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HINCKLEY NATIONAL RAIL FREIGHT INTERCHANGE

The Hinckley National Rail Freight Interchange Development Consent Order

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Proof of Evidence of Simon Stephenson on Noise

Daw Mill Colliery, Tamworth Road, Arley

For the Appellant, Harworth Estates

PINS ref no: APP/R3705/W/16/3149827

RPS Report No. JAT8968 -REPT-01-R0

26 December 2017






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1 Personal Introduction

1.1 My name is Simon Stephenson. I am a Technical Director in Acoustics at RPS Planning and Environment (RPS). I hold a Bachelor of Science (Honours) degree in Physics, am a member of the Institute of Acoustics, an Associate of the Acoustical Society of America, Secretary of the Institute of Acoustics Noise and Vibration Engineering Group and a Chartered Engineer.

1.2 RPS Group is a multi-national company providing independent environmental consultancy. The Acoustics and Vibration team within RPS Group specialises in assessing the effects on the environment of noise sources associated with industry, transport, infrastructure, construction, commerce, leisure, mineral extraction and the waste industry. The group also has an extensive local authority client base and is currently technical advisor for noise to Surrey County Council.

1.3 My experience in acoustics and vibration has included the assessment of noise and vibration within all of the above industries. I have also undertaken investigations of noise nuisance and complaints about noise in projects, which have involved modelling the noise emission from large industrial and infrastructure sites to the community. I have undertaken a research project for Defra to develop a new national method for the noise mapping of industrial sources, and have been actively involved in providing technical advice to Defra regarding noise mapping of transportation sources. I have represented both local authorities and developers at public inquiries and hearings and I am experienced in engineering noise control.

1.4 I have been particularly involved in the prediction and assessment of noise from port and freight handling developments. In the course of that work I have studied noise and vibration aspects of the construction and operation of a number of developments and have developed several methods for reducing noise from gantry cranes, container impacts, straddle carriers and other sources of noise associated with freight movement and handling.

1.5 I have visited the appeal site and I am familiar with the area.

2 Scope of Evidence

Background

2.1 This Inquiry is being held into an appeal against North Warwickshire Borough Council's refusal of Harworth Estate's planning application to develop a proposed commercial development on Daw Mill Colliery site, Arley, North Warwickshire.

2.2 RPS was instructed by Harworth Estates to prepare an environmental acoustics assessment to accompany a planning application for the redevelopment of Daw Mill Colliery, in June 2014. I joined RPS in January 2016 and was instructed by Harworth Estates in relation to this appeal on 20th October 2016.

2.3 My evidence addresses the noise issues associated with the environmental and community impact of the operation of the proposed development.

Reasons for Refusal

2.4 The reason for refusal relating to noise impacts is set out below:

"2. The development is likely to cause disturbance due to noise. Central to this adverse impact is the continuous operation required for the proposed wholly B2 use. Physical measures could provide some mitigation, however a restriction on continuous operation is likely to be necessary to fully resolve this impact. The Applicant has reiterated the continuous operation is essential to the proposal. The use of conditions to restrict operations is therefore not considered to be appropriate. The proposal is not considered to accord with Policies NW10 and NW12 of the North Warwickshire Core Strategy 2014."

Statement of Case

2.5 In their Statement of Case, North Warwickshire Borough Council state that they will "produce evidence supporting its position in respect of the assessment of potential noise impact. This will cover existing ambient noise levels as well as predicted noise levels; physical and operational mitigation measures with reference to 24 hour working and the use and operation of the rail sidings".

2.6 Rule 6 status has been given to LawRag (the local protest group) and Over Whitacre Parish Council. Their Statement of Case says:

"43) We support LPA decision that the potential noise and light pollution levels will be increased above current ambient levels as a result of the development proposals advanced by the appellant. Such impacts cannot be assessed without a detailed application and should not be compared to a working coal mine, for which there is no longer a valid planning consent."

2.7 Both the Council's and LawRag's case is therefore unspecific at the time of writing.

2.8 Hence, this Proof of Evidence provides my expert opinion on the noise Reason for Refusal 2.

2.9 Noise due to construction of the proposed development was not cited as a reason for refusal and this element has therefore been excluded from the scope of this proof of evidence.

3 Site and Scheme Description

Site History and Context

3.1 Coal production commenced at Daw Mill in 1965 when the winding gear was installed and operational and the colliery head surface site was subsequently developed over time. Coal mining ceased in February 2013 following an underground fire. The colliery head surface site has subsequently been cleared with the majority of the buildings and structures demolished and surface stocks of coal have been reclaimed and removed.

3.2 The various sources of noise at the colliery included:

- Coal loading machinery including tracked excavators and other mobile plant;
- A network of transfer conveyors;
- A 22 m high rapid loader (for loading coal on trains);
- Coal processing / preparation plant including a 30 m high coal preparation plant and a 25 m high building for coal blending;
- Various screens, pumps, compressors, crushers, separators and drying plant;
- Winding gear in the two 37 m high shaft towers;
- Shaft ventilation plant (including intake and exhaust fans);
- Boiler house;
- Substation transformers and coolers;
- Workshops; and
- Trains and HGVs.

3.3 I have been unable to obtain copies of any noise assessments or surveys for the operating colliery, but it is possible to appreciate the likely levels of noise from a working colliery based on typical noise levels for plant at other sites. Typical noise levels for colliery plant is provided in a paper presented at the Acoustics 2015 Conference in Australia [1]. These are summarised in Table 3.1:

Table 3.1 Sound power levels for typical colliery fixed plant

Description	L_W, dBA
Coal washing	114 – 125
Crushing plant	104 – 118
Transfer conveyors	102 per 100 m length
Total typical fixed plant	**127 - 130**

3.4 From the table it is clear that, whatever the noise source levels were at Daw Mill Colliery, it is likely that the colliery would have represented a major source of noise in the area for the years

when it was operational. The plant would have operated 24 hours a day, seven days a week and it is therefore likely that noise levels in the surrounding area at night would have been much higher than are currently experienced. Furthermore, the types of plant and equipment used at the colliery would have resulted in a noise environment which is similar to that proposed as part of the development proposals, albeit that the colliery was on a much larger scale and utilised older (and therefore noisier) equipment.

Description of Development Proposals and Surrounding Area

3.5 The proposed development is to be located at land in the former Daw Mill Colliery site near the village of Arley and is located within the administrative area North Warwickshire Borough Council.

3.6 The proposed development replaces a substantial colliery site, which would have been a significant source of noise in the area prior to its closure.

3.7 There are residential properties and developments surrounding the site, as described below:

- Daw Mill Cottage 50 m to the south-west of the site boundary;
- Dwellings on Devitt's Green Lane 425 m to the east of the site boundary;
- Dwellings on Nuneaton Road 300 m north of the site boundary (including Quarry Cottage and Pemberton House);
- Sadler's Meadow 270 m north-east of the site boundary;
- Dwellings on Tamworth Road 250 m south-east of the site boundary;
- Wagstaff Farm 550 m south-west of the site boundary; and
- Overbarns Cottage 580 m west of the site boundary.

3.8 The site location and surrounding area is shown in Figure 3.1.

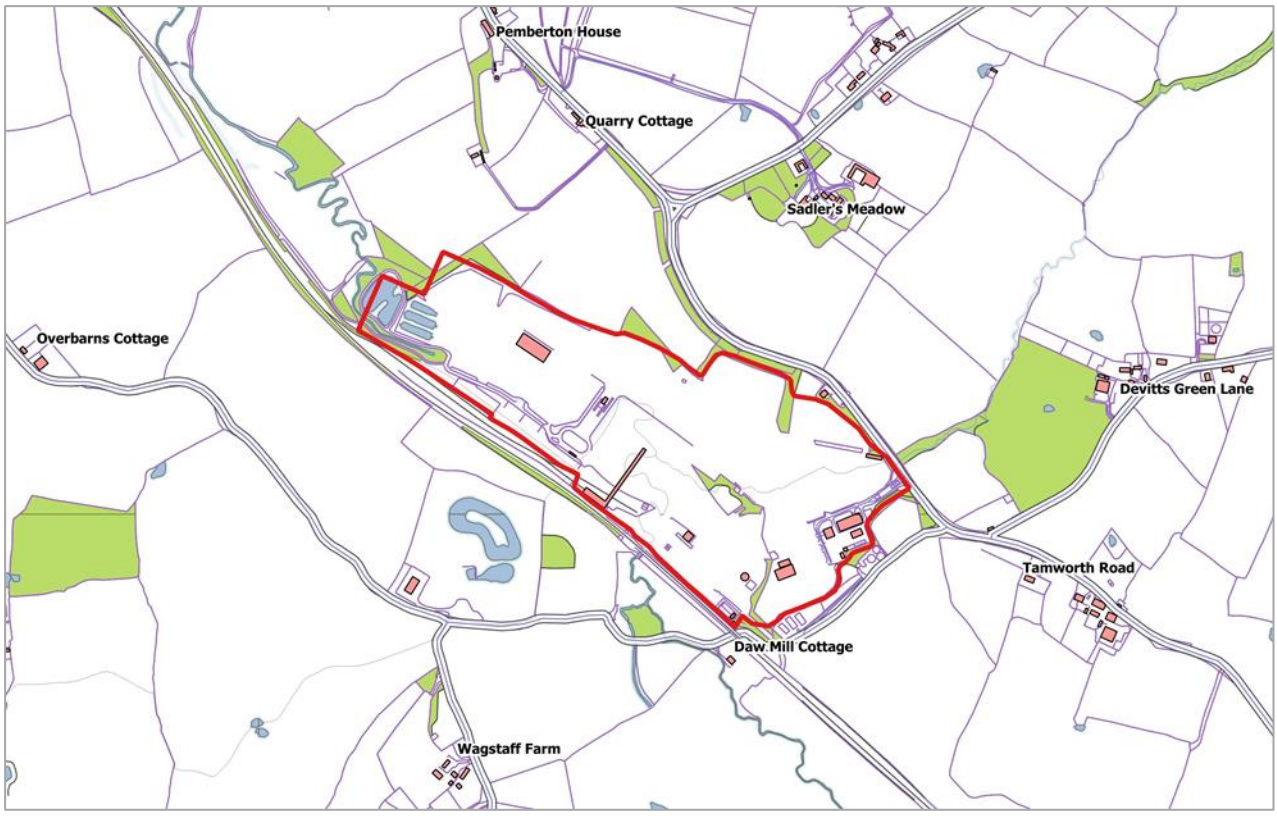


Figure 3.1 Site location and nearest noise sensitive receptors

3.9 The background noise environment in the area is now mainly influenced by noise from distant and local road traffic during the daytime as well as trains on the railway line. Up until 2013, when the colliery stopped operating, the noise environment would have been dominated by the extensive colliery workings including both fixed and mobile plant.

3.10 The application is for B2 use but the exact use, design and layout has yet to be decided, as this will depend upon the exact requirements of the operator once permission is granted. Nevertheless, the noise assessment has been undertaken based on the three most likely uses identified and details regarding an indicative layout of the site for each scenario. The three scenarios assessed are as follows:

- Rail Construction and Maintenance Facility;
- Train Manufacturing Facility; and
- Train Maintenance Facility.

3.11 Further consideration of each of these potential uses is provided in the following sections.

Rail Construction and Maintenance Facility

3.12 One potential use for the site is for the manufacture of rail components such as sleepers and track lengths. The exact layout of the site will vary depending on the nature of manufacture and the developer's individual requirements.

3.13 Rail services and manufacturing will be conducted on the site's lower level, the upper level will contain the majority of office space as well as car parking. Extending along the Eastern boundary of the site, adjacent to the rail line, some hard standing as well as open storage will be created for the ancillary storage of supply materials and finished goods to and from the manufacturing building respectively. The hard standing will also provide stable ground to enable the use of loading and unloading equipment. Such equipment may include the use of excavators as well as cranes. Flatbed vehicles and tippers may also be needed to move product around the site.

3.14 The majority of this work will take place at the northern area of the site, away from the most noise sensitive areas around Daw Mill Cottage and the majority of noise generating activities will take place indoors. The hard standing will also allow wheeled, rather than tracked, vehicles to be used mitigating noise further. The site will also have strict operational policies and training for all staff working at night in minimising the creation of noise. Additionally, railway maintenance largely takes place overnight and consequently the majority of loading and unloading activity will take place during the daytime.

3.15 Whilst the factory would operate on a 24 hour basis, the loading of train wagons would likely occur between 07:00 and 18:00 on weekdays as periods of occupation are most often overnight. The site would likely generate 25-30 trains per week, moving mostly in the early afternoon to travel to the construction site in time for occupation. The shunting and arriving/departing of trains could occur 24 hours a day, seven days a week (approximately 5 trains would be expected to leave and return at night).

Train Manufacturing Facility

3.16 The hard standing will provide stable ground to enable the use of loading and unloading equipment. Such equipment may include the use of flatbed vehicles and cranes or reach stackers to move product around the site though these will not leave the premises onto public roads.

3.17 The existing sidings to the west of the site would be retained to provide adequate stabling capacity, the required length of which would be informed by the nature of the rolling stock to be built at the location. The eastern side of the site, alongside the existing rail alignment would also provide space for a short length of track (around 900 m) for stock testing purposes. There would potentially be need for a gantry crane to add flexibility when moving rolling stock (in various stages of completion) as well as potential shunter operation. Road access for the site would remain at the existing location with a car park for the rolling stock manufacturer's employees in the south east of the location.

3.18 The majority of train manufacturing work will take place at the northern area of the site, away from the most noise sensitive areas around Daw Mill Cottage and the majority of noise generating activity will take place indoors. The site will also have strict operational policies and training for all staff working at night in minimising the creation of noise. Additionally, railway maintenance

largely takes place overnight. Trains are expected to enter and exit the site around 1-2 times per day and this could be at any time.

Train Maintenance Facility

3.19 The site layout and overall developed area would be similar to the manufacturing site, although may differ slightly dependent on the maintenance activity being undertaken. A gantry crane may be required in order to move rolling stock on and off the track. The hard standing will also provide stable ground to enable the use of loading and unloading equipment. Such equipment may include the use of flatbed vehicles and cranes to move product around the site though these will not leave the premises onto public roads.

3.20 Trains would access the site from the existing connection to the mainline. The current siding layout would be maintained to provide stabling facilities. The site would run 24 hours, the majority of work taking place overnight therefore maximising train availability during operating hours.

3.21 The majority of this work will take place at the northern area of the site, away from the most noise sensitive areas around Daw Mill Cottage. The majority of noise generation will take place indoors. The site will also have strict operational policies and training for all staff working at night in minimising the creation of noise. Additionally, train maintenance largely takes place overnight and therefore the majority of loading and unloading will take place during the day. Furthermore, operational parameters can be set to reduce train noise from horns, air conditioning units, whilst enclosures around train washing and wheel lathe facilities will minimise noise.

3.22 The vast majority of goods into and out of the site would be via rail and therefore the amount of vehicular traffic would be kept to a minimum. Rail traffic is likely to be in the region of 5-6 per night, although this may increase if it's used for train washing, fuelling or light servicing.

Hours of Operation

3.23 The hours of operation were confirmed by Harworth in a letter of 28th July 2015 as being a 24 hour basis, 7 days per week, including both road and rail movements to and from the Appeal site. That letter confirmed *"it is, however, now proposed that the handling, unloading or loading of freight containers would not be undertaken during the night time hours (i.e. 23:00hrs to 7:00hrs)".* This was reconfirmed in the letter of 2nd November 2015 where Harworth confirmed that they were *"willing to accept a condition that precluded the handling and un/loading of freight containers between 23:00hrs to 07:00hrs".*

3.24 However, there was no mention of this commitment by Harworth in the 3rd November 2015 committee report or the reason for refusal. In any case, the current scenarios being taken forward for the development proposal do not include the loading or unloading of containers.

4 Introduction to Acoustics and Noise Indices

4.1 This section provides an overview of the fundamentals of how sound propagates away from a source.

4.2 Increasing the distance from a noise source normally results in the level of noise getting quieter, due primarily to the spreading of the sound with distance, analogous to the way in which the ripples in a pond spread after a stone has been thrown in. Another important factor relates to the type of ground over which the sound is travelling. Acoustically “soft” ground, (such as grassland, ploughed fields etc.) will result in lower levels of noise with increasing distance from the noise source as compared to acoustically “hard” surfaces (e.g. concrete, water, paved areas). The reduction in noise level depends, however, on the frequency of the sound.

