
----STATEMENT & DOCUMENT FOR SUBMISSION TO THE ENQUIRY FROM
R.OSBORNE

I had hoped to present my evidence to the Inquiry with some recordings of aircraft taking off over my property that have been calibrated to replicate the exact noise levels that I am exposed to. I am both surprised and disappointed that:

In respect of the request for the noise recording, the Inspectors have continued significant concerns regarding this. It is not considered appropriate nor helpful in our consideration of the appeal development and thus we cannot accommodate this request.

I remain of the opinion that noise from the aircraft using the airport is a very significant aspect of the appeal that should be considered and that hearing the noise at the actual level it occurs in my garden with all its characteristic frequencies would give the Inspectors a much better impression of the noise than talking about decibels and frequency analysis of the sound as I will continue to do in my submission.

As a local living for 40 years under the flight path, 2.5 km from the airport, I suffer from terrible disruptive noise. As soon as one jet has roared off to a distant rumble - the next jet screams its payload of bon-voyagers off to the sun. The legal enforceable limits on noise levels from the aircraft, though frequently exceeded, take no account of the shock effect. This subjects us to a constant alert, sleep deprived state, not something represented in noise legislation that should be protecting people's health and wellbeing.

Health effects on me and my family

Throughout these 40 yrs we have suffered huge year on year increases in the numbers of deafening, roaring, stinking jet flights ruining my health and quality of life.

The induced stress from 24/7/365 sleep deprivation has wrecked my mental health and weakened my immune system, leaving me suffering from coughs colds and flu for far longer.

From being the calm, happy lucky man who slept all through the night I am now awoken twice night on average by the jets. Every time this happens, it

takes a long time to get back to sleep because of fear and anger of the next jet repeating the downward sleep deprived cycle.

This has left me short tempered snappy and permanently exhausted. Doctors have advised me to leave the area, but how can I do this when I have invested a few hundred thousand pounds that I would never recover in building a demonstration farm with waste recycling and energy producing systems that sequester greenhouse gases into food to lead communities and growers onto a new, greener and much more sustainable growing system.

Noise levels

I have commissioned an extensive professionally prepared report by Dr Dickerson an expert in the field of nuisance and noise assessment. His attached report with a real-time graphic display conclusively shows how every jet passing over my farm 2.5 km from the runway exceeds the WHO night-time noise criterion to prevent sleep disturbance with $L_{A_{Max}}$ levels up to 83dB recorded during Covid-19 restrictions on flights with light payloads. This is over 4 times louder and 300 times longer than the WHO night time noise criterion to prevent sleep disturbance and explains why my quality of sleep is so poor. Dr Dickerson also shows that current day time flights are likely to cause serious disturbance without the 50% increase in flights proposed by the airport. There is no time that I can recover from the adverse effects of this noise at my property.

I reiterate that I am surprised and disappointed that the Inspectors do not consider that listening to this noise would be appropriate or helpful in their consideration of the appeal and I am left wondering what the purpose of the Inquiry is for. Of course the Inspectors may visit a few residential properties around the villages near the airport but will they have with them a type 1 calibrated sound level meter to record the actual noise levels at these properties?

Concerns over increased greenhouse gas emissions

The Inquiry commenced in the same month that nearly 200 people died from flooding attributed to global warming in Germany and surrounding countries, over 50 deaths have been recorded in China to date in similar floods, the reported melting of permafrost in Russia releasing potentially 1,400 gigatonnes of carbon along with methane to stoke global warming even further and the annual event of ever increasing forest fires in California and Australia. The impact of greenhouse gases from the proposed increase in aircraft flights needs to be considered.

I've committed the last 35 years of my working life to living with the smallest carbon footprint - and helping others to do the same through my zero carbon work with Bio-power UK and my aquaponics food and energy production demonstration farm. But Bristol airport's deafening money making operations

drown out any ability to speak outdoors to the many people who come to me to learn.

We need a 'Fee & Dividend' carbon tax to apply first on air travel to enable the monetary system and our collective psyche to steer away from the brink of the climate crisis we now face.

Instead government nudges and tweaks Britons to carbon zero so it would be completely at odds with its message if it were to do nothing to limit aviation, let alone allow this application for Bristol Airport to expand still further, it's already too big.

This your opportunity to signal we have already reached peak aviation, not only to all the the other UK airports, but to spread the message worldwide through the Glasgow COP 26 meeting of world leaders this year.

We take the chair in this meeting and are perfectly placed to show the UK is prepared to lead the fight against the climate and ecological crisis, with real bold, enforceable and effective drastic cuts to CO₂ emissions.

We elect government to act for the greater good of the electors, to helm the nation through the stormy waters of greed, self-interest and short term gain. Instead aviation has been allowed, indeed encouraged to untrammelled growth that has led to 300 million passenger flights/yr from the UK and the airports spokesman says they want to expand to 500 million! Lord Debden is quoted as saying if anything like this happens; we can just forget any pretence of addressing the climate emergency we face.

On top of this we have 1 million people living under flightpaths suffering similar problems to me. This number is set to explode as BAL alters their glide path to gain height, right over Bristol's drinking water supply Chew Valley lake beside the Mendip Hills ANOB.... Total madness!

Conclusions

We are here to hold a foreign companies' feet to the fire as it presumes to increase the harm it is doing that we locals witness every day of our lives. The damage it is inflicting on us, our children, our ecology and on the global climate must end. I would love to list for you the pros and cons for this application for airport expansion... but how can I when the balance is so heavily skewed against it. The only benefits of BAL's 85% foreign holiday flights business is for a few low paid shop service and trolley pushers jobs and the phoney perceived benefit of a cheap getaway deal.

IT IS NOT CHEAP, IT'S A STEAL. For every £1 the people spend on this immoral air business, scores more will have to be spent by the NHS to care for the returning holiday makers who contract Covid or a whole host of other diseases and what about the burden on the NHS caring for the mental stress

and respiratory related problems suffered by noise, loss of sleep and our breathing kerosene fumes for 40 yrs. That's before we add in the trillions to reverse the climate emergency that we are simply not taking seriously enough. The proposed expansion of the airport is contrary to the precautionary principle and the polluter pays principle that should be shaping our planning decisions.

As the webcam streams this deliberation across the globe, it is time to make the decision that marks PEAK AVIATION. From here on, the message needs to be sent that we are taking stewardship of the environment seriously in advancing sustainable development without compromising the needs of future generations and the environment on which they will depend. We have invest in true green technologies and to shop low carbon and local. We have to, our survival depends on it.

I therefore urge you to Reject this application.

From: Ozzy osborne [mailto: [REDACTED]]
Sent: 23 July 2021 11:40
To: David Dickerson
Subject: Joanna's comeback

Sound file NOT accepted

----- Forwarded message -----

From: Joanna Vincent <Joanna.Vincent@gateleyhamer.com>
Date: Thu, 22 Jul 2021, 14:25
Subject: RE: urgent - response read by return [GATELEY-GHAM.FID54667]
To: Ozzy osborne [REDACTED]

Dear Richard

The Inspectors have considered the request and also discussed this after the resumption at lunchtime with Mr Humphries for BAL.

The Inspectors note that you are no longer a witness as part of the PCAA Rule 6 party. This was also confirmed by the PCAA advocate, Mr Moorhouse. It is confirmed that you are able to rely on your proof of evidence (your witness statement) as an interested person.

In respect of the request for the noise recording, the Inspectors have continued significant concerns regarding this. It is not considered appropriate nor helpful in our consideration of the appeal development and thus we cannot accommodate this request.

