening, with associated levels of traffic noise. However, there is less traffic at night and, as the new extension building will be in use on a 24 hour basis, it is the night-time that is the most noise-sensitive time of the day i.e. when background noise levels are at their lowest.
- 1.6 The noise assessment has involved:-
 - Inspecting the approved extension areas on the factory site;
 - Carrying out an environmental noise survey late at night in Birch Court;
 - Using the survey results to specify the noise rating limit for the approved extension;
 - Commenting on the implications of the noise rating limit.
- 1.7 Noise levels referred to in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible. A description of noise units and noise characteristics is provided in Appendix I.

2.0 NIGHT-TIME NOISE SURVEY

- 2.1 A noise monitoring survey has been carried out by Hepworth Acoustics outside the houses in Birch Court, as these are the nearest dwellings to the extension. The survey was carried out late at night when noise levels from road traffic in the area will be at their minimum. Nevertheless, there was still occasional traffic on Llay Road, so the survey was undertaken partway down Birch Court (near No. 6) so as to reduce the effect of noise from passing traffic on the survey results.
- 2.2 The noise levels were measured using a Rion NA-27 'Type 1' Sound Level Analyser. The calibration of the meter was checked before and after the survey and there was no drift. The weather during the survey was dry and calm.
- 2.3 The survey was carried out during the early hours of Wednesday 31 July 2013 over a series of 5-minute periods. However, we have carried out a noise survey previously at the same location, and at a similar time of night, in March 2011. So we have used the results of both surveys.
- 2.4 The results of the noise surveys are detailed in Appendix II and are summarised below in Table 1.

Table 1: Summary of Existing Noise Levels Measured Late at Night in dB(A)

Location	$L_{Aeq}(5 \text{ min})$	$L_{A90}(5 \text{ min})$
In Birch Court	38 - 51	37 - 38

- 2.5 The ambient noise climate was due to steady plant noise from the industrial estate, occasional vehicles passing on Llay Road and distant traffic. The L_{Aeq} values were influenced primarily by passing vehicles on Llay Road. In the middle of the night peaks of noise from passing vehicles were measured up to 76 dB L_{Amax} . However, the L_{A90} background noise level, which is not affected by the intermittent traffic, averaged 38 dB $L_{A90}(5 \text{ min})$.

3.0 COMMENTS ON COMPLYING WITH PLANNING CONDITIONS 6 & 7

Planning Condition 6

- 3.1 Condition 6 requires that the rating level of any noise generated by the extension must not exceed the background noise level at the nearest houses by more than 5 dB(A). The background noise climate of the area will vary throughout the day, and as the factory is a 24 hour operation, it is the night-time period that is most critical i.e. when background noise levels (i.e. from general road traffic) are likely to be at their lowest. The results of the noise survey have shown that late at night the L_{A90} background noise level in Birch Court, prior to implementation of the approved extension, is 38 dB $L_{A90(5 \text{ min})}$. Therefore in order to comply with Condition 6, the noise level (rated in accordance with BS4142:1997) from activities associated with the extension must not exceed 43 dB at night in Birch Court. However, it should be noted that this level is regularly exceeded when vehicles pass in Llay Road and therefore to check compliance with the noise limit it would be necessary to exclude noise from traffic from any noise measurements.

1600m² Building

- 3.2 The larger of the two approved extension buildings will be located in the central area of the factory site. This location will be well screened from residential properties by other factory buildings. The building will be constructed of double-skin insulated metal cladding. The approved elevation drawings show that the building will have blank gable ends (i.e. with no windows or doors). The only windows will be in the north-west elevation facing away from the residential area. The south-east elevation will be a mainly blank apart from a roller shutter door at the north-easternmost end i.e. in a well-screened location.
- 3.3 Currently this area is used for open storage of products. The only noise generated is intermittently during movement of materials into or out of the storage area by fork lift trucks. The fact that this open area will now be housed within a building will reduce the intermittent emissions of noise from such activity in this area. Whilst noise from such intermittent activity cannot readily be calculated, from the factors described above, we are confident that noise from

the storage operations housed within the new building will be within the noise limit requirement of Condition 6.

- 3.4 We note that the existing adjoining building houses anodising tanks. From our inspection of this area the anodising process generates only modest noise levels so, if the inter-connecting doors are left open, we do not envisage any significant noise emissions from the extension building. Nevertheless, as part of general ‘housekeeping’ and best practice, we would recommend that the external roller shutter door to the new extension is kept closed at night.