4.3 Wind also affects the way in which sound propagates, with noise levels downwind of a source being louder than upwind. This is partly due to the sound ‘rays’ being bent either upwards or downwards by the wind in a similar way that light is bent by a lens, as shown in Figure 4.1. Varying temperatures in the atmosphere can also cause sound ‘rays’ to be bent, adding to the complexity of sound propagation.

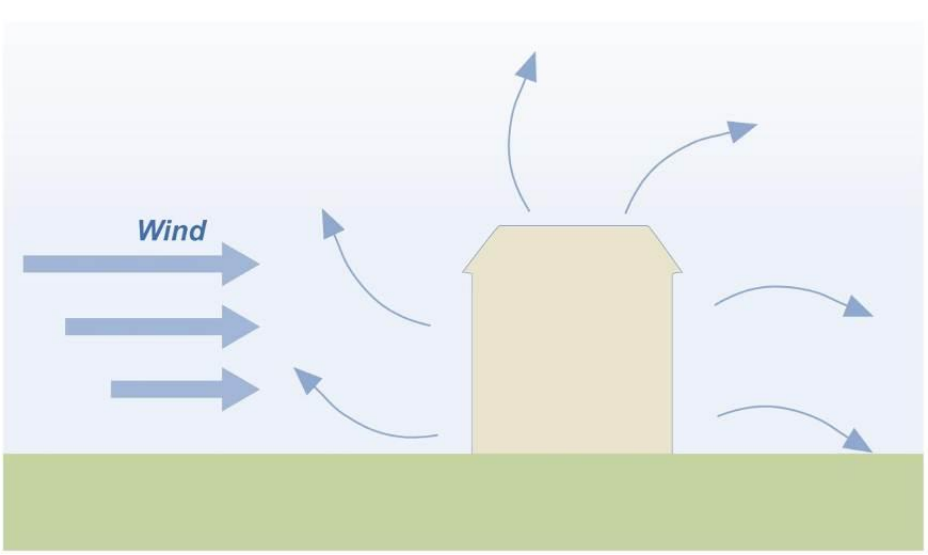


Figure 4.1 Refraction of sound waves due to wind gradients (increasing wind speed with height)

4.4 Another attenuation mechanism is absorption of sound by the molecules of the atmosphere. Higher pitched (higher frequency) sounds are more readily absorbed than lower pitched (lower frequency) sounds. The factors affecting the extent to which the sound is absorbed are the temperature and the water content of the atmosphere (relative humidity).

4.5 The effect of varying temperature and humidity is usually minimal when compared to other factors, such as wind and ground effects. However, where high frequency sounds are encountered, there may well be a significant variation between measured sound levels on different days due to variations in temperature and humidity.

4.6 When hearing noise which occurs out in the open (e.g. from road traffic, aircraft, birds, wind in the trees etc.), it is common experience that the noise level is not constant in loudness but is changing in amplitude all of the time. Therefore, in order to numerically describe the noise levels, it is beneficial to use statistical parameters. It has become practice to use indices which describe the noise level which has been exceeded for a certain percentage of the measurement period, and also an index which gives a form of average of the sound energy over a particular time interval. The former are termed percentile noise levels and are notated L_{A90}, L_{A50}, L_{A10} etc. and the latter is termed the equivalent continuous noise level and is notated by L_{Aeq}. It is worth noting that if the noise level does not vary with time, then all the parameters, in theory, normalise to a single value.

4.7 With regard to the percentile levels, the L_{A90} is the sound pressure level which is exceeded for 90% of the measurement time. It is generally used as the measure of background noise (i.e. the underlying noise) in environmental noise standards.

4.8 The L_{Aeq} (sometimes denoted $L_{Aeq,T}$) is the A-weighted equivalent continuous noise level and is an energy averaged value of the actual time varying sound pressure level over the time interval, T. It is used in the UK as a measure of the noise level of a specific industrial noise source when assessing the level of the specific source against the background noise. It is also used as a measure of ambient noise (i.e. the “all-encompassing” sound field).

4.9 Other useful parameters for describing noise include the maximum and minimum sound pressure level encountered over the time period, denote L_{Amax} and L_{Amin} respectively.

4.10 The term 'A' weighting implies a measurement made using a filter with a standardised frequency response which approximates the frequency response of the human ear at relatively low levels of noise. The resulting level, expressed in 'A' weighted decibels, or dBA, is widely used in noise standards, regulations and criteria throughout the world.

4.11 For a more detailed analysis of the frequency characteristics of a noise source, then noise measurements can be made in bands of frequencies, usually one octave wide. The resulting levels are termed octave band sound pressure levels. The standard octave band centre frequencies range from 31.5 Hz (about three octaves below middle ‘C’ on the piano) to 8 kHz (about five octaves above middle ‘C’). This covers most of the audible range of frequencies (usually taken to be around 20 Hz to 20 kHz). Octave band noise levels are usually quoted as linear data – i.e. without an ‘A’ weighting filter being applied. For more detailed analysis narrowband filters are useful for analysing tones.

4.12 The term decibel is a relative quantity and should always be referenced to an absolute level. In this report, all sound pressure levels (denoted L_P) are expressed in dB re 20 µPa. Hence, a sound pressure level of 0 dBA refers to a pressure level of 20 µPa, which is generally taken as the lowest level of sound that the human ear can detect. A negative dBA value usually implies that the sound is below the threshold of human hearing.

4.13 Subjectively, and for steady noise levels, a change in noise level of 3 dB is normally just discernible to the human ear. However, a noise change of less than 3 dB could be discernible if it has particular frequency characteristics or if it varies in loudness over time. A difference of 10 dB represents a doubling or halving of subjective loudness.

4.14 Sound power (denoted L_W) is the acoustical power radiated from a sound source. The advantage of using the sound power level, rather than the sound pressure level, in reporting noise from a source is that the sound power is independent of the location of the source, distance from the measurement point and environmental conditions. If the sound power of a source is known, then it is possible to calculate the sound pressure level at a distance away from the source, accounting for the attenuation due to propagation, as discussed above. Sound power levels are referenced to power rather than pressure; hence sound power levels are expressed in dB re 1 pW.

5 Review of Policy and Guidance

Noise Policy Statement for England

5.1 The Noise Policy Statement for England (NPSE) [2] sets out the long term overarching vision of Government noise policy, which is to promote good health and a good quality of life through the management of noise within the context of Government policy on sustainable development. Whilst the NPSE does not seek to change pre-existing policy, the document is intended to aid decision makers by making explicit the implicit underlying principles and aims regarding noise management and control that are to be found in existing policy documents, legislation and guidance.

5.2 The NPSE describes a Noise Policy Vision and three Noise Policy Aims and states that these vision and aims provide:

"the necessary clarity and direction to enable decisions to be made regarding what is an acceptable noise burden to place on society."

5.3 In other words, the purpose of the document is to provide guidance for the decision maker on whether or not the noise impact is an acceptable burden to bear in order to receive the economic and other benefits of the proposal.

5.4 Where existing policy and guidance does not provide adequate guidance then decision makers can go back to the aims of the policy statement to provide overriding guidance. The "Noise Policy Vision" is to "promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development". This long term vision is supported by the following aims, through effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

i. avoid significant adverse impacts of health and quality of life;

ii. mitigate and minimise adverse impacts on health and quality of life; and

iii. where possible, contribute to the improvement of health and quality of life.

5.5 The aims of the policy differentiate between noise impacts on health (e.g. sleep disturbance, hypertension, stress etc.) and noise impacts on quality of life (e.g. amenity, enjoyment of property etc.). The aims also differentiate between "significant adverse impacts" and "adverse impacts". The explanatory note to the NPSE clarifies that a significant adverse impact is deemed to have occurred if the "Significant Observed Adverse Effect Level" (SOAEL) is exceeded. An adverse effect, on the other hand, lies between the "Lowest Observed Adverse Effect Level" (LOAEL) and the SOAEL.

5.6 In assessing whether a development should be permitted, there are therefore four questions that should be answered, with reference to the principles of sustainable development, viz. will the development result in:

a) a significant adverse impact to health;

b) a significant adverse impact to quality of life;

c) an adverse impact to health; or

d) an adverse impact to quality of life?

5.7 If the answer to question a) or b) is yes, then the NPSE provides a clear guidance that the development should be viewed as being unacceptable (item i. above). If the answer to question c) or d) is yes, then the NPSE provides a clear steer that the impact should be mitigated and minimised (item ii. above).

National Planning Policy Framework

5.8 The National Planning Policy Framework (NPPF) [3] sets out the Government's planning policies for England and how these are expected to be applied. The emphasis of the Framework is to allow development to proceed where it can be demonstrated to be sustainable. In relation to noise, Paragraph 123 of the Framework states:

"123. Planning policies and decisions should aim to:

- *avoid noise from giving rise to significant impacts on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new developments, including through the use of conditions;*
- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and*
- *identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

Planning Practice Guidance - Noise

5.9 Planning Practice Guidance on Noise (PPG-N) [4] provides guidance to local planning authorities to ensure effective implementation of the planning policy set out in the National Planning Policy Framework. The PPG suggests that planning authorities should ensure that unavoidable noise emissions are controlled, mitigated or removed at source and establish appropriate noise limits for extraction in proximity to noise sensitive properties.

5.10 The PPG-N reiterates general guidance on noise policy and assessment methods provided in the NPPF, NPSE and British Standards and contains examples of acoustic environments commensurate with various effect levels. Paragraph 006 of the PPG-N explains 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."

5.11 According to the PPG-N, factors that can influence whether noise could be of concern include:

- the source and absolute level of the noise together with the time of day it occurs;
- for non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise;
- the spectral content and the general character of the noise;
- the local topology and topography along with the existing and, where appropriate, the planned character of the area;
- where applicable, the cumulative impacts of more than one source should be taken into account along with the extent to which the source of noise is intermittent and of limited duration;
- whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time;
- in cases where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in the overall noise level may result in a significant adverse effect occurring even though little to no change in behaviour would be likely to occur;
- where relevant, Noise Action Plans, and, in particular the Important Areas identified through the process associated with the Environmental Noise Directive and corresponding regulations;
- the effect of noise on wildlife;
- if external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces; and
- the potential effect of a new residential development being located close to an existing business that gives rise to noise should be carefully considered. This is because existing noise levels from the business even if intermittent (for example, a live music venue) may be regarded as unacceptable by the new residents and subject to enforcement action. To help avoid such instances, appropriate mitigation should be considered, including optimising the sound insulation provided by the new development's building envelope. In the case of an

established business, the policy set out in the third bullet of paragraph 123 of the NPPF should be followed.

5.12 The PPG-N provides a relationship between various perceptions of noise, effect level and required action in accordance with the NPPF. This is reproduced in Table 5.1, below.

Table 5.1 Noise Exposure Hierarchy Based On the Likely Average Response

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; 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	
Noticeable 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
Noticeable 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

5.13 The PPG-N describes sound that is not noticeable to be at levels below the No Observed Effect Level (NOEL). It describes exposures that are noticeable but not to the extent there is a perceived change in quality of life as below the LOAEL and need no mitigation. The audibility of sound from a development is not, in itself, a criterion to judge noise effects that is commensurate with national planning policy.

5.14 The PPG-N suggests that noise exposures above the LOAEL cause small changes in behaviour. Examples of noise exposures above the LOAEL provided in the PPG-N include:

- having to turn up the volume on the television;
- needing to speak more loudly to be heard;
- where there is no alternative ventilation, closing windows for some of the time because of the noise; or
- a potential for some reported sleep disturbance.

5.15 In line with the NPPF and NPSE, the PPG-N states that consideration needs to be given to mitigating and minimising effects above the LOAEL but taking account of the economic and social benefits being derived from the activity causing the noise.

5.16 The PPG-N suggests that noise exposures above the SOAEL cause material changes in behaviour. Examples of noise exposures above the SOAEL provided in the PPG-N are:

- where there is no alternative ventilation, keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present; and/or
- there is a potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep.

5.17 In line with the NPPF and NPSE, the PPG-N states that effects above the SOAEL should be avoided and that, whilst the economic and social benefits being derived from the activity causing the noise must be taken into account, such exposures are undesirable.

5.18 The PPG-N suggests that a noise impact may be partially offset if the residents of affected dwellings have access to a relatively quiet part of their dwelling, private external amenity area and/or external public or private amenity space nearby.

Local Development Plans

5.19 It is the purpose of Local Plan policies to put the Government Guidance into practice. This plan led approach is reaffirmed in Paragraph 182 of the NPPF which states that Development Plans should be *"…Consistent with national policy – the plan should enable the delivery of sustainable development in accordance with the policies in the Framework"*

5.20 The reason for refusal relating to noise stated that the proposed development is not in accord with Policies NW10 and NW12 of the North Warwickshire Core Strategy (NWCS) 2014.

5.21 Policy NW10 states that:

"Development should meet the needs of residents and businesses without compromising the ability of future generations to enjoy the same quality of life that the present generation aspires to. Development should…

…avoid and address unacceptable impacts upon neighbouring amenities through overlooking, overshadowing, noise, light, fumes or other pollution."

5.22 Policy NW10 is concerned with quality of life and states that "unacceptable" noise impacts should be avoided and addressed. Whilst the NWCS does not define what an unacceptable noise impact is, guidance is provided on this matter in the NPSE, NPPF and PPG-N described previously. The NPSE, NPPF and PPG-N implement the approach that effects above the SOAEL should be avoided, whilst taking into account the economic and social benefits being derived from the activity causing the noise, whereas effects above the LOAEL and below the SOAL should be mitigated and minimised.

5.23 Policy NW12 states that:

"All development proposals must;

• demonstrate a high quality of sustainable design that positively improve the individual settlement's character; appearance and environmental quality of an area;

• deter crime;

• sustain, conserve and enhance the historic environment

• provide, conserve and enhance biodiversity; and,

• create linkages between green spaces and wildlife corridors.

Development should protect the existing rights of way network and where possible contribute to its expansion and management."

5.24 It is not clear why Policy NW12 was provided as a reason for refusal. If it is the case that all developments must improve the environmental quality of an area, with reference to noise, then it would not be possible to develop any noise generating development or, indeed, noise neutral development whilst being in accord with this requirement. This approach would not accord with Paragraph 15 of the NPPF which states that *"Policies in Local Plans should follow the approach of the presumption in favour of sustainable development so that it is clear that development which is sustainable can be approved without delay. All plans should be based upon and reflect the presumption in favour of sustainable development, with clear policies that will guide how the presumption should be applied locally".*

6 Methodology for Assessing Noise Impact

British Standard 4142

6.1 British Standard 4142:2014 [5] describes a method for rating and assessing sound of an industrial and/or commercial nature. The standard is applicable to the determination of the rating level of industrial or commercial sound as well as the ambient, background and residual noise levels for the purposes of investigating complaints, assessing sound from proposed new, modified or additional sources or assessing sound at proposed new dwellings. The determination of whether a noise amounts to a nuisance is beyond the scope of the standard, as is rating and assessment of indoor noise levels.

6.2 The standard compares the "rating level" of the noise (i.e. the specific noise level from the site under investigation adjusted using penalties for acoustic character such as tonality or impulsiveness) with the pre-existing background noise level.

6.3 Clause 11 of the standard specifies that:

- typically, the greater the difference between rating level and background noise, 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.

6.4 The standard notes that *"adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."*

6.5 It goes on to state that *"where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following:*

1) The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low.

Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.

2) The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound, to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it.

NOTE 3 Consideration ought to be given to evidence on human response to sound and, in particular, industrial and/or commercial sound where it is available. A number of studies are listed in the "Effects on humans of industrial and commercial sound" portion of the "Further reading" list in the Bibliography.

3) The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:

i) facade insulation treatment;

ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and

iii) acoustic screening."

6.6 Other pertinent factors could include professional judgement, the sound environment, the situational context and the circumstances of the assessment.

6.7 The standard notes that where background sound levels and rating levels are both "low", absolute noise levels might be as, or more, relevant than the margin by which the rating level exceeds the background, especially at night.