In respect of the request to submit the written report as late evidence, as an exception we are prepared to accept this as an inquiry document. This needs to be submitted as soon as possible today please so that the Inspectors and relevant parties can have opportunity to review this, ahead of your scheduled appearance tomorrow. Given the late submission, if the new evidence is as such that more time is required to conduct a more detailed review it may be that you will be asked to appear in a further scheduled date for interested persons, currently anticipated for autumn.

Pease can you forward the document as a matter of urgency.

Kind regards

Joanna

Joanna Vincent
Public Inquiry Manager
for Gateley Hamer

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m: [07483 133 975](tel:07483133975)
ext: 2305

joanna.vincent@gateleyhamer.com

[View my full profile here](#)



From: Ozzy osborne <[REDACTED]>
Sent: 21 July 2021 15:02
To: Joanna Vincent <Joanna.Vincent@gateleyhamer.com>
Subject: urgent - response read by return

Joana,

The PCAA has fluffed the submission of my £5000 report preared for the enquiry. and

therefor they have suggested that i represent through you both this and my witness statement, as an independent, which if possible for you to do, would take the place of the statement i am due to give first this tomorrow morning

[Preview attachment 210719 2105 Laburnum cottage noise v1.0.pdf210719 2105 Laburnum cottage noise v1.0.pdf627 KB](#)

hard copies of the report are printed and ready for subission along with a enquiry quality type 1 approved recorded sound file , i will need to present the findings thereof, the use of the town hall sceen, projector and PA equipment calibrated and verified for real volume playback.

please let me know this afternoon

Would you also like a copy of my statement?

R.Osborne

This is the ececutive summary of said report

EXECUTIVE SUMMARY

1. 1.1.1 Environmental Pollution Management Ltd (EPM Ltd) was requested by Mr Osbourne of Laburnum Cottage, 61 Parsonage Lane, Winford, Bristol, BS40 8DH to undertake noise monitoring at his property to determine noise levels from aircraft using Bristol International Airport and ascertain whether these could disturb his sleep in support his objection to the proposed expansion of the airport.
2. 1.1.2 Noise monitoring carried out between Monday 22nd June 2021 and Monday 28th June 2021. During this period the amount of flights were not representative of the use of the airport prior to covid restrictions and any passenger flights were likely to be taking place with reduced passenger numbers and payloads with lower noise levels than normal.
3. 1.1.3 Daily LA90 background noise levels ranged from 19.2-33.5 dB and are characteristic of a quiet rural area.
4. 1.1.4 Ambient daily LAeq sound levels ranged from 44.3-49.3dB, the higher levels were associated with easterly winds when aircraft were taking-off over Laburnum Cottage. These noise levels were 14.5-29.6dB above background noise levels. A difference of +10dB represents a doubling in the loudness of the noise relative to the background level and is regarded as a significant increase. A +20dB increase represents a 4-fold increase in the loudness of the noise level relative to the background level. The worst daily case recorded of nearly +30dB represents almost an 8-fold increase in the loudness of the noise level relative to the background level.
5. 1.1.5 The WHO Guidelines for community noise recommend that outdoor living areas should not exceed 55dB LAeq for a steady, continuous noise to protect the majority of people from being seriously annoyed during the daytime (0:700-23:00 hours). Intermittent noise from aircraft flights will be more annoying such that a maximum level of 50dB LAeq could be considered a maximum noise level to prevent serious annoyance.

Results of noise monitoring at Laburnum Cottage, 61 Environmental Pollution Parsonage Lane, Winford, Bristol, BS40 8DH. Management Ltd

6. 1.1.6 Daytime LA_{Eq,18-hout} noise levels between 07:00-23:00 hours ranged from 44.5-45.9dB with westerly winds and aircraft landing over Laburnum Cottage and 49.2-49.8dB with easterly winds and aircraft taking-off over Laburnum Cottage. Once flights return to pre-covid levels it is expected with the greater number of flights and increased payload, noise levels with easterly winds and aircraft taking-off over Laburnum Cottage will exceed 50dB LA_{Eq}. The proposed 50% increase in the number of flights will increase this by approximately a further 2dB causing significant annoyance. As such Mr Osborne's objection to the proposed expansion of the airport is considered to be justified.
7. 1.1.7 The WHO Guidelines for community noise recommend the maximum night-time sound pressure level at the outside façades of the living spaces should not exceed 60dB LA_{Max}, so that people may sleep with bedroom windows open and not suffer sleep disturbance.
8. 1.1.8 With westerly wind directions, LA_{Max} maximum noise levels of around 70dB were recorded from aircraft landing which is more than twice as loud as is necessary to disturb sleep. Noise levels were above 60dB for around 16 seconds or nearly 130 times longer than necessary to disturb sleep.
9. 1.1.9 With easterly wind directions LA_{Max} levels of around 80dB were recorded from aircraft taking-off which is more than four times as loud as is necessary to disturb sleep. Noise levels were above 60dB for around 37 seconds or nearly 300 times longer than necessary to disturb sleep.
10. 1.1.10 It is concluded that flights to and from the airport during the night-time period are very likely to disturb sleep at Laburnum Cottage. As such Mr Osborne's objection to the proposed expansion of the airport is considered to be justified.

Results of noise monitoring at Laburnum Cottage, 61 Environmental Pollution Parsonage Lane, Winford, Bristol, BS40 8DH. Management Ltd

2. BACKGROUND

1. 2.1.1 Richard Osborne has lived at Laburnum Cottage, 61 Parsonage Lane, Winford, Bristol, BS40 8DH for over 30 years during which he has noticed a significant increase in noise from flights at Bristol International Airport. Laburnum cottage is located approximately 2.5km east-south-east of the runway at Bristol International Airport with the runway aligned in an east-west

direction; the flight path of incoming and outgoing aircraft is therefore not directly overhead and Mr Osborne is not eligible for a grant towards insulation of his home against noise from aircraft using the airport.

2. 2.1.2 When the wind direction is in the prevailing westerly direction, aircraft take off into the wind in a westerly direction and land from an easterly direction. When the wind direction is in an easterly direction, aircraft take off into the wind in a easterly direction and land from a westerly direction. This is the scenario that causes the most disruption to Mr Osbourne.
3. 2.1.3 Mr Osborne is objecting to the proposed expansion of the airport because he foresees that if this is approved, there will be an increase in the number of flights which are likely to be taking place during the night-time period causing disruption to his sleep which is already being disturbed by existing flights.
4. 2.1.4 Mr Osbourne requested EPM Ltd to undertake noise monitoring at his property to determine noise levels from aircraft using the airport and whether these could disturb his sleep to support his objection to the proposed expansion of the airport. Dr Dickerson of EPM Ltd carried out the survey and wrote this report. Dr Dickerson has over 40 years of experience in conducting environmental assessments including noise. He is a member of the institute of environmental management and assessment and a chartered environmentalist. Until recently Dr Dickerson was a member of the institute of acoustics, a member of the chartered institute of environmental health and a member of environmental protection UK. He has acted

Date: 19 July 2021 Document ref: 2105 Page 5 of 29

Results of noise monitoring at Laburnum Cottage, 61 Environmental Pollution Parsonage Lane, Winford, Bristol, BS40 8DH. Management Ltd

as an expert witness in areas of nuisance and pollution control in civil and criminal actions for claimants, defendants and enforcement agencies as well as planning applications. His area of expertise covers dust, noise and odour including the determination of the best practicable environmental option (BPEO) to control pollution.