320m² Building

- 3.5 The smaller of the two approved extension buildings will be located adjacent to, and just to the south of, the larger one. It will form a southern extension to an existing assembly building in the central area of the factory site. The building will be constructed of double-skin insulated metal cladding. The approved elevation drawings show that the building will have blank elevations apart from a roller shutter door in the south-east elevation. This door will be approximately 120 metres from the nearest house at Birch Court.
- 3.6 A visit was made to the existing assembly building in the daytime on 31 July 2013 in order to observe the activities that are carried out. During our visit, assembly operations were taking place but this did not involve any noisy machinery/activity. However, we understand that riveting is carried out in this building from time to time, depending on the particular type of product that is being assembled. This is a noisier activity and since it can take place at night, needs to be taken into account for the new extension.
- 3.7 The existing assembly building has a standard roller shutter door in the south-east elevation. On the night of the recent noise survey some riveting took place for a short time in the assembly building. We assume the roller shutter door was closed because in Birch Court the sound of this riveting was only just audible.
- 3.8 In order to minimise noise break-out from the new door opening in the approved extension we recommend that an insulated sectional overhead door is fitted rather than a standard roller shutter door. We recommend that the same Rw 25dB rated door (available from R & M Door

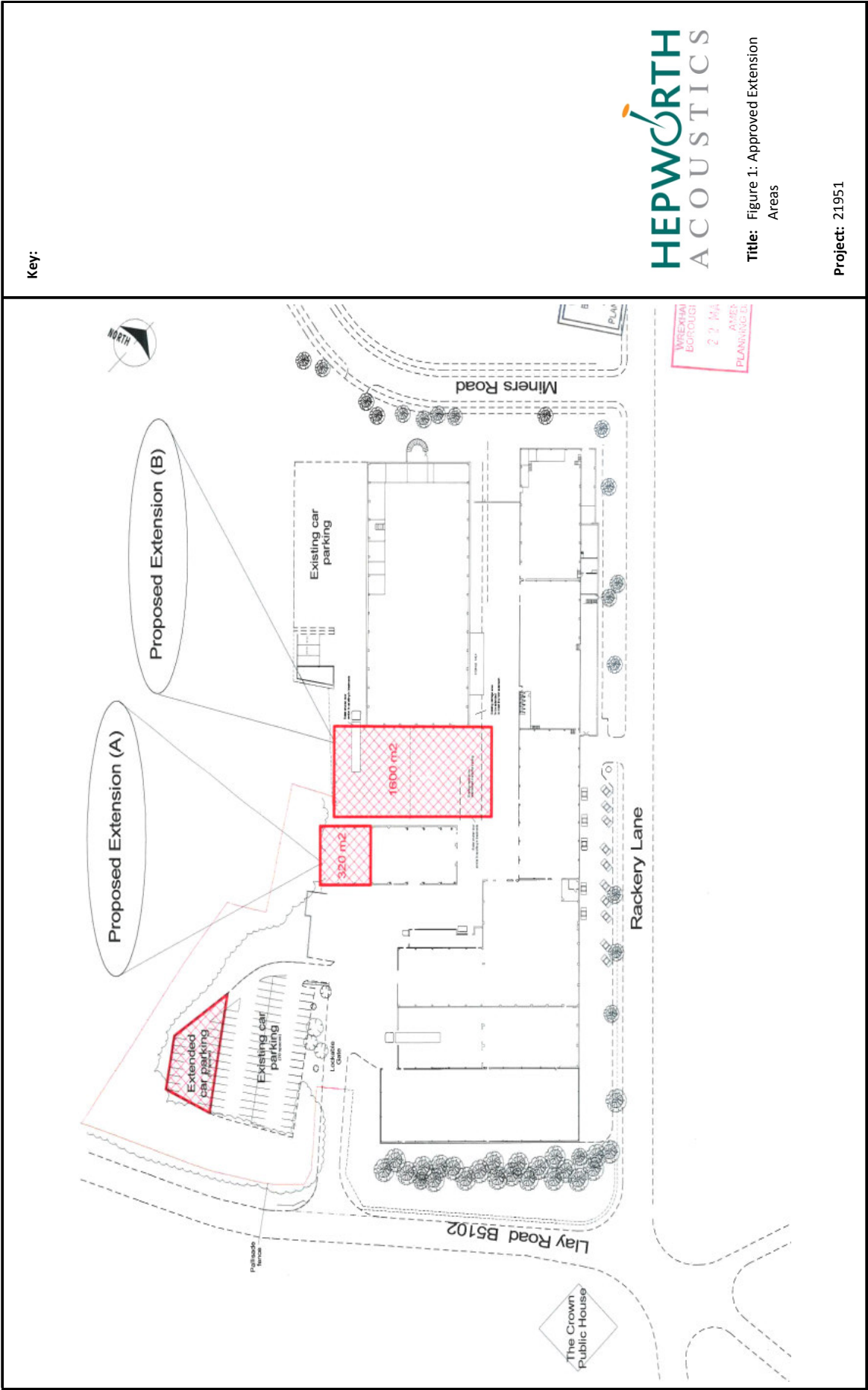
Engineering Ltd) which has been installed for other recent extension areas of the factory, and which we know has effective edge sealing with the frame, is installed. This door must be kept closed at night.