6.8 With regards to the rating correction, paragraph 9.2 of BS 4142 states:

"Consider the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention."

6.9 The commentary to paragraph 9.2 of BS 4142 suggests the following subjective methods for the determination of the rating penalty for tonal, impulsive and/or intermittent specific sounds:

"Tonality - For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a rating 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.

Impulsivity – A 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. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.

Other sound characteristics - Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

Intermittency - When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. … If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."

British Standard 8233

6.10 British Standard 8233:2014 [6] has been used for many years for general guidance on acceptable noise levels in and around buildings. The latest revision to the standard, BS 8233:2014, provides guidance on design criteria for internal ambient noise levels in new (or refurbished) buildings. The scope of the standard states that it does it should not be used to assess the effects of changes in the external noise level to occupants of an existing building.

6.11 In relation to external noise levels, the second paragraph of 7.7.3.2 states that: *"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments..."*

World Health Organisation (WHO) Guidelines

6.12 In 2009 a report was published presenting the conclusions of a World Health Organisation (WHO) working group responsible for preparing guidelines for exposure to noise during sleep entitled "Night Noise Guidelines for Europe" [7]. The document can be seen as an extension to the original 1999 WHO Guidelines for Community Noise. Various effects are described including biological effects, sleep quality, and well-being. The document gives threshold levels for observed effects expressed as $L_{max,\ inside}$ and $L_{night,\ outside}$. The L_{night} is a *year-long average* night-time noise level, not taking into account the façade effect of a building. In an exposed population a noise exposure of 40 dB $L_{night,\ outside}$ is stated as equivalent to the "lowest observed adverse effect level" for night noise. Above this level adverse health effects observed are self-reported sleep disturbance, environmental insomnia and increased use of somnifacient drugs and

sedatives. Above 55 dB $L_{night, outside}$ cardiovascular effects become the major public health concern. Threshold levels for waking in the night, and/or too early in the morning are given as 42 dB $L_{Amax, inside}$. Lower thresholds are given that may change sleep structure.

6.13 The effects of different levels of night noise on the population's health in the NNGs are summarised in Table 6.1.

Table 6.1 Summary of Observed Health Effects in the Population (WHO NNG)

Noise Level, $L_{night, outside}$	Observed Effect
up to 30 dBA	No substantial biological effects are observed.
30 to 40 dBA	A number of effects are observed to increase: body movements, awakening, self-reported sleep disturbance, arousals. The intensity of the effect depends on the nature of the source and on the number of events, even in the worst cases the effects seem modest.
40 to 55 dBA	Adverse health effects are observed along the exposed population. Many people have to adapt their lives to cope with the noise at night. Vulnerable groups are now severely affected.
Above 55 dBA	The situation is considered increasingly dangerous for public health. Adverse health effects occur frequently, a high percentage of the population is highly annoyed and there is limited evidence that the cardiovascular system is coming under stress.

6.14 It is relevant to note that taking into account typical night to night variation in noise levels that will often occur due to meteorological effects and the effects of a façade, the night noise guidelines are similar to those previously given in the 1999 WHO report [8] (an external façade noise level of 45 dB L_{Aeq}), although defined in a different way.

6.15 The WHO guideline values give the lowest threshold noise levels below which the occurrence rates of particular effects can be assumed to be negligible. Exceedances of the WHO guideline values do not necessarily imply significant noise impact and, indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached.

6.16 Guidance on desirable levels of environmental noise is also given in the 1999 report. Section 4.3.1 of the document states that *"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 55 dB L_{Aeq} for a steady continuous noise. To protect the majority of people from being moderately annoyed during the daytime, the sound pressure level should not exceed 50 dB L_{Aeq}. These values are based on annoyance studies but most countries in Europe have adopted 40 dB L_{Aeq} as the maximum allowable level for new developments."*

6.17 The daytime value of 40 dB L_{Aeq} for new developments is very low and, in my experience, is not consistent with the criteria adopted for new developments (be it new noise sensitive development or new noise sources) in the UK. The values for moderate and serious annoyance are, however, consistent with UK planning policy.

6.18 The WHO guidelines have not been formally adopted into UK legislation or guidance, hence it remains a source of information reflecting a high level of health care with respect to noise, rather than a standard to be rigidly applied. The guideline values give the lowest threshold noise levels

below which the occurrence rates of particular effects can be assumed to be negligible. Exceedances of the WHO guideline values do not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached.

6.19 The major concern in Europe is with respect to noise from transportation systems, and most of the studies on which these guidelines are based relate to this type of noise source. There can be no certainty that the same effects will be observed from noise of an industrial nature, but in the absence of any more detailed information some weight should be attached to the WHO guidance when assessing industrial noise as well.

6.20 In 2001 the Defra-funded National Noise Incidence Survey [9] measured external noise levels outside 1,160 dwellings throughout the UK over 24-hour periods spread over the course of the year. The study concluded that an estimated 55% of the population of the United Kingdom live in dwellings exceeding the recommended WHO daytime noise level threshold of 55 dB L_{Aeq} and that 67% live in dwellings exceeding the night-time threshold for sleep disturbance of 45 dB L_{Aeq}.

IEMA Guidelines for Noise Impact Assessments

6.21 The IEMA Guidelines for Environmental Noise Impact Assessment [10] provide guidance on key principles of noise impact assessment which are applicable to all development proposals where noise effects are likely to occur. They cover:

- How to scope a noise assessment;
- Issues to be considered when defining the baseline noise environment;
- Prediction of changes in noise levels as a result of implementing development proposals; and
- Definition and evaluation of the significance of the effect of changes in noise levels.

6.22 The document provides definitions of terminology to be used in a noise impact assessment, viz.:

- **Noise Impact** – the difference between the acoustic environment before and after the implementation of the proposals (also known as the magnitude of change);
- **Noise Effect** – the consequence of the noise impact, e.g. a change in annoyance caused, disturbance due to the change in acoustic environment or potential to change the character of the area such that there is a perceived change in the quality of life; and
- **Significance of Effect** – the evaluation of the Noise Effect and whether or not that impact is significant.

6.23 When the impact of a scheme has been suitably described and assessed, the guidelines state that it is then necessary to assess the effect of the development on receptors likely to be impacted. The guidance sets out a generic scale for describing a range of effects from a receptor, as set out (for adverse effects) in Table 6.2.

Table 6.2 Generic relationship between noise impact (magnitude) and noise effect (magnitude + sensitivity), including the evaluation of effect significance

Magnitude	Description of effect	Significance
Negligible	N/A = No discernible effect on the receptor	Not significant
Slight	Receptor perception - Non-intrusive Noise can be heard, but does not cause any change in behaviour or attitude, e.g. turning up volume of TV, speaking more loudly, closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life	**Less likely to be significant** (greater justification needed based on impact magnitude and receptor sensitivity to justify a significant effect) ↕ (greater justification needed based on impact magnitude and receptor sensitivity to justify a non-significant effect) **More likely to be significant**
Moderate	Receptor perception - Intrusive Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of TV, speaking more loudly, closing windows. Potential for non-awakening sleep disturbance. Affects the behaviour such that there is a material change in the quality of life	
Substantial	Receptor perception - Disruptive Causes a material change in behaviour or attitude, e.g. avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in character of the area.	
Severe	Receptor perception - Physically harmful Significant changes in behaviour and/or 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. noise induced hearing loss.	Significant

6.24 The guidelines also provide example classifications for determining the impact due to noise change. An example of noise change criteria is shown in Table 6.3. The example noise change impact criteria are based on those used in other EIA's (in this case, HS2) and are, in my experience, similar to those which have been adopted on a number of project in the UK and worldwide. They are based on the "rules of thumb" for environmental noise that a 3 dB change is subjective the minimum perceptible change in noise and a 10 dB change is an approximate doubling or halving in subjective loudness. The criteria also recognise that people living nearby a new development are likely to be more sensitive to noise from a development when it first becomes operational but, in time, noise from the development can become a defining feature of the background noise environment and gain general acceptability in the area.

Table 6.3 Example impact from the change in sound levels

Long-term Impact Classification	Short-term Impact Classification	Sound level change, dB L_{Aeq}
Negligible	Negligible	≥ 0 dB and < 1 dB
	Minor	≥ 1 dB and < 3 dB
Minor	Moderate	≥ 3 dB and < 5 dB
Moderate	Major	≥ 5 dB and < 10 dB
Major		≥ 10 dB

Summary of Proposed Noise Impact Criteria

6.25 In order to provide a holistic assessment, the impact of operational noise associated with the proposed development should be assessed by considering:

- the noise level difference;
- the noise change; and
- the final absolute level.

6.26 In other words, it is appropriate to undertake:

- a BS 4142 assessment;
- to assess the noise change in terms of ambient noise; and
- to compare absolute levels against the criteria set out in WHO guidance.

7 Baseline Conditions

Baseline Survey Methodology

7.1 As part of the original noise impact assessment RPS consulted[1] with the Senior Pollution Control Officer at NWBC and agreed the scope of the assessment, including the background sound level survey locations and the methodology for the analysis of survey data.

7.2 The original baseline noise surveys undertaken for the ES have not been used in this proof of evidence. This is because demolition activities were taking place at the Daw Mill site at the time of the original baseline noise monitoring exercise and it was considered that this revised assessment should be updated to reflect current baseline noise conditions.

7.3 BS 4142 provides a definition of the background sound level and it is not synonymous with the "baseline" sound level. The background sound level is determined in the absence of the specific sound. Therefore, it is the same regardless of what is taken as the baseline situation; i.e. whether or not the baseline includes specific sound from the operational colliery, the background sound level adopted for the assessment does not include it.

7.4 The baseline sound levels have been determined from surveys at the nearest noise sensitive receptors to the colliery site. Data were processed to obtain robust and conservative values that are representative of the long term background noise levels in accordance with the methodology contained within BS 4142.

7.5 The noise surveys were undertaken using Class 1 Rion type NL-52 sound level meters. The monitors were programmed to measure various parameters including the L_{Aeq}, L_{AFmax} and L_{A90} values, logging at contiguous 15 minute intervals throughout the monitoring period. Microphone positions were between 1.2 and 1.5 metres above the ground and at least 3.5 metres from any vertical reflecting surface. The equipment calibration level was checked prior to, and after the monitoring periods – no significant changes (±0.2 dB) were noted.

7.6 The measurements conformed to the requirements of BS 7445:2003 [11].

7.7 The noise monitors continuously logged overall A-weighted sound pressure levels over the measurement period. The measurement locations and times are summarised in Table 7.1 and shown on the map in Figure 7.1.

[1] *Email correspondence between Phil Evans, Senior Director – Acoustic (RPS) and Dean Walters, SPCO (NWBC), 15th April 2014. Email correspondence between Toby Dudman, Principal Acoustic Consultant (RPS) and Dean Walters, SPCO (NWBC), 14th and 29th May 2014.*

Table 7.1 Noise monitoring locations and times (unattended monitoring)

Location	Measurement start	Measurement end
Daw Mill Cottage	21/11/2016 18:00	30/11/2016 21:15
Devitt's Green Lane	17/11/2016 13:00	21/11/2016 15:30
Nuneaton Road (east)	17/11/2016 14:15	21/11/2016 17:00
Nuneaton Road (west)	17/11/2016 14:45	21/11/2016 17:15

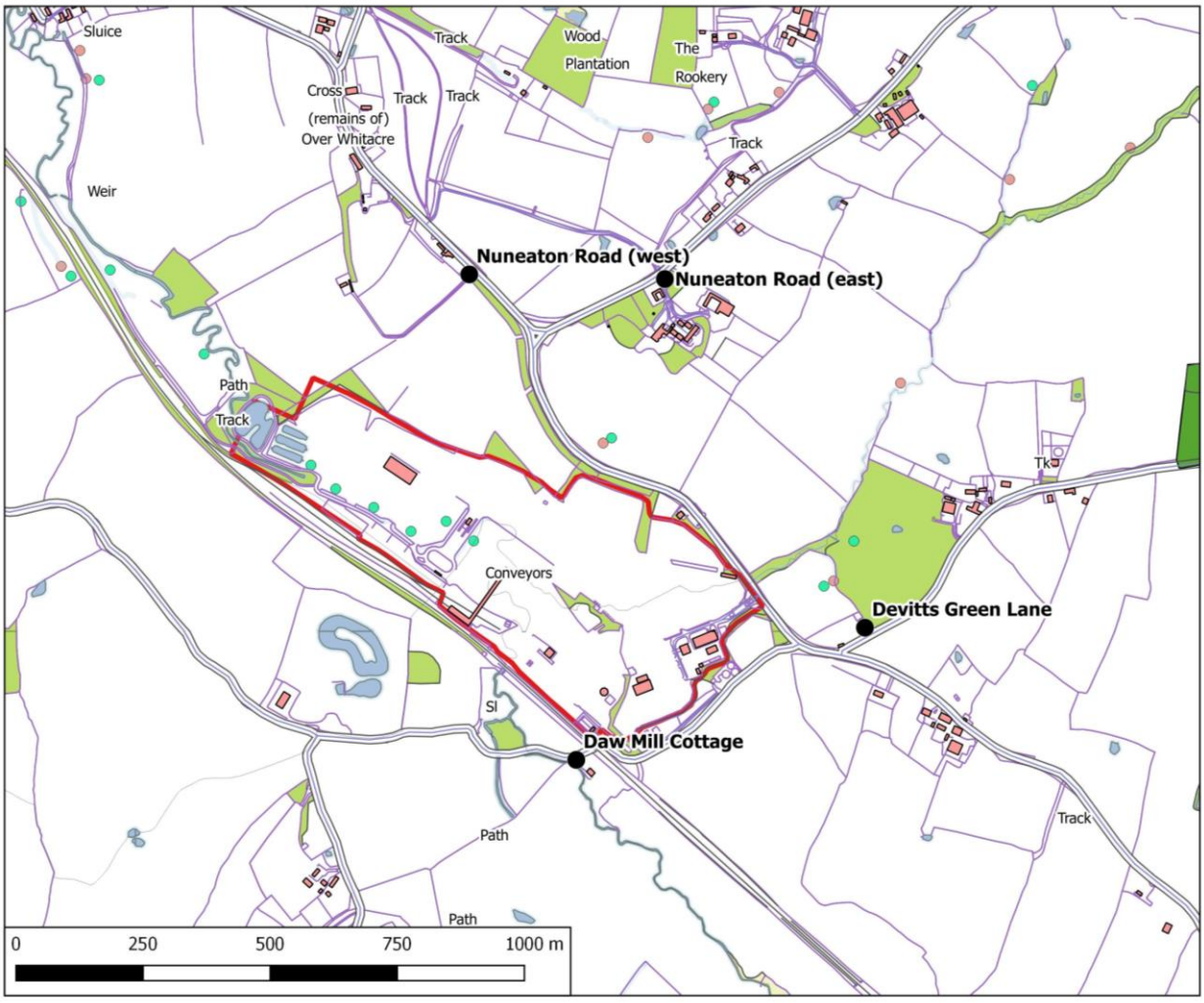
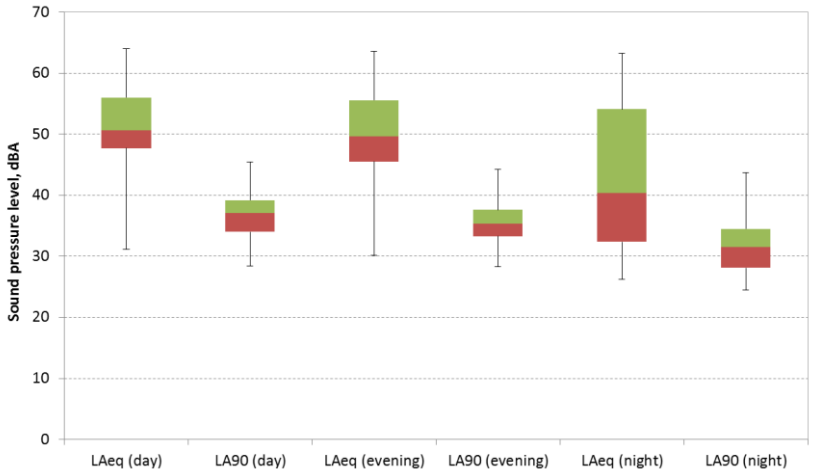
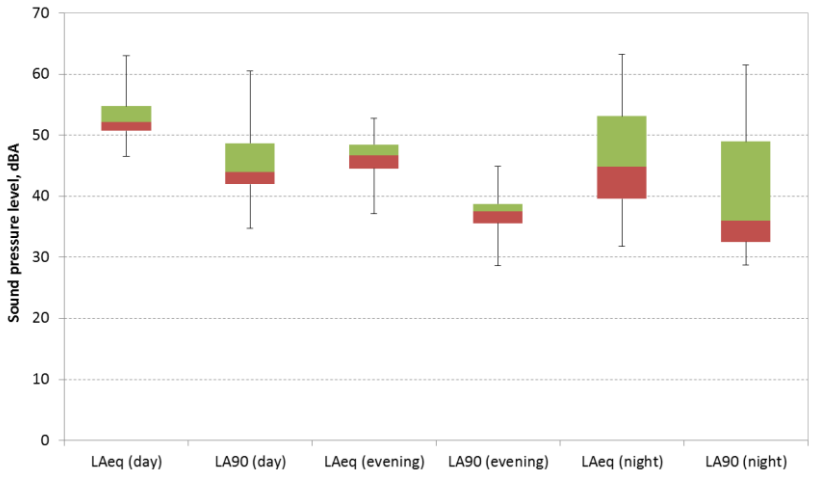