2.1.5 This report sets out the results of noise monitoring carried out between Monday 22nd June 2021 and Monday 28th June 2021. During this period the amount of flights would not be representative of the use of the airport prior to covid restrictions and any passenger flights are likely to be taking place with reduced passenger numbers payloads with lower noise levels than normal.

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Environmental Pollution Management Ltd

Results of noise monitoring at Laburnum Cottage, 61 Parsonage Lane, Winford, Bristol, BS40 8DH.

For

Richard Osborne

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1. EXECUTIVE SUMMARY

- 1.1.1 Environmental Pollution Management Ltd (EPM Ltd) was requested by Mr Osbourne of Laburnum Cottage, 61 Parsonage Lane, Winford, Bristol, BS40 8DH to undertake noise monitoring at his property to determine noise levels from aircraft using Bristol International Airport and ascertain whether these could disturb his sleep in support his objection to the proposed expansion of the airport.
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- 1.1.3 Daily L_{A90} background noise levels ranged from 19.2-33.5 dB and are characteristic of a quiet rural area.
- 1.1.4 Ambient daily L_{Aeq} sound levels ranged from 44.3-49.3dB, the higher levels were associated with easterly winds when aircraft were taking-off over Laburnum Cottage. These noise levels were 14.5-29.6dB above background noise levels. A difference of +10dB represents a doubling in the loudness of the noise relative to the background level and is regarded as a significant increase. A +20dB increase represents a 4-fold increase in the loudness of the noise level relative to the background level. The worst daily case recorded of nearly +30dB represents almost an 8-fold increase in the loudness of the noise level relative to the background level.
- 1.1.5 The WHO Guidelines for community noise recommend that outdoor living areas should not exceed 55dB L_{Aeq} for a steady, continuous noise to protect the majority of people from being seriously annoyed during the daytime (0:700-23:00 hours). Intermittent noise from aircraft flights will be more annoying such that a maximum level of 50dB L_{Aeq} could be considered a maximum noise level to prevent serious annoyance.

- 1.1.6 Daytime $L_{Aeq,18-hout}$ noise levels between 07:00-23:00 hours ranged from 44.5-45.9dB with westerly winds and aircraft landing over Laburnum Cottage and 49.2-49.8dB with easterly winds and aircraft taking-off over Laburnum Cottage. Once flights return to pre-covid levels it is expected with the greater number of flights and increased payload, noise levels with easterly winds and aircraft taking-off over Laburnum Cottage will exceed 50dB L_{Aeq} . The proposed 50% increase in the number of flights will increase this by approximately a further 2dB causing significant annoyance. As such Mr Osborne's objection to the proposed expansion of the airport is considered to be justified.
- 1.1.7 The WHO Guidelines for community noise recommend the maximum night-time sound pressure level at the outside façades of the living spaces should not exceed 60dB L_{AMax} , so that people may sleep with bedroom windows open and not suffer sleep disturbance.
- 1.1.8 With westerly wind directions, L_{AMax} maximum noise levels of around 70dB were recorded from aircraft landing which is more than twice as loud as is necessary to disturb sleep. Noise levels were above 60dB for around 16 seconds or nearly 130 times longer than necessary to disturb sleep.
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2. BACKGROUND

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as an expert witness in areas of nuisance and pollution control in civil and criminal actions for claimants, defendants and enforcement agencies as well as planning applications. His area of expertise covers dust, noise and odour including the determination of the best practicable environmental option (BPEO) to control pollution.

- 2.1.5 This report sets out the results of noise monitoring carried out between Monday 22nd June 2021 and Monday 28th June 2021. During this period the amount of flights would not be representative of the use of the airport prior to covid restrictions and any passenger flights are likely to be taking place with reduced passenger numbers payloads with lower noise levels than normal.

3. TECHNICAL BACKGROUND TO SOUND

3.1 The nature of sound

- 3.1.1 Sound is a form of energy produced by the vibration of objects causing pressure fluctuations in air with the propagation of sound waves which are detected by the ear. The greater the energy causing the object to vibrate, the greater the amplitude of the sound wave resulting in a louder sound level being detected by the ear. The ear is capable of detecting an extremely wide range of sound energy levels from 10^{-12} watts/m² at the threshold of hearing to 10 watts/m² at the threshold of pain.
- 3.1.2 The rate at which the object vibrates governs the frequency or pitch of the sound; this can be recorded as cycles per second or hertz (Hz). The range of sound frequencies that can be detected by the human ear range from approximately 20 Hz to 20,000 Hz but our response is greatest in the range 1,000 - 4,000 Hz and declines with age and exposure to loud sounds.
- 3.1.3 The human ear is poor at detecting sounds in the low frequency (up to 250 Hz) and high frequency (greater than 8,000 Hz) ranges. Microphones in sound level metres respond in a uniform manner to these frequencies which therefore need to be filtered to make the sound level meter respond like the human ear. The most commonly used filter is the "A" filter which corresponds to the response of the human ear at 40 dB.

3.2 The decibel scale

- 3.2.1 A scale of 10^{-12} to 10 watts/m² representing the range of human hearing is not very practical and instead, a logarithmic scale known as Bels has been developed which compares the log of the sound energy of the source (I) relative to the sound energy at the threshold of hearing (I_0). The Bel scale has a range of 0 to 13 which was considered not large enough to represent the range of sound levels from the threshold of hearing to the threshold of pain so the bel scale was expanded by a factor of 10 to give a decibel range of 0dBA at the threshold of hearing to 130dBA at

the threshold of pain. A quiet room would have a sound level of around 30dBA, a noisy office would have a sound level of around 60dBA, a noisy factory would have a sound level of around 90dBA. Because of the logarithmic nature of the decibel scale, an increase of 3dBA represents a doubling of the sound energy but an increase of 10dBA is perceived as a doubling in the loudness of the sound.

3.3 Sound indices

3.3.1 Sound levels fluctuate over a period of time with random or cyclic events. The variation is averaged using the following techniques:

1. The level that is exceeded for n % of the time (L_{An}). The L_{A90} is normally used for measuring background noise levels.
2. The Maximum and Minimum A-weighted sound pressure level, L_{AMax} or L_{AMin} . This represents the maximum or minimum A-weighted sound pressure level reached during a measurement period. Readings are taken with either the fast (averaging over 0.125 second) or slow response (averaging over 1 second) of the sound level meter. Normally, the fast response is used as it gives higher or lower readings. L_{AMax} is used for determining the likelihood of sleep disturbance at night. e.g. the World Health Organisation (WHO) "Guidelines for Community Noise", 1999 and WHO "Night Noise Guidelines for Europe", 2009.
3. The Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$. This represents the value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T, has the same mean-square sound pressure as a sound that varies with time. This index is widely used in noise assessment for planning and noise complaints. e.g. BS4142, Technical Guidance to the National Planning Policy Framework, WHO "Guidelines for Community Noise", 1999 and WHO "Night Noise Guidelines for Europe", 2009.