Planning Condition 7

- 3.9 Condition 7 requires that the rating level of any noise generated by air handling plant associated with the extension must not exceed the background noise level at the nearest houses by more than 5 dB(A). As stated previously, the results of the noise survey have shown that late at night the L_{A90} background noise level in Birch Court, prior to implementation of the approved extension, is 38 dB $L_{A90(5 \text{ min})}$. Therefore in order to comply with Condition 7, the noise level (rated in accordance with BS4142:1997) from any air handling equipment associated with the extension must not exceed 43 dB at night in Birch Court.
- 3.10 We understand that neither of the new approved extension buildings will have any air handling plant. Therefore, Condition 7 will not have any implications for these buildings. However, should, in the future, there be a need to install air handling plant for the extension areas it will be necessary to carefully select, locate, and acoustically control (where necessary) any such plant so as to comply with the requirement of Condition 7.

4.0 SUMMARY AND CONCLUSIONS

- 4.1 Hepworth Acoustics Ltd has assessed the implications of noise limit conditions attached to a planning permission for an extension to the Magellan Aerospace factory at Llay.
- 4.2 The conditions require the Rating Level of any noise emission from the extension areas to be limited to be no more than 5dB above the existing L_{A90} background noise level at the nearest dwellings. Therefore it has been necessary to carry out a measurement survey of existing noise levels in the nearest residential area (Birch Court) before the extensions are built.
- 4.3 The existing L_{A90} noise level was found to be 38 dB $L_{A90(5 \text{ min})}$ late at night. Therefore in order to comply with Condition 6, the noise level (rated in accordance with BS4142:1997) from activities associated with the extension must not exceed 43 dB at night in Birch Court. Similarly, in order to comply with Condition 7, the BS 4142 noise rating level from any air handling equipment associated with the extension must not exceed 43 dB at night in Birch Court.
- 4.4 The implications of the planning condition noise limits have been investigated and, where necessary, recommendations for noise mitigation have been made for the approved extension.



Appendix I – Noise Units and Indices

a) Sound Pressure Level and the decibel (dB)

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3dB(A) higher than each of the individual noise levels e.g. 60dB(A) plus 60dB(A) = 63dB(A). In terms of perceived 'loudness', a 3dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

b) Frequency and hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kilohertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20,000 Hz. However, the upper frequency limit gradually reduces as a person gets older.

c) A-weighting

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBLA.

d) Glossary of Terms

When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices can be used. The indices used in this report are described below.

L_{Aeq} This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.

L_{Amax} This is the maximum A-weighted noise level that was recorded during the monitoring period.

L_{A90} This is the A-weighted noise level exceeded for 90% of the time period. L_{A90} is used as a measure of background noise.

Appendix II – Results of Environmental Noise Surveys

2013 Survey	Date:	Early Hours of Wednesday 31 July 2013
	Equipment:	Rion NA27 Sound Level Meter (sn: 00590966), calibrator.
	Weather:	Dry, mild (15°C) and calm.
2011 Survey	Date:	Early Hours of Tuesday 8 March 2011
	Equipment:	Rion NA27 Sound Level Meter (sn: 00590966), calibrator.
	Weather:	Dry, cold (-2°C) and calm.

Location : In Birch Court (in road near No. 6)

Date	Time (hours)	Noise levels (dB)			Comments
		L _{Amax}	L _{Aeq}	L _{A90}	
31/7/13	02:45 – 02:50	62.0	42.2	36.7	Distant steady noise from Industrial Estate. 1 car & 1 van passed in Llay Road
“	02:51 – 02:56	69.5	46.6	37.3	Distant steady noise from Industrial Estate. 1 lorry tractor unit & 1 car passed in Llay Road. Distant aircraft.
“	02:57 – 03:02	52.3	38.4	37.8	Distant steady noise from Industrial Estate. Distant vehicle.
“	03:03 – 03:08	65.1	42.0	37.7	Distant steady noise from Industrial Estate. 1 van passed in Llay Road
“	03:08 – 03:13	76.3	50.9	37.7	Distant steady noise from Industrial Estate. 1 articulated lorry & 1 car passed in Llay Road. V faint distant rivetting few secs at a time (?).
“	03:14 – 03:19	61.6	41.5	36.7	Distant steady noise from Industrial Estate. 1 car & 1 van passed in Llay Road.
8/3/11	02:55 – 03:00	58.6	40.9	38.2	Distant steady noise from Industrial Estate. 1 car passed in Llay Road
“	03:00 – 03:05	66.7	47.6	38.0	Distant steady noise from Industrial Estate. 1 car, 1 lorry & 1 van passed in Llay Road
“	03:05 – 03:10	52.2	38.6	37.8	Distant steady noise from Industrial Estate. No passing cars. Occasional distant traffic.
“	03:10 – 03:15	67.9	45.7	38.4	Distant steady noise from Industrial Estate. 1 milk truck passed in Llay Road. Birds.
Average 5-minute L _{A90} Value				37.6	