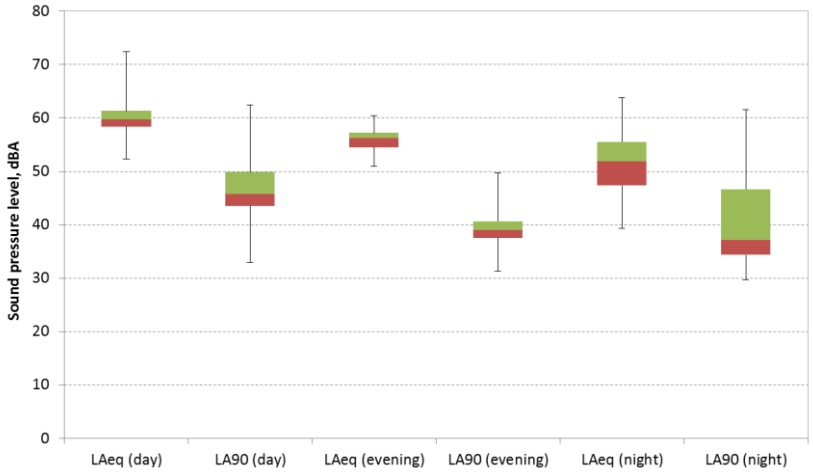
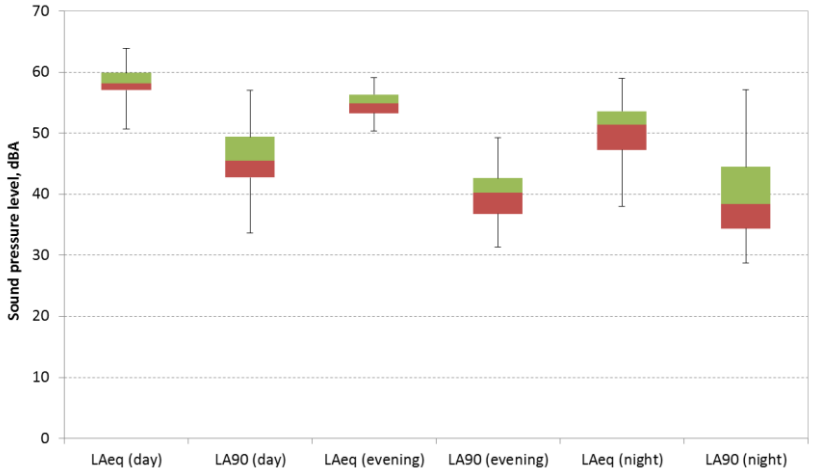
Figure 7.1 Baseline noise monitoring locations

7.8 The time history noise plots for the long term monitoring are provided in Figures A1 to A4 at the back of this proof of evidence.

7.9 Noise levels in the locality are dominated by road traffic movements on local roads and train movements. There were no activities on the site during the background sound level surveys. A summary of the measured baseline noise levels is given in Table 7.2. Wind speeds were generally very low (<2 m/s) during the measurement period and it has not, therefore, been necessary to remove any data from the measurements due to high winds.

Table 7.2 Summary of unattended noise monitoring results

	Day		Evening		Night	
	Ambient, dB L_{Aeq}	Background, dB L_{A90}	Ambient, dB L_{Aeq}	Background, dB L_{A90}	Ambient, dB L_{Aeq}	Background, dB L_{A90}
Daw Mill Cottage						
Range	31 - 64	28 - 45	30 - 64	28 - 44	26 - 63	25 - 44
Logarithmic average	55	38	55	37	53	34
Arithmetic average	51	37	50	36	43	32
Upper Quartile	56	39	56	38	54	35
Median	51	37	50	35	40	32
Lower quartile	48	34	46	33	32	28
Standard deviation	5.9	3.3	7.3	3.4	11.2	4.0
Devitt's Green Lane						
Range	47 - 63	35 - 61	37 - 53	29 - 45	32 - 63	29 - 62
Logarithmic average	55	49	47	38	53	50
Arithmetic average	53	46	46	37	46	40
Upper Quartile	55	49	48	39	53	49
Median	52	44	47	38	45	36
Lower quartile	51	42	45	36	40	33

	Day		Evening		Night	
	Ambient, dB L_{Aeq}	Background, dB L_{A90}	Ambient, dB L_{Aeq}	Background, dB L_{A90}	Ambient, dB L_{Aeq}	Background, dB L_{A90}
Standard deviation	3.5	5.2	3.0	3.4	7.8	9.4
Nuneaton Road (East)						
Range	52 - 72	33 - 62	51 - 60	31 - 50	39 - 64	30 - 62
Logarithmic average	61	52	56	41	55	50
Arithmetic average	60	47	56	39	52	41
Upper Quartile	61	50	57	41	56	47
Median	60	46	56	39	52	37
Lower quartile	58	44	55	38	47	34
Standard deviation	2.7	5.8	2.2	3.3	5.6	8.9
Nuneaton Road (West) – representative of Saddlers Meadow						
Range	51 - 64	34 - 57	50 - 59	31 - 49	38 - 59	29 - 57
Logarithmic average	59	49	55	42	52	46
Arithmetic average	58	46	55	40	50	40
Upper Quartile	60	49	56	43	54	45
Median	58	46	55	40	51	38
Lower quartile	57	43	53	37	47	34
Standard deviation	2.3	5.1	1.9	4.0	4.7	7.1

7.10 BS 4142 requires that the background sound levels adopted for the assessment be representative for the period being assessed. The Standard recommends that the background sound level should be derived from continuous measurements of normally not less than 15-minute intervals, which can be contiguous or disaggregated. However, the Standard states that there is no 'single' background sound level that can be derived from such measurements. It is particularly difficult to determine what is 'representative' of the night-time period is because it can be subject to a wide variation in background sound level between the shoulder night periods. The accompanying note to paragraph 8.1.4 states that *"a representative level ought to account for the range of background sounds levels and ought not automatically to be assumed to be either the minimum or modal value".*

7.11 One approach which is commonly adopted is to use the 25th percentile (lower quartile) of the night-time background and ambient noise levels and I have adopted this method in order to characterise the baseline noise environment, i.e. the data from the long-term surveys, as 15 minute periods, has been processed to provide a level that represents the 25th percentile. This level excludes 75% of the noisier levels and, although it is not the lowest sound level encountered, is lower than obtained using the average, median or modal values. It therefore represents somewhere in the range of lower sound levels that are likely to be encountered and consequently represents a precautionary assessment. In addition to this, only data have been considered where wind speeds were at or less than 2 m/s. This is again a very stringent approach as Clause 6.4 of BS 4142 implies that measurements can be taken in wind speeds up to 5 m/s.

7.12 Therefore, the representative ambient and background noise levels have been derived from data arising from long-term surveys which have then been processed to exclude measurements when wind speeds were in excess of 2 m/s; from which the 25th percentile has been derived for each location. This is considered to represent a very stringent method to obtain representative background noise levels and hence this underpins the robustness of the operational noise assessment.

7.13 The baseline noise levels used in the assessment are summarised in Table 7.3.

Table 7.3 Baseline noise levels used in assessment

Parameter	Period	Daw Mill Cottage	Tamworth Road	Devitts Green Lane	Sadler's Meadow	Quarry Cottage	Overbarns Cottage	Pemberton House	Wagstaff Farm
Ambient dB L_{Aeq}	Day	48	48	51	57	58	48	58	48
	Evening	46	46	45	53	55	46	55	46
	Night	32	32	40	47	47	32	47	32
Background dB L_{A90}	Day	34	34	42	43	44	34	44	34
	Evening	33	33	36	37	38	33	38	33
	Night	28	28	33	34	34	28	34	28

8 Assessment of Operational Impact

Approach

8.1 At the present time, no decision on the exact use of the site has been made. The choice of plant and equipment will depend on several factors including market demand at the time. Therefore, to determine the suitability of the Proposed Development site with regard to potential noise impacts and the types of mitigation required, the assessment is based on the worst case example site designs which exhibit maximum adverse noise impacts.

8.2 It should be noted that the plant and equipment included in the assessment are typical of the type of equipment that might be used. Different types of equipment produce different noise levels and noise characteristics and the plant selected was considered to give a representative worst-case assessment of the noise levels and characteristics that could occur from any selected use. This would also enable different noise mitigation measures to be assessed as part of the noise impact assessment.

8.3 It is necessary for the assessment to reflect the likely range of sound emissions from the development. Sound from the development will be more or less noticeable depending on what and where activities are being undertaken. For the purposes of carrying out a noise assessment, three worst-case scenarios have been developed to reflect the potential use of the site. These scenarios, and the assumptions used to model them, are summarised in Table 8.1.

Table 8.1 Scenarios assessed and assumptions

	Rail construction / maintenance yard	Train / carriage maintenance facility	Train manufacturing facility
Hard Standing	Area along trackside where trains are loaded / unloaded	Area where trains are unloaded	Area where trains are unloaded
Trains	Up to 5 train visits per night – maximum of 1 train idling at a time (assumed Class 66 as a worst case)	Up to 5 train visits per night – maximum of 1 train idling at a time (assumed Class 66 as a worst case)	Up to 5 train visits per night – maximum of 1 train idling at a time (assumed Class 66 as a worst case)
Unloading	Minerals / steel rails	Train carriages / locomotives	Train carriages / locomotives
Loading	Prefab rail sections / sleepers	Refurbished locomotives / carriages	Refurbished locomotives / carriages
Plant	1-2 reach stackers or cranes, 1-2 JCBs / excavators Artic tipper and flatbed / excavator for movement and loading / unloading	1 gantry crane (assumed in operation 50% of time)	1 gantry crane or mobile crane (assumed in operation 50% of time)
HGVs	Up to 13 movements per hour during day and evening (worst case) and up to 1 movement per hour during night	Up to 13 movements per hour during day and evening (worst case) and up to 1 movement per hour during night	Up to 13 movements per hour during day and evening (worst case) and up to 1 movement per hour during night
Activities	Loading / unloading of minerals, sleepers and rails. Most loading / unloading will take place weekdays between 07.00 and 18.00 because most railway maintenance occurs at nights or weekends.	A small amount of goods coming in by HGV for use in manufacturing / maintenance Train washing (assume operated 2 times per hour and wash time of 3.5 minutes) as well as more heavy duty engineering inside the shed – assumed that northern doors are open at all times as a worst case scenario The majority of loading / unloading will take place during the daytime.	Arrival of prefab train sets Final assembly of kit – engines, internal fitment, bogeys etc. Drilling / assembly inside the building – assumed that northern doors are open at all times as a worst case scenario Testing of kit on the sidings
Train types	Freight class 66 network rail / colas rail engineering trains Stationary trains have heating, ventilation and air conditioning (HVAC) units switched off when stabled	Any type of diesel pax or freight train Stationary trains have heating, ventilation and air conditioning (HVAC) units switched off when stabled	Any type of diesel pax or freight train Stationary trains have heating, ventilation and air conditioning (HVAC) units switched off when stabled
Working hours	24/7 - likely to be more intensive at weekends in line with engineering maintenance schedules.	24/7	24/7

8.4 The proposed development will generate 54 HGVs a day. In any one hour the highest HGV flow is anticipated to be 9 arrivals and 4 departures. Consequently, a worst case assumption of 13 HGV movements per hour has been assumed for the daytime and evening periods. Consequently, the noise model represents the very worst case hour in terms of HGV movements.

HGV deliveries are unlikely during the night but a worst case assumption of 1 HGV per hour has been assumed.

Noise Source Data

8.5 Noise source data for the assessment has been based on a combination of data noise data taken from the RPS database for other similar developments along with publically available information such as that contained in BS 5228. Sound power levels used in the assessment are shown in Table 8.2.

Table 8.2 Overall A-weighted and linear octave band sound power levels, dB re 1 pW

	L_W, dBA	63	125	250	500	1k	2k	4k	8k
Reach stacker	109	101	104	111	107	104	97	90	81
Crane / reach stacker placing pallet or container on hardstanding	105	108	107	103	102	100	97	93	83
HGV	106	116	109	107	104	100	98	92	88
Class 66 idle or pulling away	106	116	104	101	105	102	95	90	76
Train wash (doors open)	109	105	104	107	106	103	102	99	94
Depot (doors open)	98	96	94	93	93	92	91	89	86
RTG Crane engine	109	105	113	110	106	103	100	95	90
RTG Crane exhaust	105	109	119	109	91	84	82	76	70
Wheeled excavator	94	92	88	91	92	90	85	79	73
Train manufacturing depot (internal L_W per m^2)	93	91	93	93	91	87	84	79	67

Noise Model Methodology

8.6 The noise emissions due to the proposed development have been modelled using the CadnaA environmental noise prediction software. This model calculates the contribution from each noise source input as a specified source type (e.g. point, line, area) octave band sound power levels at selected locations. It predicts noise levels under light down-wind conditions based on hemispherical propagation, atmospheric absorption, ground effects, screening and directivity based on the procedure detailed in ISO 9613.

8.7 The ground between the site and the receiver locations has been assumed to be soft although the site has been assumed to be hard. Terrain contour data has also been entered in the model based on OS land contours. The site buildings have been included and these provide some degree of screening as well as reflecting surfaces.

8.8 The model has been run using a receiver height of 4 metres in order to investigate the noise impact from night-time operations at first floor level.

8.9 The same noise modelling techniques have been used by RPS on numerous sites in the UK and worldwide and there is a high degree of confidence in the model. The main area of uncertainty

relates to source noise level data for the equipment because, as stated previously, the final choice of plant and site design has not been decided yet.

BS 4142 Assessment

Rail Construction / Maintenance Yard

8.10 The BS 4142 assessment for the rail construction / maintenance yard scenario is shown in Table 8.3. No acoustic feature correction has been applied because noise from the site will be broadband in nature and will not contain any other readily distinctive characteristics.

Table 8.3 Summary of Noise Assessment Results - rail construction / maintenance yard

	Daw Mill Cottage	Tamworth Road	Devitts Green Lane	Sadler's Meadow	Quarry Cottage	Overbarns Cottage	Pemberton House	Wagstaff Farm
Day								
Background, dB L_{A90}	34	34	42	43	44	34	44	34
Rating level, dB $L_{Ar,Tr}$	41	38	33	39	40	38	36	40
Level difference, dB	+7	+4	-9	-4	-4	+4	-8	+6
Evening								
Background, dB L_{A90}	33	33	36	37	38	33	38	33
Rating level, dB $L_{Ar,Tr}$	41	38	33	39	40	38	36	40
Level difference, dB	+8	+5	-3	+2	+2	+5	-2	+7
Night								
Background, dB L_{A90}	28	28	33	34	34	28	34	28
Rating level, dB $L_{Ar,Tr}$	38	34	30	37	38	38	36	39
Level difference, dB	+10	+6	-3	+3	+4	+10	+2	+11

8.11 According to BS 4142, a difference of around +10 dB or more is likely to be an indication of a significant adverse impact and a difference of around +5 dB is likely to be an indication of an adverse (but not significant adverse) impact, depending on the context.