3.4 Noise assessment

3.4.1 The following are useful parameters to consider in determining whether noise gives rise to justifiable complaints:

1. Frequency of occurrence: How often does the noise occur? Is it daily, weekly, monthly or an occasional event once or twice a year?
2. Intensity: How loud is the noise relative to the background or ambient sound level? Most individuals will accept a degree of annoyance and discomfort from occasional or intermittent noisy activities, the interference must impact significantly and materially on the recipient to the extent that they are unable to use their home / land in a normal or reasonable manner.
3. Duration: How long does the noise last? Is it the odd bark from a dog or an hour's piano practice? Does it last for several hours, long periods or the whole day?
4. Offensiveness: High frequency noise and noise with noticeable tonal components such as a hum, screech or whine or impulsive noises will be more annoying than constant "anonymous" noises. For impulsive type noises, how frequently does the sound occur? e.g. once an hour, once a minute or ten times a minute. The time at which the noise occurs should also be considered; noise at night has the potential to disturb sleep.
5. Location: What the background or ambient sound level? Is the noise part of an accepted tradition or convention that most people can tolerate such as music at a local fair, or is it a new practice to the location such as a skate park in a previously quiet residential location?
6. Reasonable use: The use of the land must be reasonable and there must be give and take between neighbouring occupiers of land. A particular facility may be of value to the community, but care should be exercised in the siting

of the facility and measures taken to mitigate against excessive noise such as sound barriers, sound proofing of a building or the design of equipment to minimise noise emissions.

3.5 Noise assessment criteria

3.5.1 There is no set level at which noise becomes a nuisance and there are a number of factors that should be considered in determining whether the noise amounts to unreasonable interference including as outlined above. Noise from irregular bursts of sound and impulsive noises such as bangs, shouts, thuds and screams are generally more alarming because of the sudden nature, intensity and changes in the noise level. A number of guidelines and Standards have been published to assist with planning applications and in determining whether complaints are likely, that can be useful in assessing the impact of the noise.

3.5.2 The WHO Guidelines for community noise state:¹

In dwellings, the critical effects of noise are on sleep, annoyance and speech interference. To avoid sleep disturbance, indoor guideline values for bedrooms are 30dB L_{Aeq} for continuous noise and 45dB L_{Amax} for single sound events. Lower levels may be annoying, depending on the nature of the noise source. The maximum sound pressure level should be measured with the instrument set at "Fast".

To protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55dB L_{Aeq} for a steady, continuous noise. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50dB L_{Aeq} . These values are based on annoyance studies, but most countries in Europe have adopted 40dB L_{Aeq} as the maximum allowable level for new developments (Gottlob

¹ WHO Guidelines for community noise, World Health Organisation, Geneva 1999

1995). Indeed, the lower value should be considered the maximum allowable sound pressure level for all new developments whenever feasible.

At night, sound pressure levels at the outside façades of the living spaces should not exceed 45dB L_{Aeq} and 60dB L_{Amax} , so that people may sleep with bedroom windows open. These values have been obtained by assuming that the noise reduction from outside to inside with the window partly open is 15dB.

3.5.3 The WHO guidelines do not consider impulsive daytime noises but if a L_{Amax} level of 60dB could interfere with sleep during the night time period, this level during the daytime could also cause significant interference if it occurred frequently.

3.5.4 BS8233:2014² suggests criteria such as reasonable sleeping/resting conditions and proposes noise limits that will normally satisfy these criteria for most people in keeping with the WHO Guidelines for community noise. It is recognised that people vary widely in their sensitivity to noise, and the limits suggested may have to be adjusted to suit local circumstances. Moreover, noise limits refer only to the physical characteristics of sound and cannot differentiate between pleasant and unpleasant sounds. The criteria are for “anonymous” noise such as that from road traffic, than noise from neighbours which may trigger complex emotional reactions that are disproportionate to the noise level:

- Outdoor amenity areas limit value: <55dB L_{Aeq} 16 hour
- Outdoor amenity areas desirable value: <50dB L_{Aeq} 16 hour
- Living rooms good standard: <30dB L_{Aeq} 16 hour
- Living rooms reasonable standard: <40dB L_{Aeq} 16 hour
- Bedrooms good standard: <30dB L_{Aeq} 8 hour

² British Standard BS 8233:2014. Sound insulation and noise reduction for buildings - code of practice

- Bedrooms reasonable standard: $<35\text{dB } L_{\text{Aeq}} 8 \text{ hour}$
- Bedrooms reasonable standard: $<45\text{dB } L_{\text{AMax}} 8 \text{ hour}$

The Standard does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building.

4. NOISE MONITORING APPROACH

4.1 Methodology

- 4.1.1 Noise levels were recorded over the period 19:00 hours on Monday 21 June 2021 to 15:00 hours on Monday 28 June using a 01dB Duo smart noise monitor (serial number 10241) calibrated at 93.7 dB with a 01dB Stell Cal 21 calibrator (serial number 35183005).
- 4.1.2 The sound level meter conforms to IEC 61672-3 Class 1 and was certified in conformance with this standard on 27 May 2021 by Acoustic 1. The Calibrator was certified in conformance on 23rd June 2020 (certificate No. 34323957).
- 4.1.3 The microphone for the 01dB duo was mounted on a tripod 1.5m above ground level in the garden of Laburnum Cottage as shown in Figure 4.1. This location was more than 3.5 m from noise reflecting surfaces other than the ground which was a grass lawn and was a free field measurement location in conformance with BS 7445-1:2003.
- 4.1.4 The 01dB Duo was calibrated before readings at 93.7 dBA and checked after readings were completed; the reading afterwards was also 93.7 dBA.



Figure 4.1 Location of sound monitoring positions at Laburnum Cottage

4.1.5 The 01dB Duo was programmed to record noise levels at 0.1 second intervals throughout 1/3 octave band frequencies throughout the audible frequency range 20-20,000 Hz along with unweighted and “A” weighted total sound levels. This sampling frequency is close to the WHO maximum night-time external community noise level of 60 dBA measured with the instrument set at “Fast” (see 3.5.2 above). A number of flight take-offs were also recorded audibly with RAW (uncompressed data for dB Trait post processing) at a sampling frequency of 12.8 kHz. This recording can be played back at a level that replicates the maximum noise level recorded to give the listener an impression of the actual sound conditions during the recording by playing the recording through a sound amplification system and adjusting the maximum level during the event to the actual maximum level recorded.

4.2 Weather conditions

4.2.1 Weather conditions over the monitoring period were taken from Bristol International Airport using the skylinkweather website³. Wind speeds over the monitoring period ranged from 0-8m/s. Care should be exercised with noise readings where the wind speed exceeds 5 m/s because of the possibility of wind generated noise from turbulence over the microphone being recorded. However, the garden of Laburnum Cottage is sheltered and wind speeds close to the ground are likely to be less than speeds recorded at the airport such that the noise levels recorded are considered to be free from any wind generated turbulence over the microphone.

³ <http://skylinkweather.com/metar/metar-show-data.php?stationid=EGGD>

5. RESULTS

5.1.1 Sound levels recorded over the monitoring period were analysed over hourly episodes in terms of L_{Aeq} , L_{Amin} , L_{Amax} and L_{A90} . The results of the analysis are presented in Table 5.1 which includes a summary of the results over each day of sampling.

5.1.2 From Monday 21 June to 12:00 hours on Wednesday 23 June and from 0:00 hours on 26 June to 15:00 hours on 28 June the wind was in an easterly direction (highlighted in yellow in the Table such that aircraft were likely to be taking off over Laburnum Cottage with the highest noise levels being recorded. From 12:00 hours on Wednesday 23 June to 0:00 hours on 26 June the wind was in an westerly direction that aircraft were likely to be landing over Laburnum Cottage with lower noise levels being recorded.