8.12 It can be seen that a significant adverse impact is likely to occur at night at Daw Mill Cottage, Overbarns Cottage and Wagstaff Farm, depending on the context. These impacts fall to adverse but not significant adverse impacts during the daytime and evening. Thus, no significant adverse impacts are likely during the daytime or evening, when amenity is the primary concern. In addition an adverse, although not significant, impact could occur at Tamworth Road at night, depending on the context.

8.13 As discussed previously, determining the rating level difference is only the first step in an assessment. BS 4142 also requires the context to be taken into account in the assessment, including the character and absolute level of the sound and the circumstances of the assessment. In this respect, it is clear that the specific noise from the site will be below the 42 dB L_{Aeq} threshold for onset of sleep disturbance effects and the 50 dB L_{Aeq} threshold for onset of moderate annoyance from WHO guidance. Consequently, when considered alongside the absolute level of the specific noise, this rating level is unlikely to have the potential to yield a significant adverse impact.

8.14 People living near a new development are likely to be more sensitive to noise when it first becomes operational but, in time, noise from the development can become a defining feature of the background noise environment and gain general acceptability in the area. The historical context for the area is that the site was previously a major colliery which would have been a significant source of noise in the area prior to its closure in 2013. Over the decades when the colliery was operational, it would have been viewed by local residents as an inherent aspect of the local background noise environment. Noise from the colliery would have been similar in character to the proposed development, but is likely to have been at a higher level. Consequently, residents living in the area up until 2013 would have been used to living with much higher noise levels than currently exist. Taking this into account, along with the absolute noise level, it is concluded that the rail construction / maintenance yard scenario would result in an adverse but not significant impact due to noise. In other words, the noise impact will be above LOAEL but below the SOAEL.

Train / Carriage Maintenance Facility

8.15 The BS 4142 assessment for the train / carriage maintenance facility scenario is shown in Table 8.4. No acoustic feature correction has been applied because noise from the site will be broadband in nature and will not contain any other readily distinctive characteristics.

Table 8.4 Summary of Noise Assessment Results - train / carriage maintenance facility

	Daw Mill Cottage	Tamworth Road	Devitts Green Lane	Sadler's Meadow	Quarry Cottage	Overbarns Cottage	Pemberton House	Wagstaff Farm
Day								
Background, dB L_{A90}	34	34	42	43	44	34	44	34
Rating level, dB $L_{Ar,Tr}$	40	37	32	37	37	38	35	40
Level difference, dB	+6	+3	-10	-6	-7	+4	-9	+6
Evening								
Background, dB L_{A90}	33	33	36	37	38	33	38	33
Rating level, dB $L_{Ar,Tr}$	40	37	32	37	37	38	35	40
Level difference, dB	+7	+4	-4	0	-1	+5	-3	+7
Night								
Background, dB L_{A90}	28	28	33	34	34	28	34	28
Rating level, dB $L_{Ar,Tr}$	37	33	29	34	35	38	34	39
Level difference, dB	+9	+5	-4	0	+1	+10	0	+11

8.17 It can be seen that a significant adverse impact is likely to occur at night at Overbarns Cottage and Wagstaff Farm, depending on the context. These impacts fall to adverse but not significant adverse impacts during the daytime and evening. In addition an adverse, although not significant, impact could occur at Daw Mill Cottage and Tamworth Road, depending on the context. No significant adverse impacts are likely during the daytime or evening, when amenity is the primary concern.

8.18 Specific noise from the site will be below the 42 dB L_{Aeq} threshold for onset of sleep disturbance effects and the 50 dB L_{Aeq} threshold for onset of moderate annoyance from WHO guidance. Consequently, when considered alongside the absolute level of the specific noise, this rating level is unlikely to have the potential to yield a significant adverse impact.

8.19 Taking the historical context into account, residents living in the area would have been used to living with much higher noise levels than currently exist due to the colliery, which would have been similar in character to the proposed development, but at a higher noise level. When this is considered along with the absolute noise level, it is concluded that the train / carriage maintenance facility scenario would result in an adverse but not significant impact due to noise. In other words, the noise impact will be above LOAEL but below the SOAEL.

Train Manufacturing Facility

8.20 The BS 4142 assessment for the train manufacturing facility scenario is shown in Table 8.5. No acoustic feature correction has been applied because noise from the site will be broadband in nature and will not contain any other readily distinctive characteristics.

Table 8.5 Summary of Noise Assessment Results – train manufacturing facility

	Daw Mill Cottage	Tamworth Road	Devitts Green Lane	Sadler's Meadow	Quarry Cottage	Overbarns Cottage	Pemberton House	Wagstaff Farm
Day								
Background, dB L_{A90}	34	34	42	43	44	34	44	34
Rating level, dB $L_{Ar,Tr}$	40	37	32	37	39	39	39	40
Level difference, dB	+6	+3	-10	-6	-5	+5	-5	+6
Evening								
Background, dB L_{A90}	33	33	36	37	38	33	38	33
Rating level, dB $L_{Ar,Tr}$	40	37	32	37	39	39	39	40
Level difference, dB	+7	+4	-4	0	+1	+6	+1	+7
Night								
Background, dB L_{A90}	28	28	33	34	34	28	34	28
Rating level, dB $L_{Ar,Tr}$	37	33	28	34	38	38	38	39
Level difference, dB	+9	+5	-5	0	+4	+10	+4	+11

8.21 It can be seen that a significant adverse impact is likely to occur at night at Overbarns Cottage and Wagstaff Farm, depending on the context. These impacts fall to adverse but not significant adverse impacts during the daytime and evening. In addition an adverse, although not significant, impact could occur at Daw Mill Cottage and Tamworth Road, depending on the context. No significant adverse impacts are likely during the daytime or evening, when amenity is the primary concern.

8.22 The specific noise from the site will below the 42 dB L_{Aeq} threshold for onset of sleep disturbance effects and the 50 dB L_{Aeq} threshold for onset of moderate annoyance from WHO guidance. Consequently, when considered alongside the absolute level of the specific noise, this rating level is unlikely to have the potential to yield a significant adverse impact.

8.23 Taking the historical context into account, residents living in the area would have been used to living with much higher noise levels than currently exist due to the colliery, which would have been similar in character to the proposed development, but at a higher noise level. Taking this into account, along with the absolute noise level, it is concluded that the train / carriage

maintenance facility scenario would result in an adverse but not significant impact due to noise. In other words, the noise impact will be above LOAEL but below the SOAEL.

Absolute Noise Level Assessment

8.24 BS 4142 notes that where background sound levels and rating levels are both “low”, absolute noise levels might be as, or more, relevant than the margin by which the rating level exceeds the background, especially at night. An assessment of absolute noise levels against WHO criteria is therefore a significant consideration in understanding the context of the noise and coming to a conclusion about its potential significance.

8.25 As noted previously, the WHO guideline values give the lowest threshold noise levels below which the occurrence rates of particular effects can be assumed to be negligible. Exceedances of the WHO guideline values (especially marginal exceedances) do not necessarily imply significant noise impact and, indeed, it may be that significant impacts do not occur until much higher degrees of noise exposure are reached.

8.26 In terms of the absolute noise level assessment, noise from site will be significantly lower than the 50 dB L_{Aeq} noise level specified in WHO guidance for onset of moderate annoyance and the 55 dB L_{Aeq} threshold for serious annoyance during the daytime.

8.27 Thus, taking the BS 4142 assessment, historical context and absolute noise level assessment into consideration, it is considered that the site will not result in an adverse impact to amenity or quality of life.

8.28 In terms of the night-time, noise from the Proposed Development will be below the level for onset of sleep disturbance (i.e. LOAEL) contained in WHO Guidance of 42 dB L_{Aeq} (free-field). Noise from the development is also well below the WHO NNG interim target of 55 dBA at night. Therefore noise from the proposed development is considered unlikely to result in sleep disturbance.

8.29 Thus, taking the BS 4142 assessment, historical context and absolute noise level assessment into consideration, it is considered that the site will not result in an adverse impact to health.

Consideration of Maximum Instantaneous Noise Levels

8.30 A prediction of maximum L_{AFmax} event instantaneous sound pressure levels is shown in Table 8.6. This is based on the LAmax sound pressure level of a large container being dropped on hardstanding by a crane or reach stacker. Given that containers no longer form a part of the development proposals this represents a very pessimistic assessment and it is therefore likely that the predicted L_{Amax} levels are unrealistically high.

Table 8.6 Instantaneous L_{AFmax} sound pressure levels

Name	dB $L_{Amax,outside}$	dB $L_{Amax,inside}$
Daw Mill Cottage	53	38
Tamworth Road	43	28
Devitts Green Lane	37	22
Sadler's Meadow	43	28
Quarry Cottage	42	27
Overbarns Cottage	39	24
Pemberton House	39	24
Wagstaff Farm	46	31

8.31 The predicted events are all below the WHO NNG threshold levels for waking in the night, and/or too early in the morning (based on 42 dB $L_{Amax, inside}$ with a 15 dB correction to account for attenuation through a partially open window, resulting in an equivalent threshold of 57 dB $L_{Amax, inside}$). It can therefore be concluded that there is unlikely to be an adverse impact due to impulsive noise from the proposed development.

Ambient Noise Change Assessment

8.32 The magnitude of impacts on the receptors has been defined in Table 8.7, based on the change in ambient noise. These assumptions are based on the philosophy described in the generic scale for assessing impacts on people, as summarised previously in Table 5.1 and Table 6.2.

8.33 It is important to note that a given change in noise level could have a greater impact if the end absolute noise level exceeds the criteria in World Health Organisation Guidance for annoyance or sleep disturbance. Thus, it is unlikely that even a large change in ambient noise would result in a substantial impact unless the criteria for sleep disturbance or annoyance were also exceeded.

Table 8.7 Long term noise change assessment criteria

Sound level change	Perception	Description of effect	Magnitude
≥ 0 dB and < 3 dB	Not perceptible or barely perceptible	N/A = No discernible effect on the receptor	Negligible
≥ 3 dB and < 5 dB	Perceptible	Receptor perception - Non-intrusive Noise can be heard, but does not cause any change in behaviour or attitude, e.g. turning up volume of TV, speaking more loudly, closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life	Slight
≥ 5 dB and < 10 dB	Up to twice as loud	Receptor perception - Intrusive Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of TV, speaking more loudly, closing windows. Potential for non-awakening sleep disturbance. Affects the behaviour such that there is a material change in the quality of life	Moderate
≥ 10 dB	Twice as loud or more	Receptor perception - Disruptive Causes a material change in behaviour or attitude, e.g. avoiding certain activities during periods of intrusion. Quality of life diminished due to change in character of the area.	Substantial

8.34 The change in ambient noise levels as a result of the proposed development is shown in Table 8.8.

Table 8.8 Ambient noise change assessment

Noise Change	Daw Mill Cottage	Tamworth Road	Devitts Green Lane	Sadler's Meadow	Quarry Cottage	Overbarns Cottage	Pemberton House	Wagstaff Farm
Rail construction / maintenance yard								
Day	+1	0	0	0	0	0	0	+1
Evening	+1	+1	0	0	0	+1	0	+1
Night	+7	+4	0	0	+1	+7	0	+8
Train / carriage maintenance facility								
Day	+1	0	0	0	0	0	0	+1
Evening	+1	+1	0	0	0	+1	0	+1
Night	+8	+6	+1	0	0	+7	0	+8
Train manufacturing facility								
Day	+1	0	0	0	0	0	0	+1
Evening	+1	+1	0	0	0	+1	0	+1
Night	+8	+6	+1	0	+1	+7	+1	+8

8.35 A 3 dB change in noise level is usually taken to be the minimum perceptible change in environmental noise. The noise change will be 1 dB or less at all locations (for all scenarios) during the daytime and evening when amenity is the primary concern. Such a change would not be noticeable and it is highly unlikely that this would lead to a significant impact.

8.36 It can be seen that the change in ambient noise levels at Devitt's Green Lane, Sadler's Meadow, Quarry Cottage and Pemberton House will be negligible and will not be significant even at night.

8.37 A 10 dB change is usually taken to mean a doubling in subjective loudness. Consequently, it is likely that the noise change at Daw Mill Cottage, Tamworth Road, Overbarns Cottage and Wagstaff Farm will be clearly audible during the quietest periods of the night, but less than a doubling in loudness. However, as existing ambient levels are very low (e.g. 32 dB L_{Aeq} at Daw Mill Cottage) and absolute noise levels will not exceed the WHO threshold for onset of sleep disturbance effects, it is considered that the noise change at night would only result in a moderate impact and it is unlikely that this would seriously affect the quality of life of residents in close proximity to the site.

8.38 It is an important consideration that the noise change will be 1 dB or less at all locations during periods when people would typically be awake and when amenity and quality of life are the main concern (i.e. the daytime and evening). Consequently, although the site could be audible at times, it would not be a significant change in the quality of life to residents living in even the closest proximity to the site.

8.39 It is also important to recognise that people living near a new development are likely to be more sensitive to noise from a development when it first becomes operational but, in time, noise from the development can become a defining feature of the background noise environment and gain general acceptability in the area. In this respect it is an important consideration that the site was previously an operational colliery with associated high noise emissions. It is considered that the character and absolute level of noise from the proposed development would be similar to that which existed in the area for many years prior to the collieries recent closure.

8.40 Taking the above factors into account, the noise change is considered to be at the LOAEL during the daytime and above LOAEL but below SOAEL at night.

Road Noise

8.41 The maximum number of HGVs expected during the operational phase for any of the possible schemes is 54 HGV visits per day. Noise from HGVs on the access road and on site has been taken into account in the operational noise modelling. For noise on the roads, HGVs will gain access to site via the A4098. This road is already very busy and an additional 54 HGVs per day (i.e. 108 movements) would not make any discernible difference to traffic noise to properties along the road and surrounding area.

9 Mitigation

Engineering Noise Control and Best Practicable Means

9.1 The assessment has demonstrated that noise from the proposed development would be below the LOAEL during the daytime but above the LOAEL and below the SOAEL during the night. Consequently, there is an obligation under the NPSE to consider mitigation measures which could be implemented in order to reduce the adverse impacts to a minimum.

9.2 The assessment carried out in this proof of evidence has been based on a number of worst case, precautionary assumptions. Noise source data have been based upon standard designs as opposed to low noise options for the majority of plant. However, there are several methods available to reduce noise emissions from the proposed development, the exact details of which would depend on the precise use of the facility. Some examples are illustrated below.

9.3 The assessment has been based on the use of standard rubber tyre gantry (RTG) cranes. These are diesel engine powered and potentially a significant source of noise. However, modern RTGs can be made much quieter as long as attention is paid to providing a good sound attenuation enclosure for the engine and a high performance exhaust silencer (normally a double attenuator arrangement). Sound power levels significantly lower than those assumed in this assessment can be achieved by careful attention to detail, and by buying the RTGs to a defined noise specification. Based on experience at ports in the UK and worldwide, a modern RTG crane purchased to a high specification acoustic standard would be expected to be 8 to 10 dB quieter than has been assumed in the noise modelling for this assessment.

9.4 An alternative to RTG cranes could be to use a rail mounted gantry (RMG) crane. These would be electrically driven and therefore significantly quieter than RTG cranes in operation. Noise from RMG cranes is primarily due to electric motors, winches and air handling equipment in the machinery house with additional noise from external sources such as trolleying. A RMG crane with enhanced acoustic enclosure would have a sound power level of approximately 100 dBA or less, compared to 110 dBA for a RTG crane as assumed in the assessment.

9.5 Another option for reducing noise from RTG/RMG cranes would be to utilise hybrid cranes. Unlike conventional diesel electric cranes the hybrid versions are powered primarily from energy storage systems which utilise lithium polymer batteries, resulting in significantly lower noise levels as well as fuel and emissions reductions. The sound power level of a hybrid crane would be approximately 100 dBA, compared to 110 dBA for a RTG crane as assumed in the assessment. It may be possible to reduce noise further by utilising high specification silencers and enhanced enclosures.

9.6 There is also the possibility that reach stackers and RTG/RMG cranes could be replaced with bar cranes extending outside the building. If this option is chosen, noise levels would be significantly lower as the options for control of noise on a fixed crane are greater than for a mobile crane. For

example, crane motors, winches and machinery could be housed in very robust acoustic enclosures or inside the building.

9.7 Other plant items included in this assessment are also based on standard design units. Reach stackers and excavators, or any other permanent plant, can all be designed or procured to a low noise specification. As with the RTGs, this would typically include uprated engine enclosures and high specification engine exhaust systems. Reductions in the order of 10 dB can be achieved through equipment selection and engineering noise control.

9.8 Noise from handling of materials can be significantly reduced by introducing mechanisms to limit the terminal set-down velocity of objects. An example of this approach is DP World Southampton where gantry crane electronic control systems have been installed in order to automatically reduce the velocity as a container nears the ground. Other potential systems incorporate radar sensor control systems with the same result. Experience of these systems shows that potentially significant reductions in impact noise can be achieved.

9.9 The train maintenance / manufacturing depot has been modelled assuming that doors will have to be left open on a 24/7 basis. It is possible, depending on the exact configuration of the site, that the building could be designed with a door system which could remain closed during operation, especially at night. It is estimated that a reduction in sound power level from the building by approximately 8 dB can be achieved by keeping doors closed. Further enhancement of the building internal facades using acoustically absorptive materials also has the potential to significantly reduce noise levels compared to those presented in this report. This would result in a further reduction of approximately 2 to 3 dB.

9.10 The assessment has been carried out on the assumption that one diesel locomotive would be either pulling in or out of the siding or sitting at idle for 24 hours per day, which is considered to be a worst case, precautionary assumption. Many diesel locomotives are now fitted with engine cut-outs which automatically shut the engine off if it is left on idle for 3 minutes. These measures are now become more widespread and, for example, three-quarters of DB Cargo's fleet is fitted with automatic engine cut-outs. It is considered likely that such cut-out systems will be fitted to more locomotives in future (not least due to the benefit of fuel savings) and consequently it is considered that the modelling assumptions are unrealistically pessimistic and this source of noise is unlikely to occur for the majority of the time.

9.11 Other mitigation measures, commensurate with use of Best Practicable Means, include:

- vehicles within the control of the operator should use active broadband reversing signals;
- rail unloading and loading during the night-time to be minimised where practicable;
- rail unloading and loading to be undertaken from the middle sidings where practicable; and
- locomotives idle at the northernmost area of sidings during unloading.

9.12 Taking all of the above mitigation measures in account, it is likely that noise from the proposed development could be reduced by approximately 5 to 10 dB compared to the levels presented in this proof of evidence, depending on the final design and layout chosen.

9.13 Without mitigation in place it has been demonstrated that the development will be below the LOAEL during the daytime but above the LOAEL and below the SOAEL during the night. Once the mitigation measures are implemented, it is considered that residual noise from site will be below the LOAEL during the night.

Operational Noise Management Plan

9.14 The contents of an Operational Noise Management Plan (ONMP) would depend on the final use decided for the site and the type of plant to be used. However, it is envisaged that the plan would contain the following:

- Details of the noise sources on site, their sound levels and characteristics and their impact on noise sensitive receivers;
- Procedure for selection of inherently low noise plant and equipment;
- Details of noise control measures, including:
  - Engineering noise control such as silencers, enclosures, acoustic absorption, barriers, cladding etc.;
  - Technological / procedural control measures such as set down velocity control, white noise alarms, automatically closing doors etc.;
  - Management control measures such as door closures, site speed limits, use of noisy tools / activities indoors, avoiding noisy activities during the night, maintenance of equipment etc.;
- Training of site personnel about environmental noise and how to minimise its impact;
- Noise emission monitoring (including monitoring at noise sensitive receptors and demonstrating compliance with the planning noise limits) and maintaining an up to date noise model of the site;
- Noise contingency measures including complaints handling and investigation procedure and actions to be taken in case of an identified exceedance of the planning noise limit;
- Reporting measures; and
- Management responsibilities and review.

Planning Conditions for Noise

9.15 The Appellant's letter of 2nd November 2015 proposed the following noise conditions:

- **Condition N1: Noise Limits** *"The long-term downwind rating level of noise, LAR,L TR (DW), emitted from the site, determined in accordance with BS 4142:2014 and BS 7445-3:1991,*

shall not exceed 55 dB between 07:00 and 23:00 hours Monday to Friday; 50 dB between 07:00 and 23:00 hours Saturday and Sunday; and 45 dB at any other time, at any residential property that is lawfully inhabited at the time of this consent".

- **Condition N2: Operational Noise Management Plan** *"The site shall not commence operations until a scheme for minimizing adverse noise effects (Operational Noise Management Plan) on residential property that is lawfully inhabited at the time of this consent has been submitted and approved by the local planning authority. All works which form part of the scheme shall be completed before any part of development is operational. The evaluation of whether noise effects are adverse shall be in accordance with the methods contained within BS 4142:2014 and the guidance on noise contained within Department for Communities and Local Government's National Planning practice Guidance".*

9.16 Ambient noise levels are already in the range 48 to 58 dB L_{Aeq} during the daytime and a noise limit of less than 55 dB L_{Aeq} during this period could therefore be difficult to enforce. Nevertheless, given the requirement for operating 24 hours a day, 7 days per week, it is the night time noise limit that will determine the extent of mitigation required and it is unlikely that daytime levels will be much higher than the night-time noise levels (as demonstrated by the three modelling scenarios assessed in this proof of evidence).

9.17 The proposed noise condition is based on the use of a rating level, as defined in BS 4142:2014. This means that noise with a character (such as impulsiveness, tonality etc.) would attract a penalty of up to 15 dB. Thus, for example, if the noise attracted a penalty of 15 dB then the absolute level of noise would need to be 30 dB L_{Aeq} or less. This provides an added layer of protection to residents living nearby such that both the level and character of sound are taken into account in order to minimise the potential for an adverse impact in terms of amenity and sleep disturbance.

9.18 Condition N2 provides a mechanism by which the local authority can ensure that mitigation measures have been put in place to a satisfactory level prior to the site becoming operational. The night time noise limit, defined as a rating level, in combination with a requirement for an ONMP will ensure that there are no significant adverse impacts at night. Any activities which could lead to an exceedance of the noise limit, including transient or impulsive noise which would attract a penalty under BS 4142, would require mitigation either by engineering noise control or by management of the activity according to the ONMP (which could, for example, include restrictions on certain activities at night). In other words, both the noise limit and ONMP would automatically provide protection against both continuous noise and in the event that impulsive noise occurred. Consequently, there is no need for an "Hours of Operation" restriction for the proposed development.

9.19 It is therefore my opinion that these two planning conditions would provide adequate protection to residents living near the site in terms of avoiding significant adverse impacts and minimising adverse impacts on their quality of life and health.

10 Policy Compliance

10.1 The reason for refusal relating to noise impacts can be broken down as follows:

i. The development is likely to cause disturbance due to noise, especially at night;

ii. Physical mitigation measures could provide some mitigation but restriction on operational hours would be required to fully resolve this impact; and

iii. The proposal is not considered to accord with Policies NW10 and NW12 of the North Warwickshire Core Strategy 2014.

10.2 With respect to item i., although it is accepted that the proposed development could result in a noticeable change in ambient noise levels at night, noise levels will not exceed the thresholds set out in WHO guidelines for sleep disturbance at night or for annoyance during the daytime. It is therefore considered that any "disturbance" due to noise will not significantly affect the health or quality of life of residents living in even close proximity to the site.

10.3 With respect to item ii., this proof of evidence has demonstrated that a significant adverse impact will not occur even without any further mitigation measures being put in place. With the addition of the engineering noise control and management measures put forward in Section 9 of this proof of evidence, it is anticipated that noise levels can be reduced by a further 5 to 10 dB compared to those assessed. It is therefore concluded that not only will any impacts at night be below the SOAEL, but that with mitigation in place they could fall below the LOAEL, depending on the final site design and layout chosen. It is therefore anticipated that the proposed development could operate at night without causing an "unacceptable" (i.e. significant) adverse impact and, furthermore, that the site could practically comply with operational noise limits designed to reduce the impact of noise to such an acceptable level.

10.4 With respect to item iii., Policy NW10 is only concerned with quality of life and states that "unacceptable" noise impacts should be avoided and addressed. (It is not clear why Policy NW12 was cited as a reason for refusal.) Although the NWCS does not define what an unacceptable noise impact is, guidance is provided on this matter in the NPSE, NPPF and PPG-N described previously (i.e. that effects above the SOAEL should be avoided, whilst taking into account the economic and social benefits being derived from the activity causing the noise, whereas effects above the LOAEL and below the SOAL should be mitigated and minimised). This proof of evidence has robustly demonstrated that noise from the proposed development will not significantly affect the quality of life of residents living even in close proximity to the site. In other words, the noise from the development would not approach the SOAEL but be somewhere in the lower range of being between the LOAEL and SOAEL.

10.5 According to the NPSE, there are four key questions which need to be answered to determine whether the Government's noise policy aims have been met for a Proposed Development:

a) is there a significant adverse impact to health;

b) is there a significant adverse impact to quality of life;

c) is there an adverse impact to health; or

d) is there an adverse impact to quality of life?

10.6 If the answer to question a. or b. is yes, then the NPSE provides a clear guidance that the Proposed Development should be viewed as being unacceptable. If the answer to question c. or d. is yes, then the NPSE provides a clear steer that the impact should be mitigated and minimised. It follows that if the answer to all four questions is "no" then the Proposed Development should normally be viewed as acceptable on noise grounds.

10.7 With respect to the impacts of noise on health, it is the effect on sleep that is likely to be the primary concern. The absolute noise level assessment shows that noise from the Proposed Development will not exceed the WHO threshold for onset of sleep disturbance of 42 dB L_{Aeq}. Noise levels will also be well below the 55 dB L_{Aeq} threshold for significant sleep disturbance and health effects. Consequently, this places noise from the proposed development as being below the LOAEL and the SOAEL in terms of impact on health.

10.8 Although some residents living in close proximity to the Proposed Development could experience higher noise levels during the quietest period of the night compared to what they are used to, it is the daytime and evening periods that are of greatest concern with respect to the impact on quality of life (amenity, enjoyment of property etc.). This is because people will tend to be indoors or asleep during the night, whereas during the day and evening they are more likely to be using outdoor spaces for amenity purposes.

10.9 It has been established that the Proposed Development will result in, at most, a 1 dB increase in ambient noise during the daytime and evening. This change in noise level is unlikely to be noticeable. It is therefore only considered to be a minor impact and it is unlikely that this would seriously affect the quality of life of even those in close proximity to the site.

10.10 In terms of the absolute noise level assessment, noise from the Proposed Development will be significantly less than the 50 dB L_{Aeq} noise level specified in WHO guidance for the onset of moderate annoyance (and 55 dB L_{Aeq} for onset of serious annoyance) during the daytime. Thus, taking both the change in noise level and the absolute noise level assessment into consideration, the Proposed Development will not result in an adverse impact on quality of life.

10.11 The BS 4142 assessment indicates that noise from the Proposed Development could result in an adverse impact at night, depending on context, at some locations, although this also depends on the chosen use for the site. Taking the absolute noise levels into consideration, this is not considered to be a significant impact according to the meaning in NPSE. However, there will be a requirement to ensure that noise impacts are reduced to a minimum through use of appropriate mitigation. In this respect, it is proposed that the developer will install appropriate mitigation measures in order to reduce noise to as low as reasonably practicable by use of industry best practice. Examples of some of the types of mitigation that could be employed have been described in Section 9 of this proof of evidence. It is estimated that further reductions of between

5 and 10 dB could achieved compared to the worst-case noise level predictions presented within this proof of evidence, depending on the site design and plant chosen.

10.12 Taking into account the historical context of the site and surrounding area, it is an important consideration that the development site was a large working colliery until it closed in 2013. Noise levels in the area would have been dominated by the colliery for many decades and it is only since the colliery ceased operating that noise levels have been relatively quiet during the night. Over the decades when the colliery was operational, it would have been viewed by local residents as an inherent aspect of the local background noise environment.

10.13 People living near a new development are likely to be more sensitive to noise when it first becomes operational but, in time, noise from the development can become a defining feature of the background noise environment and gain general acceptability in the area. Noise from the colliery would have been similar in character to the proposed development, but colliery noise is likely to have been at a higher level than will be produced by the proposed development. Consequently, it can be concluded that although the proposed development will result in an increase in noise levels compared to the current situation (i.e. now that the colliery has shut down) the noise levels are likely to be lower in level than has historically been the case for many decades.

10.14 Taking the above factors into consideration, it is concluded that noise from the Proposed Development will not result in a significant adverse impact at any of the nearby noise sensitive receptors. The assessment has determined robustly that noise exposures are likely to be at or below the LOAEL during the daytime and above the LOAEL but below the SOAEL during the night-time.

10.15 According to the PPG-N, noise which is below the LOAEL is defined as *"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."* With mitigation measures in place, it is possible that noise from the site will be audible during the quietest periods of the night. However, noise levels will not be high enough to cause sleep disturbance and there will be no need to close windows. Furthermore, although the character of the area will be slightly changed by the proposals it will not be significant, especially if the historical context of the colliery site is taken into account.

10.16 It is therefore considered that noise from the proposed development will be below the LOAEL and SOAEL during the night-time and night time once mitigation is taken into account.

10.17 Consequently, it is concluded that noise from the proposed development whilst adverse to some degree will not be unacceptable. It follows that, with the mitigation measures discussed within this proof of evidence in place, the development will be in accord with Policy NW10 of the North Warwickshire Core Strategy 2014.

11 Conclusions

11.1 When the context is taken into account, including the absolute level of noise, the character of the noise and the historic context (i.e. the fact that the site was an extensive operational colliery for a number of decades up to 2013), I am content that no significant impact is predicted to occur. Noise due to the proposed development, without any further mitigation measures in place, is likely to be below the LOAEL during the daytime but between the LOAEL and SOAEL at night.

11.2 Once mitigation measures, as set out in Section 9 of my proof of evidence are taken into account, noise from the proposed development is likely to be below the LOAEL even for the properties in close proximity to the site. I am therefore confident that the development proposal can avoid significant impacts and mitigate and reduce any residual adverse impacts to a minimum as required by the NPSE, PPG-N and NPPF.

11.3 Noise from the proposed development, with or without mitigation measures in place, is also likely to be of a similar character but lower in level than when the colliery was in operation.

11.4 Consequently, I have concluded that noise from the proposed development, whilst adverse to some degree, will not be unacceptable. It follows that, with the mitigation measures discussed within this proof of evidence in place, the development will be in accord with Policy NW10 of the North Warwickshire Core Strategy 2014.

11.5 I am content that any scheme built within the parameters and employing best practicable means to control and mitigate noise will comply with conditions N1 and N2. Furthermore, my evidence has demonstrated that no significant impact will occur during the night and there is therefore no need for an “Hours of Operation” restriction on the appeal proposals.

11.6 Taking all of the above reasons into consideration, the propose development will not result in a significant or unacceptable impact due to noise and there is therefore no reason to refuse the application on noise grounds.