Table 5.1 Hourly sound levels and weather conditions over the monitoring period

Period start	L_{Aeq}	L_{Amin}	L_{Amax}	L_{A90}	Wind Speed	Wind Direction	Wind Sector
Monday 21 June 2021							
19.00	43.2	29.3	68.5	33.2	5	45	NE
20.00	39.7	27.9	58.2	32.6	7	45	NE
21.00	36.7	24.6	58.7	29.7	5	23	NNE
22.00	41.2	31	62.7	34	6	23	NNE
23.00	40.2	26.6	59.1	29.8	5	23	NNE
Summary	40.7	24.6	68.5	31.7			

Period start	LAeq	L Amin	L Amax	LA90	Wind Speed	Wind Direction	Wind Sector
Tuesday 22 June 2021							
0.00	33.4	25.5	58.7	27.9	6	0	N
1.00	36.2	25.8	60.4	31.4	7	23	NNE
2.00	38.2	30.2	59.6	33.5	6	0	N
3.00	39.7	32.3	54.8	35.8	7	23	NNE
4.00	56.6	32.7	73.8	38.2	7	23	NNE
5.00	44.6	33	62.2	37.7	6	23	NNE
6.00	51.6	32.4	82.5	36			
7.00	54.2	32.7	77.5	36.2	6	23	NNE
8.00	44.4	34.8	69.7	37.7	7	45	NE
9.00	50.4	33.1	78	37.9	7	45	NE
10.00	44.2	32.8	65	37.4	8	23	NNE
11.00	46.1	33.8	73.6	37.6	6	23	NNE
12.00	44.1	31.9	70.1	36.3	7	45	NE
13.00	51.5	31.5	79.3	35.7	8	23	NNE
14.00	45.2	31.6	72.7	35.3	7	23	NNE
15.00	52.2	30.1	78.5	34.5	6	0	N
16.00	50.9	30.5	78.4	34	5	0	N
17.00	51.4	29.5	77.5	32.7	5	0	N
18.00	51.5	26.2	78.6	31.2	4	23	NNE
19.00	49.1	25.4	76.5	29.9	3	0	N
20.00	49.3	23.2	75.8	27.2	2	0	N
21.00	40.1	21.5	67.8	25.2	1	68	ENE
22.00	32.5	18.9	63.2	21.8	0	---	---
23.00	23.7	17.5	46.6	18.4	0	---	---
Summary	49.2	17.5	82.5	26.3			

Period start	LAeq	L Amin	L Amax	LA90	Wind Speed	Wind Direction	Wind Sector
Wednesday 23 June 2021							
0.00	22.8	16.9	50.2	17.4	1	293	WNW
1.00	26.6	17	58.2	17.5	1	0	N
2.00	25.9	17.1	55.4	17.7	2	0	N
3.00	22.6	17.1	47.3	18	1	0	N
4.00	56.5	20.5	72.6	28.1	3	23	NNE
5.00	43.7	25.9	73.1	31.7	3	23	NNE
6.00	52.6	26.2	77.8	31.5	3	45	NE
7.00	43.9	26.4	69.5	29.4	3	45	NE
8.00	40.5	24.8	74.1	29.1	2	0	N
9.00	49	24.5	76.1	28.1	3	23	NNE
10.00	47.8	24.5	69.9	29.2	3	338	NNW
11.00	47.5	26.3	69.6	31.3	3	293	WNW
12.00	49.8	26.3	76.1	31.8	3	0	N
13.00	43.4	24.8	70.8	27.2	4	270	W
14.00	45.3	25.8	71.2	29.6	5	270	W
15.00	46.2	26.9	69.1	31	5	270	W
16.00	44.8	28.7	67.9	32.4	6	270	W
17.00	48	28.8	77.4	33.6	6	270	W
18.00	45.2	29.1	71.3	34.3	7	270	W
19.00	46.3	29.1	71.5	33.6	5	270	W
20.00	44.1	27.9	66.1	31.1	4	270	W
21.00	35.5	25.2	63.1	28.1	3	270	W
22.00	40.2	24.9	68.8	27.9	3	248	WSW
23.00	42.5	21.4	68.6	24.4	3	248	WSW
Summary	47.4	16.9	77.8	19.2			

Period start	LAeq	L Amin	L Amax	LA90	Wind Speed	Wind Direction	Wind Sector
Thursday 24 June 2021							
0.00	27.2	18.9	53.2	20.6	2	248	WSW
1.00	26.4	17.8	58	18.9	2	0	N
2.00	26.9	17.7	52.9	18.3	1	0	N
3.00	21.8	17.6	44.1	18.4	2	248	WSW
4.00	51	19.3	72.7	24.8	2	248	WSW
5.00	44.1	23.7	66.6	29.3	2	248	WSW
6.00	41.6	23.4	66.5	28.7	3	270	W
7.00	43.2	23.6	66.2	27.9	3	270	W
8.00	41.7	25.4	71.5	30.2	4	270	W
9.00	47.4	26.5	69.5	30.9	4	270	W
10.00	44.9	26.8	65.8	31.2	3	270	W
11.00	46.5	26.7	73.2	30.6	4	270	W
12.00	43.3	26.2	68.7	28.8	4	293	WNW
13.00	46.1	25.8	68	30.3	4	270	W
14.00	41.6	26.4	64.4	29.9	4	225	SW
15.00	44.9	26.6	70.4	31	5	248	WSW
16.00	46.3	27.2	69.9	32.8	5	225	SW
17.00	45.4	29.7	67.2	35.6	7	248	WSW
18.00	44.3	32.4	73.3	35.7	6	248	WSW
19.00	45.7	32.8	71.9	36.7	5	248	WSW
20.00	44.5	31.7	71.5	35.1	6	248	WSW
21.00	38.4	31.6	58.9	34.4	6	248	WSW
22.00	40.7	30.1	55	33.9	6	248	WSW
23.00	41.1	25	66.8	28.3	6	248	WSW
Summary	44.3	17.6	73.3	20.6			

Period start	LAeq	L Amin	L Amax	LA90	Wind Speed	Wind Direction	Wind Sector
Friday 25 June 2021							
0.00	35.1	23.7	50.5	26.7	5	248	WSW
1.00	40	28.2	52.7	32.2	5	225	SW
2.00	45	37.9	61.3	40.8	5	248	WSW
3.00	41.4	29.3	51.1	34.1	5	248	WSW
4.00	48.3	28.9	64.9	38.9	5	270	W
5.00	43.7	28.1	65.1	32.2	4	270	W
6.00	46.8	29.7	71.1	35.3	5	270	W
7.00	44.9	31	70.8	34.6	5	270	W
8.00	42.4	29.4	71.8	33.2	6	293	WNW
9.00	44.5	30.4	67.8	33.6	5	293	WNW
10.00	43	28.9	65.1	32.8	6	270	W
11.00	45.3	28.6	70.1	32.7	6	270	W
12.00	44.9	28.4	69.9	32.5	6	270	W
13.00	40.3	27.2	65.8	31.6	7	270	W
14.00	45	30.3	69.6	34.2	7	270	W
15.00	46.5	31.6	77.1	36	8	270	W
16.00	46	32	71.1	35.6	5	248	WSW
17.00	52.5	30	76.3	36.1	6	270	W
18.00	46.1	29.5	70.7	34	3	248	WSW
19.00	45.3	24.6	68.9	30.8	5	270	W
20.00	44.6	24	70.3	29.2	3	248	WSW
21.00	36.4	21.1	56.5	24.9	2	248	WSW
22.00	42	20.3	66.7	23	2	203	SSW
23.00	26.3	18.8	57.8	20.3	1	225	SW
Summary	45.2	18.8	77.1	28.1			

Period start	LAeq	L Amin	L Amax	LA90	Wind Speed	Wind Direction	Wind Sector
Saturday 26 June 2021							
0.00	38	18	64.3	19.2	1	0	N
1.00	24.1	17.7	57.5	18.6	0	---	---
2.00	24.3	17.6	54.7	18.2	2	90	E
3.00	22.9	17.5	49	18.2	3	68	ENE
4.00	48.6	19.1	67.3	30.9	3	68	ENE
5.00	42.7	22.4	66.7	30.5	3	90	E
6.00	53.7	22.6	74.3	29.4	3	90	E
7.00	53.2	22.4	79.2	28.4	3	90	E
8.00	53.7	23.3	78.4	28.7	3	113	ESE
9.00	47.4	24.8	73.7	28.7	4	113	ESE
10.00	48.6	26.2	76.3	29.5	4	90	E
11.00	48.1	26.9	74.4	31.2	6	90	E
12.00	50	26.6	78.5	32.7	5	90	E
13.00	46.5	28.3	74.7	32.3	5	90	E
14.00	41	29.1	70.6	32.9	6	90	E
15.00	48	30.2	80.3	33.6	5	113	ESE
16.00	49.6	28	81.3	32	5	113	ESE
17.00	52.9	27.3	78.8	30.9	5	113	ESE
18.00	52.2	25.8	79.9	29.6	4	90	E
19.00	45.9	24.8	71.1	28.7	4	90	E
20.00	52.8	24.5	78.7	28.7	3	68	ENE
21.00	51.8	23.6	74.4	27.5	3	45	NE
22.00	33.4	21	65.1	25.7	5	45	NE
23.00	34.5	24.6	53.3	29	6	45	NE
Summary	49.3	17.5	81.3	19.7			

Period start	LAeq	L Amin	L Amax	LA90	Wind Speed	Wind Direction	Wind Sector
Sunday 27 June 2021							
0.00	37.4	28.4	60	32.3	7	45	NE
1.00	39	25.2	59.4	28.7	7	45	NE
2.00	35.6	25.2	54.1	30.5	7	45	NE
3.00	38	25.9	54.6	30.2	7	45	NE
4.00	46.5	29.1	64	36.7	8	45	NE
5.00	46.5	30.6	64.9	39.2	8	45	NE
6.00	46.6	34	72.7	38	9	45	NE
7.00	42	31.8	61.8	36.5	8	23	NNE
8.00	49.7	30.9	78.2	35.5	7	23	NNE
9.00	45.3	31.1	72.5	34.3	7	45	NE
10.00	41.3	32.3	61.3	35.8	6	45	NE
11.00	48.6	33.4	75.2	37.3	8	45	NE
12.00	48.5	32.7	75	36.8	8	45	NE
13.00	52.2	33.6	78.7	37.6	8	68	ENE
14.00	51.1	32.9	76.7	36.7	7	45	NE
15.00	45.7	34.1	71.9	37.3	7	45	NE
16.00	50.8	33.1	78.4	36.7	8	45	NE
17.00	49.4	31.4	77.9	36.2	5	45	NE
18.00	49.7	27.3	78.6	30.8	7	45	NE
19.00	49.6	28.7	77.3	33.3	5	45	NE
20.00	51.2	27.8	79.3	32.3	5	23	NNE
21.00	51.8	34.9	78.8	38.4	6	45	NE
22.00	47	34.2	71.1	38.5	6	45	NE
23.00	37.5	28.7	59.1	31.7	6	45	NE
Summary	48	25.2	79.3	33.5			

Period start	LAeq	L Amin	L Amax	LA90	Wind Speed	Wind Direction	Wind Sector
Monday 28 June 2021							
0.00	38.6	28.1	48.5	31.6	6	45	NE
1.00	41.7	33.2	51	36.5	6	45	NE
2.00	45	35	56.1	38.7	5	23	NNE
3.00	49.9	35.7	58.2	43.2	5	23	NNE
4.00	51.8	42.8	62.5	46.4	6	23	NNE
5.00	44.4	33.9	60.8	37.6	6	45	NE
6.00	41.2	30.8	69.2	33.8	6	45	NE
7.00	57.3	31.3	83.1	34.2	5	23	NNE
8.00	49.1	31.1	79	34	6	23	NNE
9.00	43.5	28.6	69	32.2	5	45	NE
10.00	47.9	27.4	72.1	31.5	5	23	NNE
11.00	40.6	27.2	71.3	31.2	5	23	NNE
12.00	48.6	27.5	79.7	30.6	4	45	NE
13.00	46.1	25.3	74.6	29.6	4	23	NNE
14.00	42.7	25.6	69.5	29.8	6	23	NNE
Summary	49	25.3	83.1	32.1			

6. DISCUSSION

6.1 Background noise levels

- 6.1.1 The L_{A90} background noise level is determined from the noise level that is exceeded for 90% of the time and represents noise level of the area without aircraft and motor vehicle noise or bird song close to the microphone. Table 5.1 shows daily L_{A90} background noise levels to range from 19.2-33.5dB that are characteristic of a quiet rural area. The lowest L_{Amin} level recorded was 16.9dB.

6.2 Ambient noise levels

- 6.2.1 Since the decibel scale is logarithmic, an increase in 10dB represents a 10 fold increase in the amount of sound energy present such that arithmetic averaging of the sound level over a period of time is inappropriate. The equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ represents the value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T, has the same mean-square sound pressure (or energy) as a sound that varies with time.
- 6.2.2 Table 5.1 shows the daily L_{Aeq} sound levels ranging from 44.3-49.3dB which were between 14.5-29.6dB above the background noise level. A difference of +10dB represents a doubling in the loudness of the noise relative to the background level and is regarded as a significant increase. A +20dB increase represents a 4-fold increase in the loudness of the noise level relative to the background level. The worst daily case recorded of nearly +30dB represents almost an 8-fold increase in the loudness of the noise level relative to the background level. It is concluded that Laburnum Cottage is adversely affected by noise from aircraft using Bristol International Airport.
- 6.2.3 The WHO Guidelines for community noise recommend that outdoor living areas should not exceed 55dB L_{Aeq} for a steady, continuous noise to protect the majority of people from being seriously annoyed during the daytime (0:700-23:00 hours). To

protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50dB L_{Aeq} . Intermittent noise from aircraft flights will be more annoying such that a maximum level of 50dB L_{Aeq} could be considered a maximum noise level to prevent serious annoyance.

- 6.2.4 Further analysis of the daytime $L_{Aeq,18-hout}$ levels from 07:00-23:00 hours showed noise levels ranging from 44.5-45.9dB with westerly winds and aircraft landing over Laburnum Cottage and 49.2-49.8dB with easterly winds and aircraft taking-off over Laburnum Cottage. Once flights return to pre-covid levels it is expected with the greater number of flights and increased payload, noise levels with easterly winds and aircraft taking-off over Laburnum Cottage will exceed 50dB L_{Aeq} and a 50% proposed increase in the number of flights will further increase this by approximately 2dB. As such Mr Osborne's objection to the proposed expansion of the airport is considered to be justified.