Glossary

Term	Definition
Arithmetic average	Geometrical mean of data
A-Weighted	Indicates that the reported level has been adjusted to reflect the standardised human sensitivity to frequency
BS	British Standard
HGV	Heavy Goods Vehicle
Hz	Hertz – a unit of frequency (cycles per second)
km	Kilometer
L_{90}	The sound pressure level which is exceeded 90% of the time. The A-weighted value is reported as L_{A90}
L_{eq}	The sound pressure level of the steady sound which contains the same acoustic energy as the noise being assessed over a specific time period. The A-weighted value is reported as L_{Aeq}
L_{max}	The maximum noise level measured over a sample period. The A-weighted value is reported as L_{Amax}
$L_{max,inside}$	Instantaneous maximum sound pressure level inside a room
L_{night}	Equivalent sound pressure level for the 8 hour period between 2300 and 0700 hours averaged over the course of a year
$L_{night,outside}$	Year-long average night-time noise level, not taking into account the façade effect of a building
LOAEL	Lowest Observed Adverse Effect Level
Logarithmic average	Mean of data using energy averaging
Lower quartile	Measure of the lowest 25% of data set
L_W	Sound power level
m	Meter (unit length)
m/s or ms^{-1}	Meters per second (velocity)
Median	The value separating the higher half of a data set from the lower half
NPPF	National Planning Policy Framework
NPSE	Noise Policy Statement for England
NSR	Noise Sensitive Receptor
ONMP	Operational Noise Management Plan
Pa	Pascal (unit of pressure)
PPG-N	Planning Practice Guidance – Noise
RMG	Rail Mounted Gantry Crane
RTG	Rubber Tyre Gantry Crane
SOAEL	Significant Observed Adverse Effect Level
Standard deviation	A measure of the spread of a data set
Upper Quartile	Measure of the highest 25% of data set
WHO	World Health Organisation

Figures

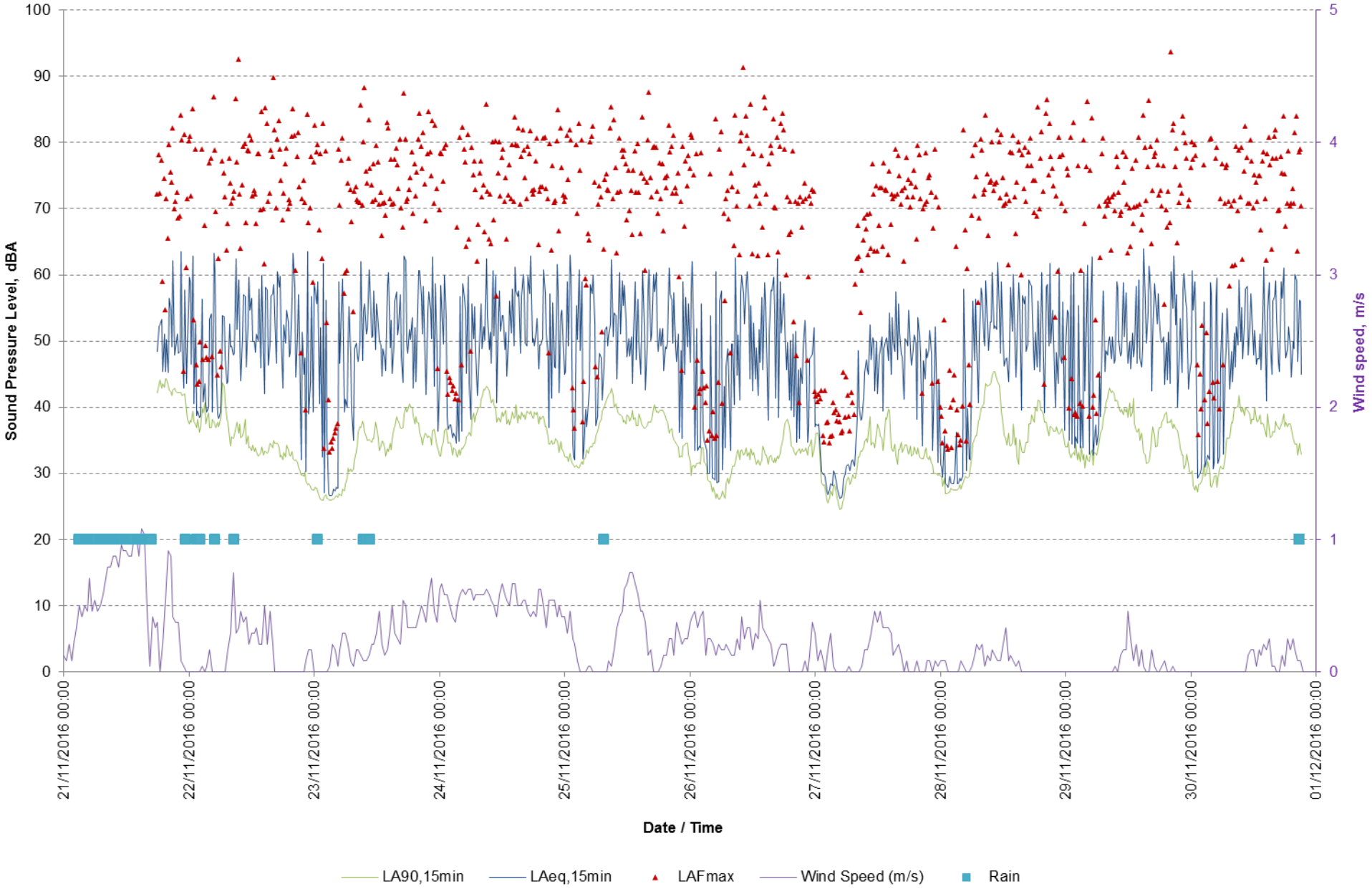


Figure A 1 Sound Pressure Level Time History, Daw Mill Cottage

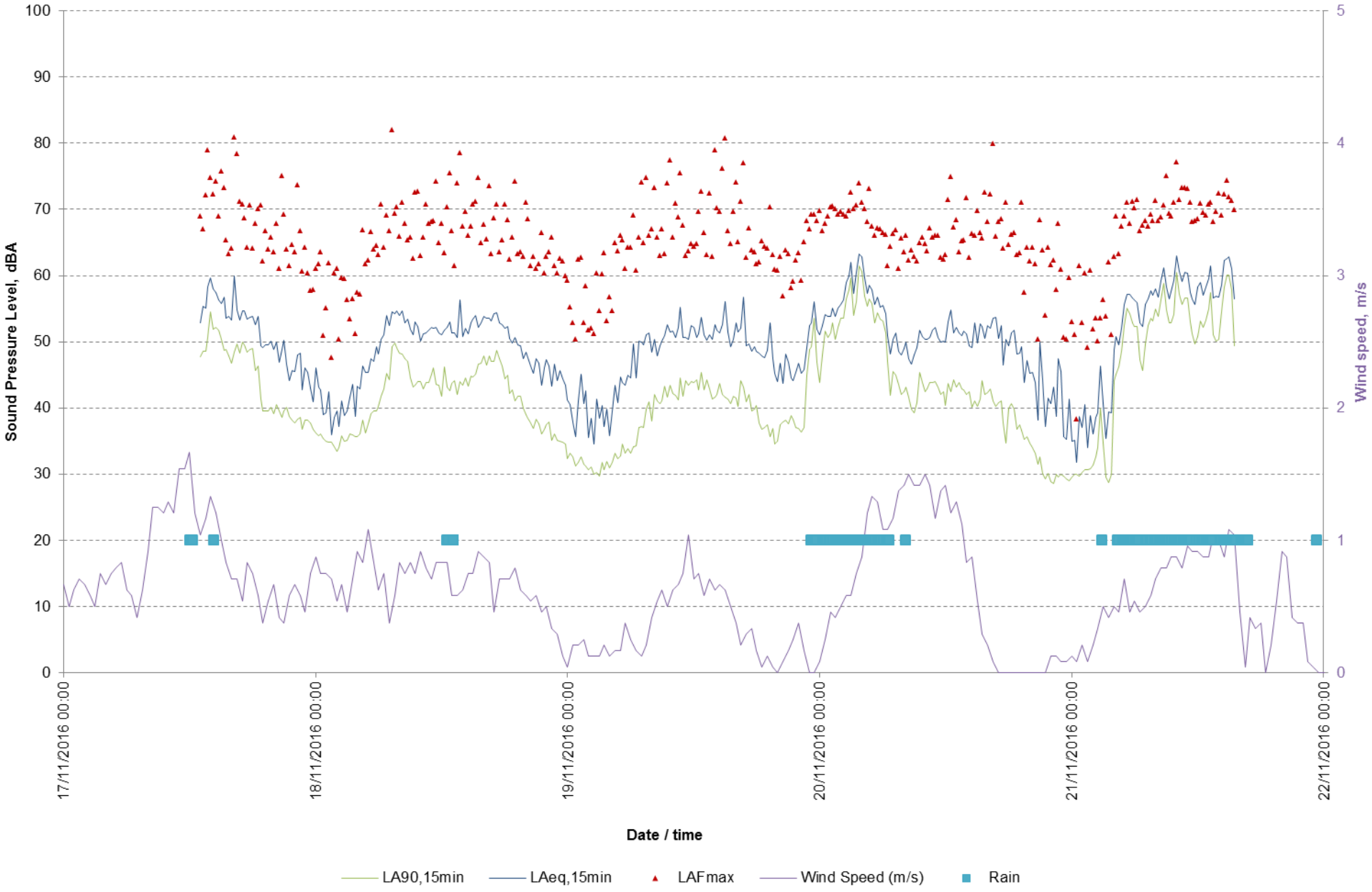


Figure A 2 Sound Pressure Level Time History, Devitts Green Lane

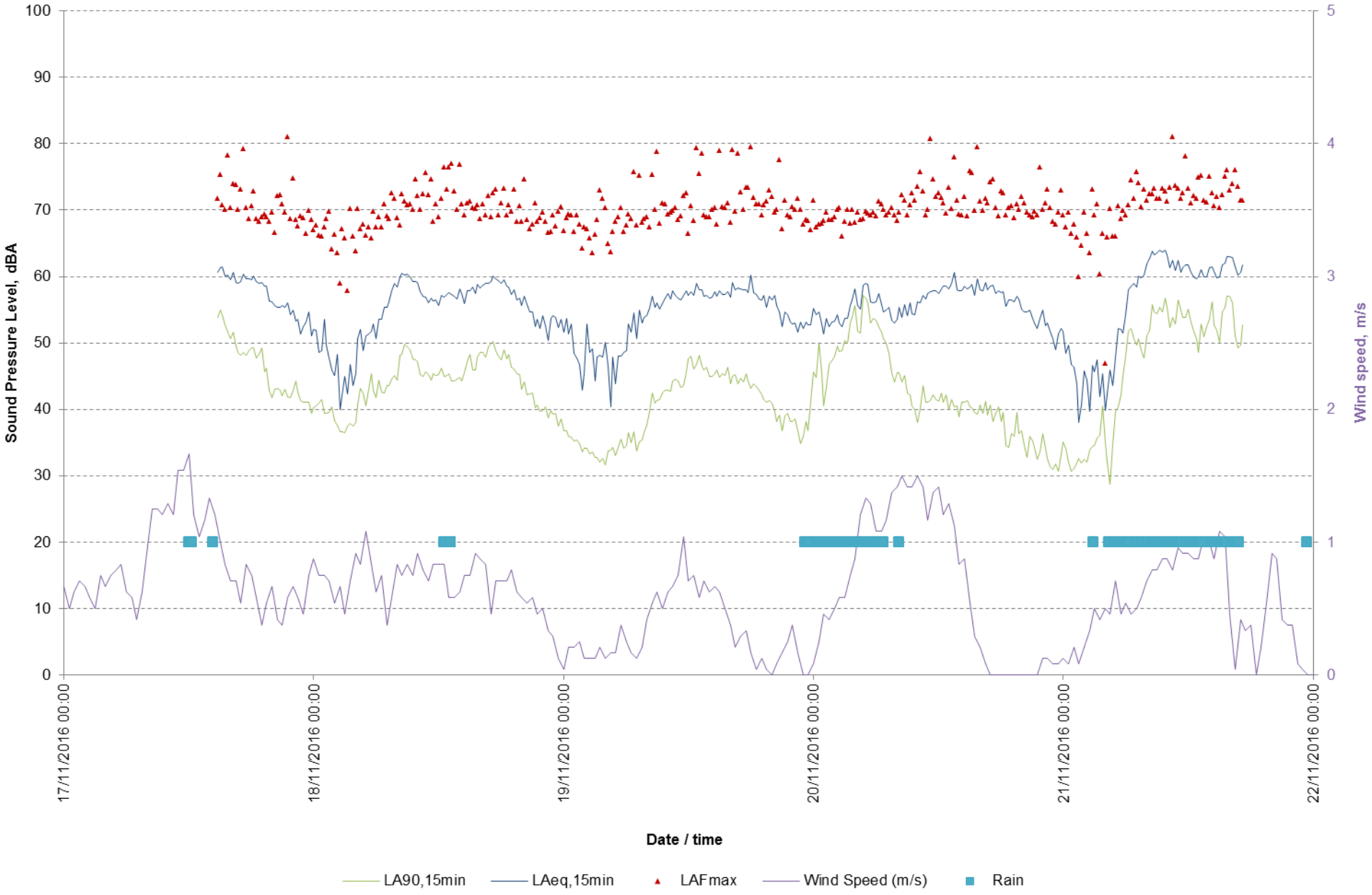


Figure A 3 Sound Pressure Level Time History, Nuneaton Road (West)