6.3 Maximum noise levels

- 6.3.1 Table 5.1 shows maximum noise levels from aircraft around 80 dBA during take-off with easterly winds and maximum noise levels from aircraft of around 70 dBA during landings with westerly winds.
- 6.3.2 Care is needed in interrogating the results as demonstrated in Figure 6.1 which shows noise levels between 14:40 and 16:10 hours on Friday 25 June with westerly winds and aircraft landing. The maximum noise level recorded over this period was 77.1dBA at 15:36 hours but this was not associated with aircraft; it could have been from bird song beside to the microphone. The characteristic traces of aircraft are shown in Figure 6.1 at 15:37, 15:44 and 15:48 hours with maximum noise levels of 69.2dBA, 66.5dBA and 65.5dBA.

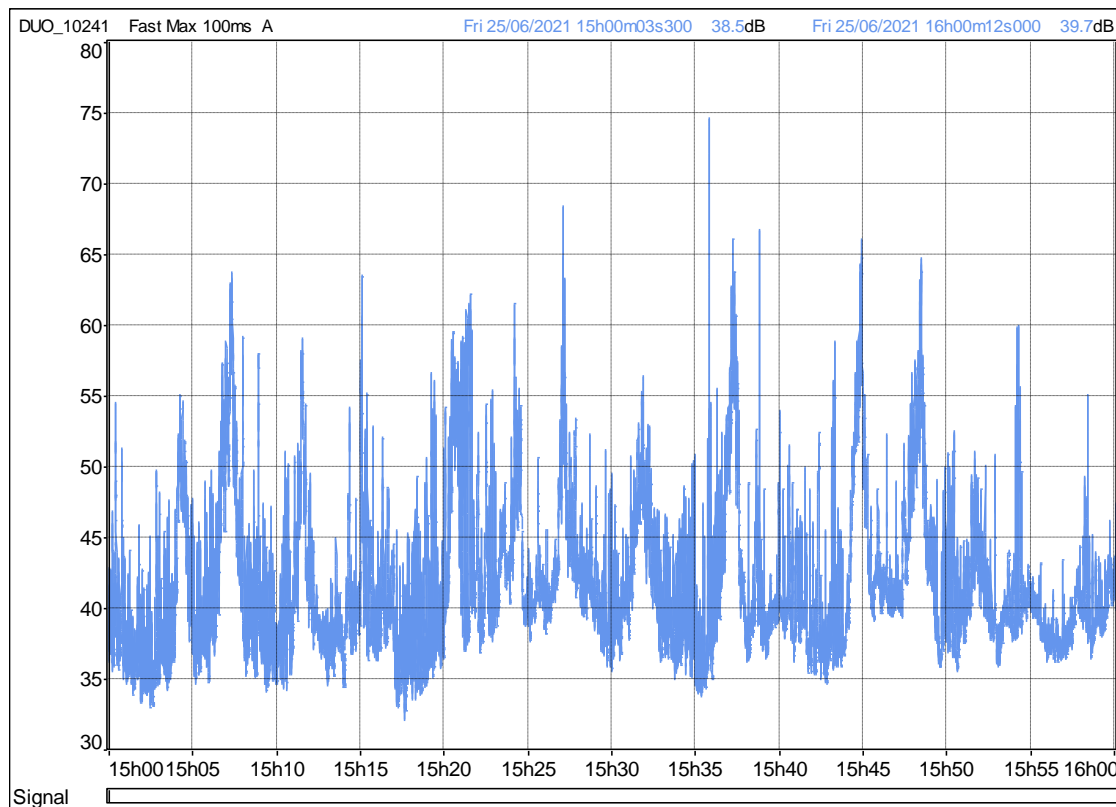


Figure 6.1 Noise levels with aircraft landing between 15:00-16:00 hours, Friday 25 June

6.3.3 The noise level of the aircraft landing on Thursday 24 June at 18:14 hours in Figure 6.2 shows a maximum noise level of 73.3dBA with levels above 60dBA for 16 seconds.

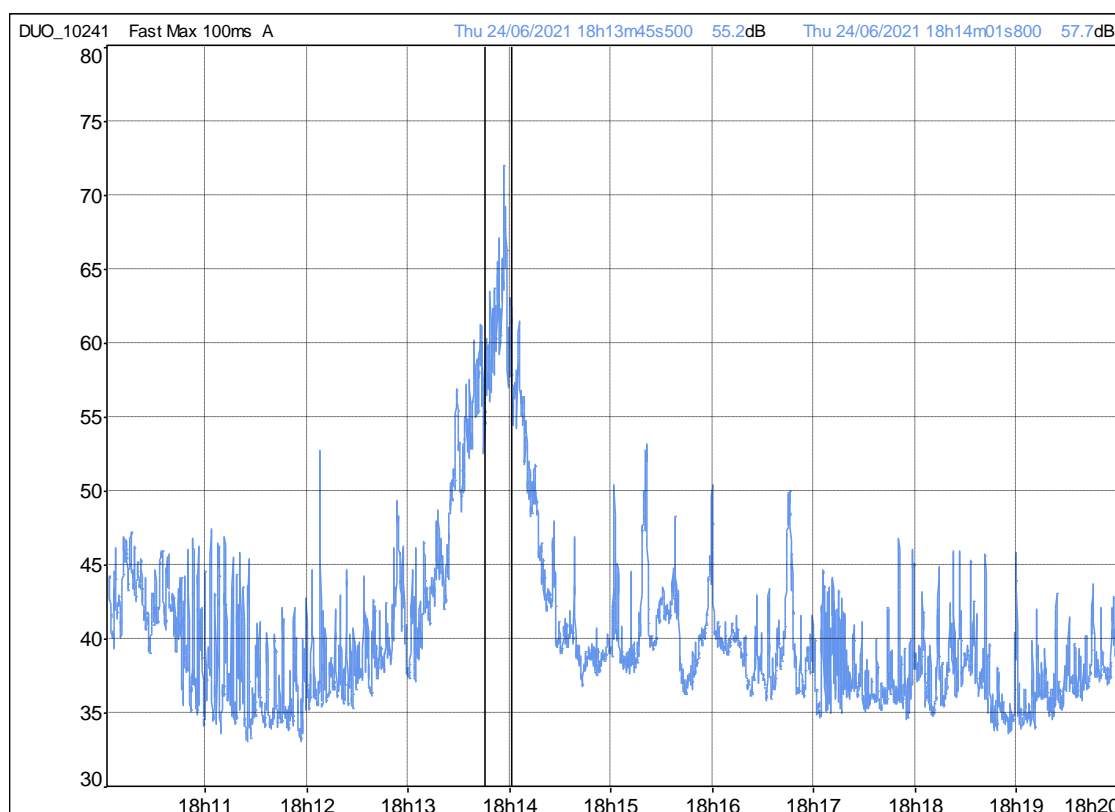


Figure 6.2 Noise level of aircraft landing at 18:14 on Thursday 24 June

6.3.4 In contrast, Figure 6.3 shows noise levels from aircraft taking off with an easterly wind on Monday 28 June between 07:00 and 08:00 hours. Maximum noise levels were recorded of 81.3dBA at 07:00 hours, 76.8dBA at 07:05 hours, 83.1dBA at 07:11 hours, 75.6dBA at 07:17 hours, 80.3dBA at 07:22 hours, 74.9dBA at 07:25 hours and 75.7dBA at 07:55 hours. Parts of the take-off noise were recorded at 07:22, 07:25 and 07:55 hours with levels above 60dBA for approximately 37 seconds.

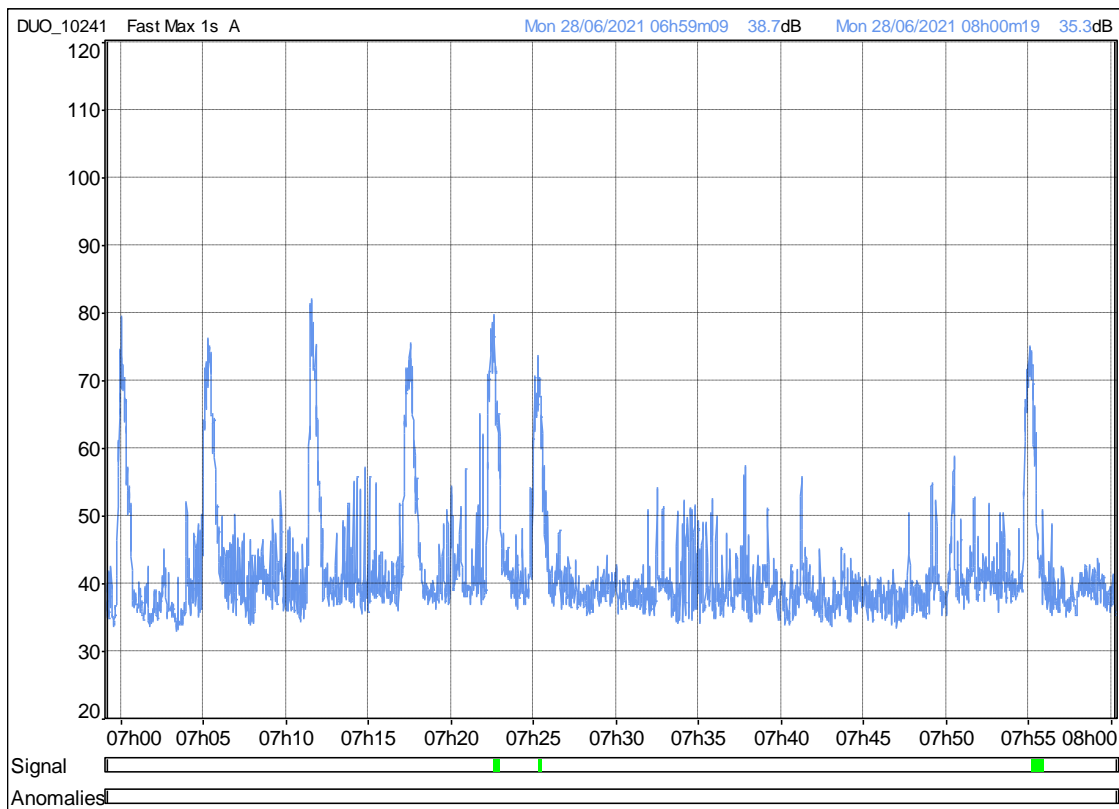


Figure 6.3 Noise levels with aircraft take-off between 07:00-08:00 hours Monday 28 June

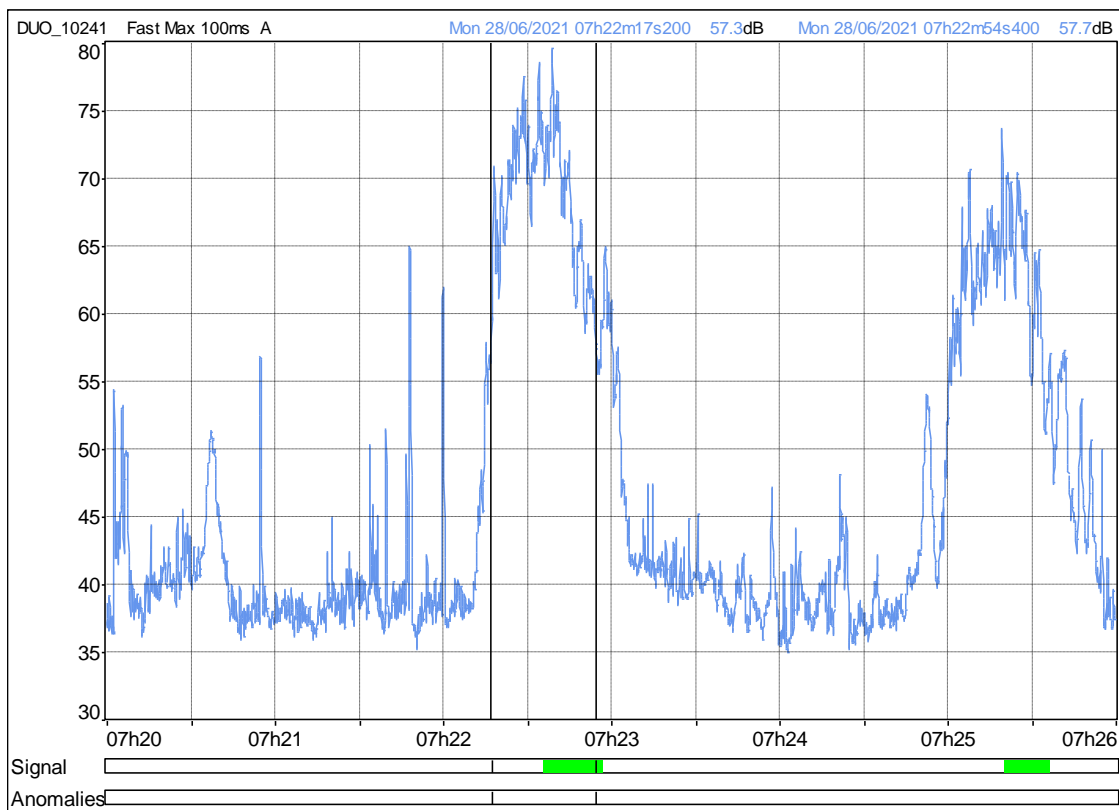


Figure 6.4 Noise level of aircraft take-off at 07:22 on Monday 28 June

- 6.3.5 At night, the WHO Guidelines for community noise recommend the sound pressure level at the outside façades of the living spaces should not exceed 60dB $L_{A_{Max}}$, so that people may sleep with bedroom windows open and not suffer sleep disturbance. These values have been obtained by assuming that the noise reduction from outside to inside with the window partly open is 15dB. Noise levels at façades will be 3dB higher than free field measurements because the maximum amplitude of the sound wave occurs at the façade. The sound levels recorded in Mr Osborne's garden were free field measurements. The $L_{A_{Max}}$ sound level is measured over $\frac{1}{8}^{th}$ second as it is the sudden change from the background noise level that can disturb sleep. Once sleep has been disturbed, it can take some time for sleep to return.
- 6.3.6 With westerly wind directions and aircraft landing over Laburnum Cottage, Figure 6.2 shows a $L_{A_{Max}}$ sound level of 73.3dB which is more than twice as loud as is necessary to disturb sleep and exceeds the WHO $L_{A_{Max}}$ criterion of 60dB for 16 seconds or nearly 130 times longer than is necessary to disturb sleep. In contrast, with easterly wind directions and aircraft taking-off over Laburnum Cottage, Figure 6.4 shows a $L_{A_{Max}}$ sound level of 81.3dB which is more than four times as loud as is necessary to disturb sleep and exceeds the WHO $L_{A_{Max}}$ criterion of 60dB for 37 seconds or nearly 300 times longer than is necessary to disturb sleep. It is concluded that flights to and from the airport during the night time period are very likely to disturb sleep at Laburnum Cottage. As such Mr Osborne's objection to the proposed expansion of the airport is considered to be justified.

7. DOCUMENT CONTROL

Environmental Pollution Management Limited, 24 Highmead Gardens, Bishop
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