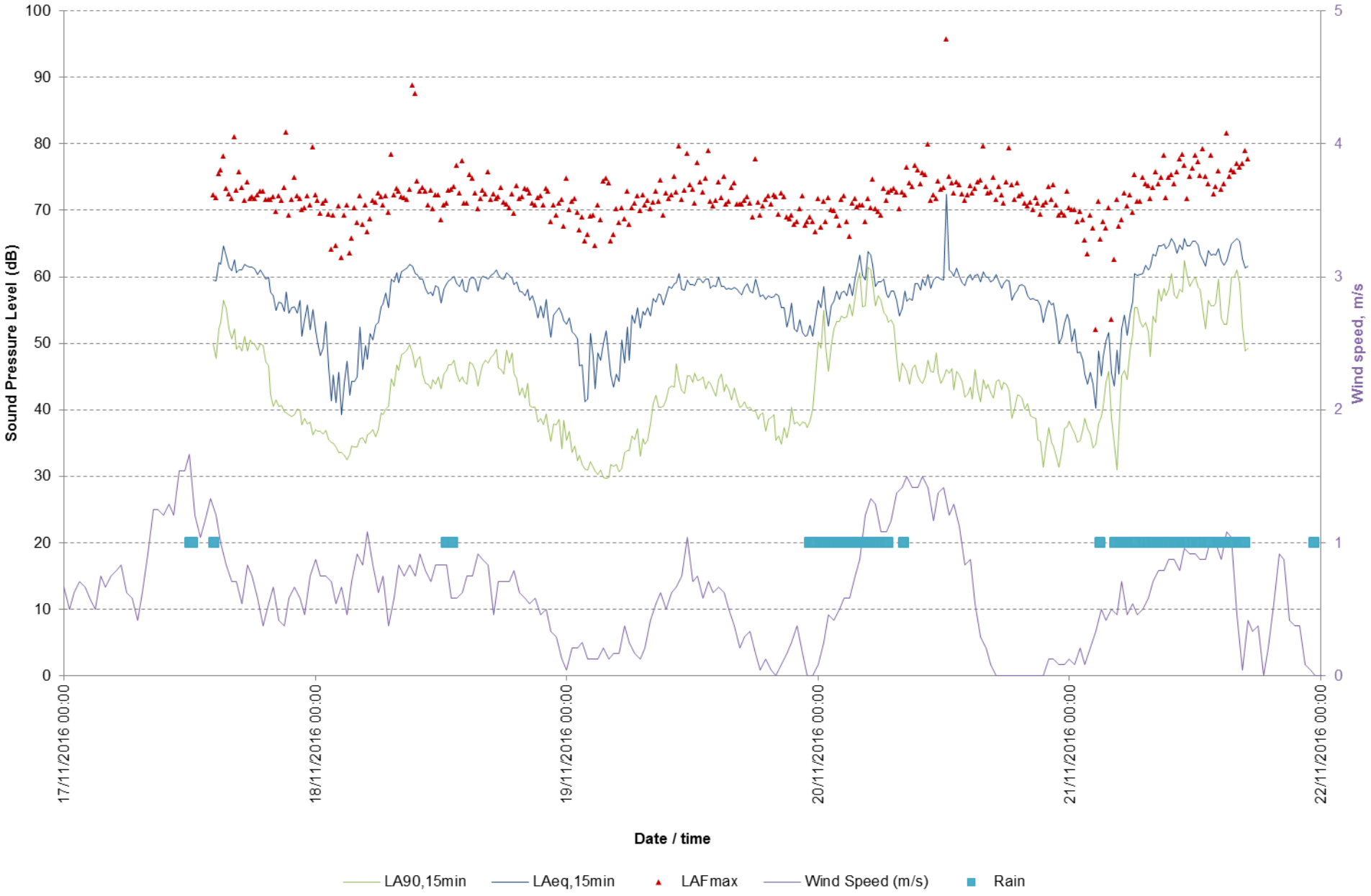
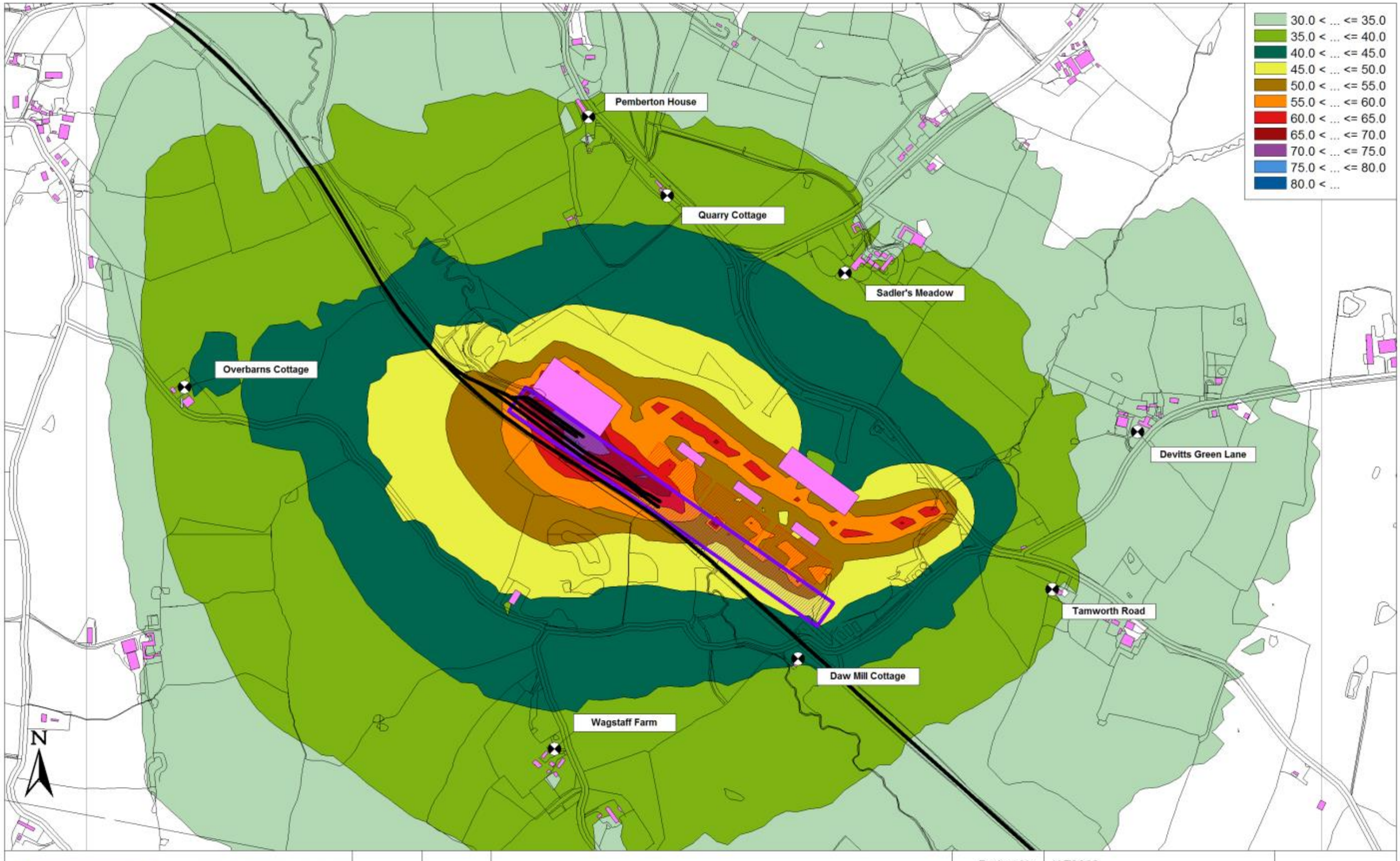


Figure A 4 Sound Pressure Level Time History, Nuneaton Road (East)



Harworth Estates	Author	SJS	**Daw Mill Colliery** **Noise Contours - Rail Construction Depot** **Daytime**	Project No.	JAT8968
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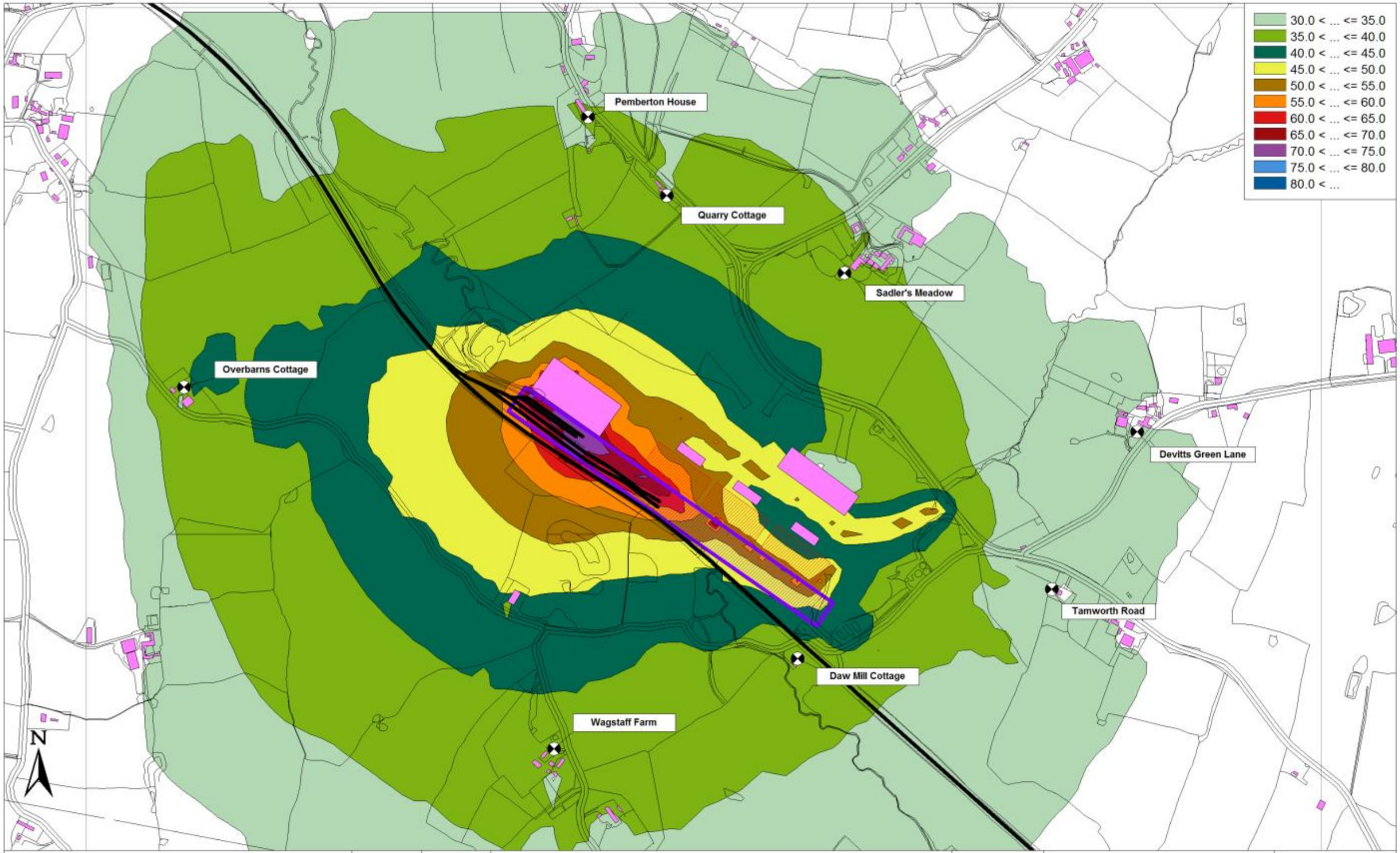
			Sheet 1 of 1	Date	25.01.17

RPS



Harworth Estates

Author	SJS
Scale	1:7500@A3

Daw Mill Colliery
Noise Contours - Rail Construction Depot
Night

Sheet 1 of 1

Project No.	JAT8968
Project Title	Daw Mill Colliery
Drawing No.	Figure A6
Date	25.01.17

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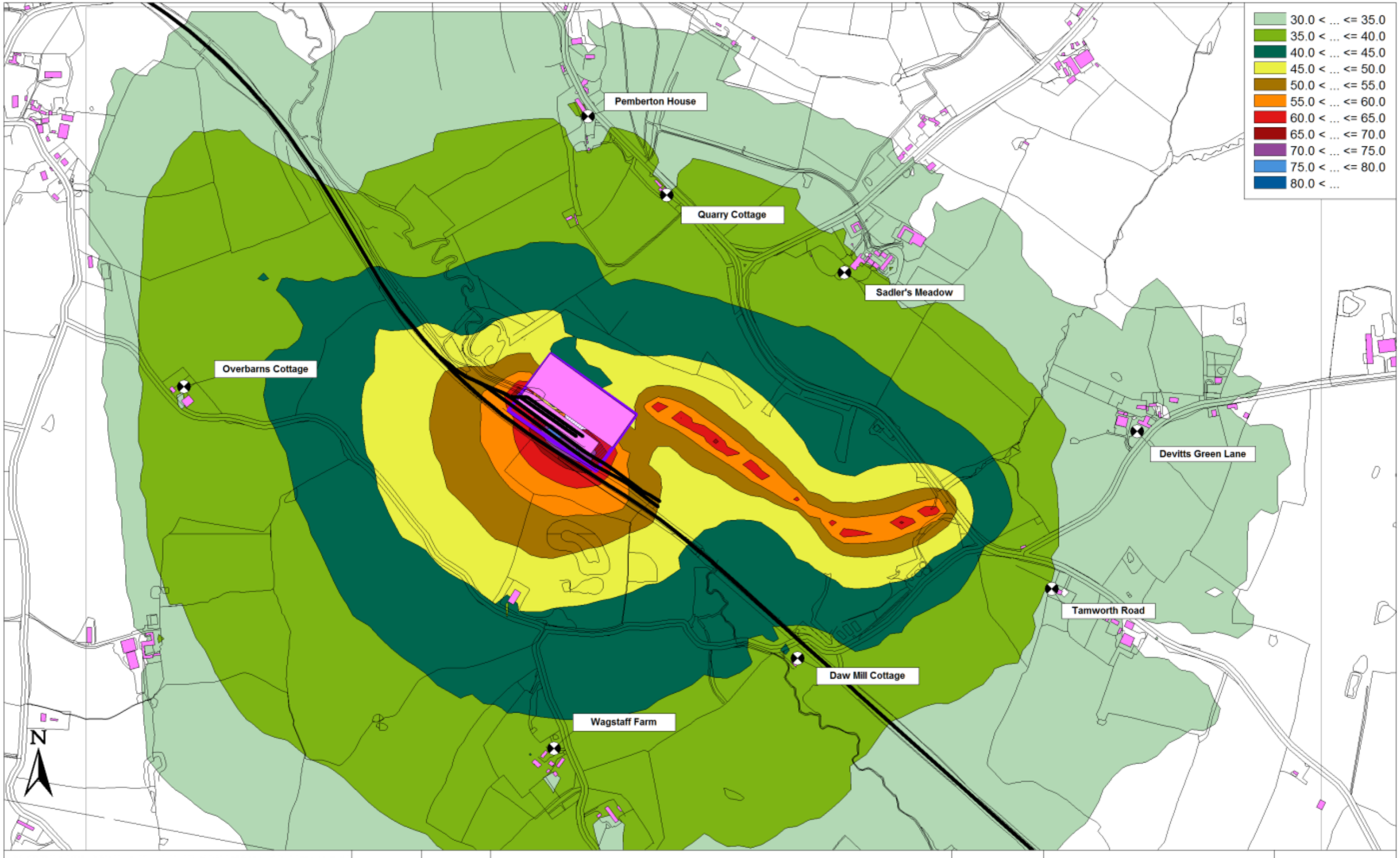

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		Date	25.01.17

Daw Mill Colliery
Noise Contours - Train Maintenance Depot
Daytime

Sheet 1 of 1

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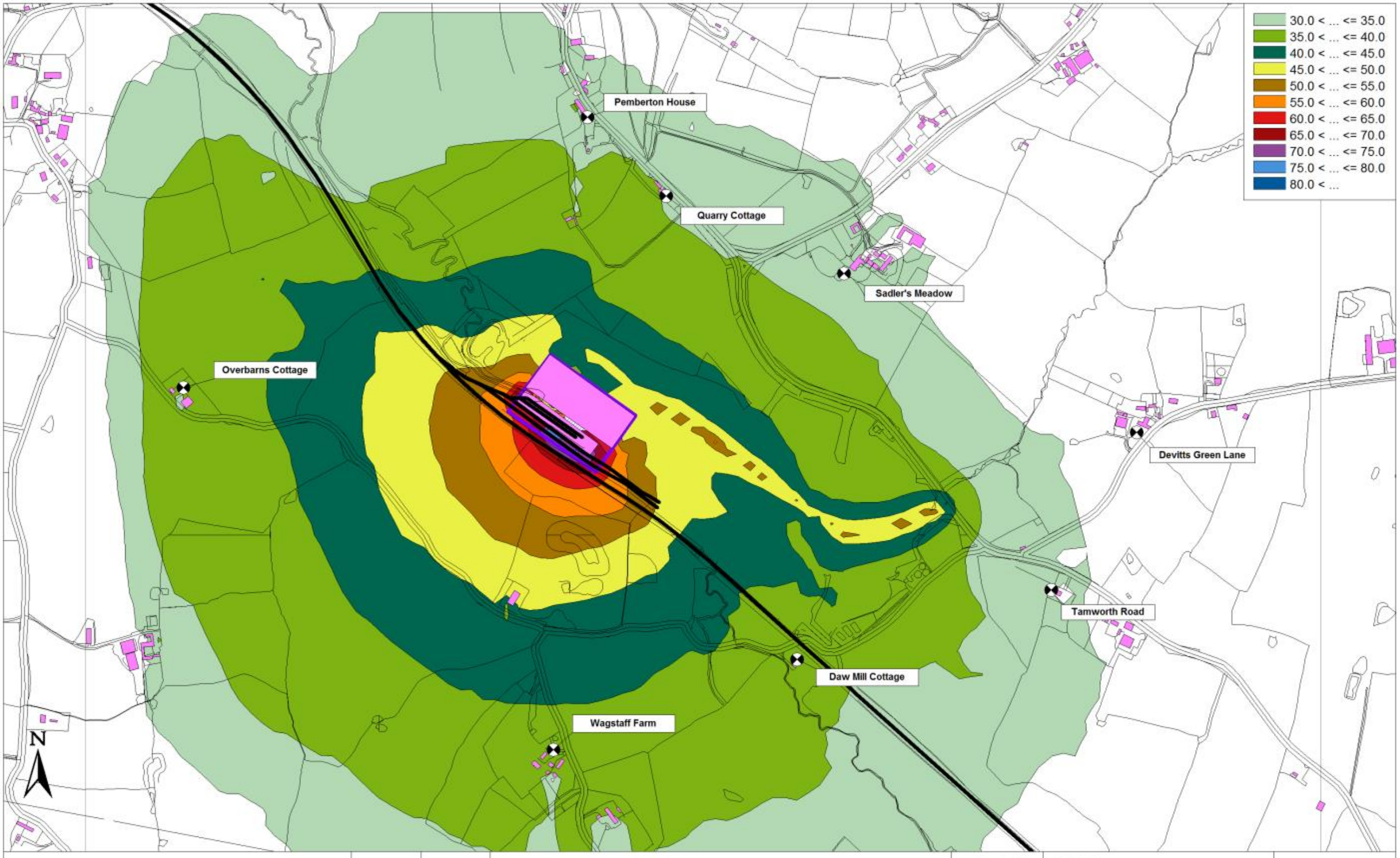

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Author	SJS
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Daw Mill Colliery
Noise Contours - Train Maintenance Depot
Night

Sheet 1 of 1

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Drawing No.	Figure A8
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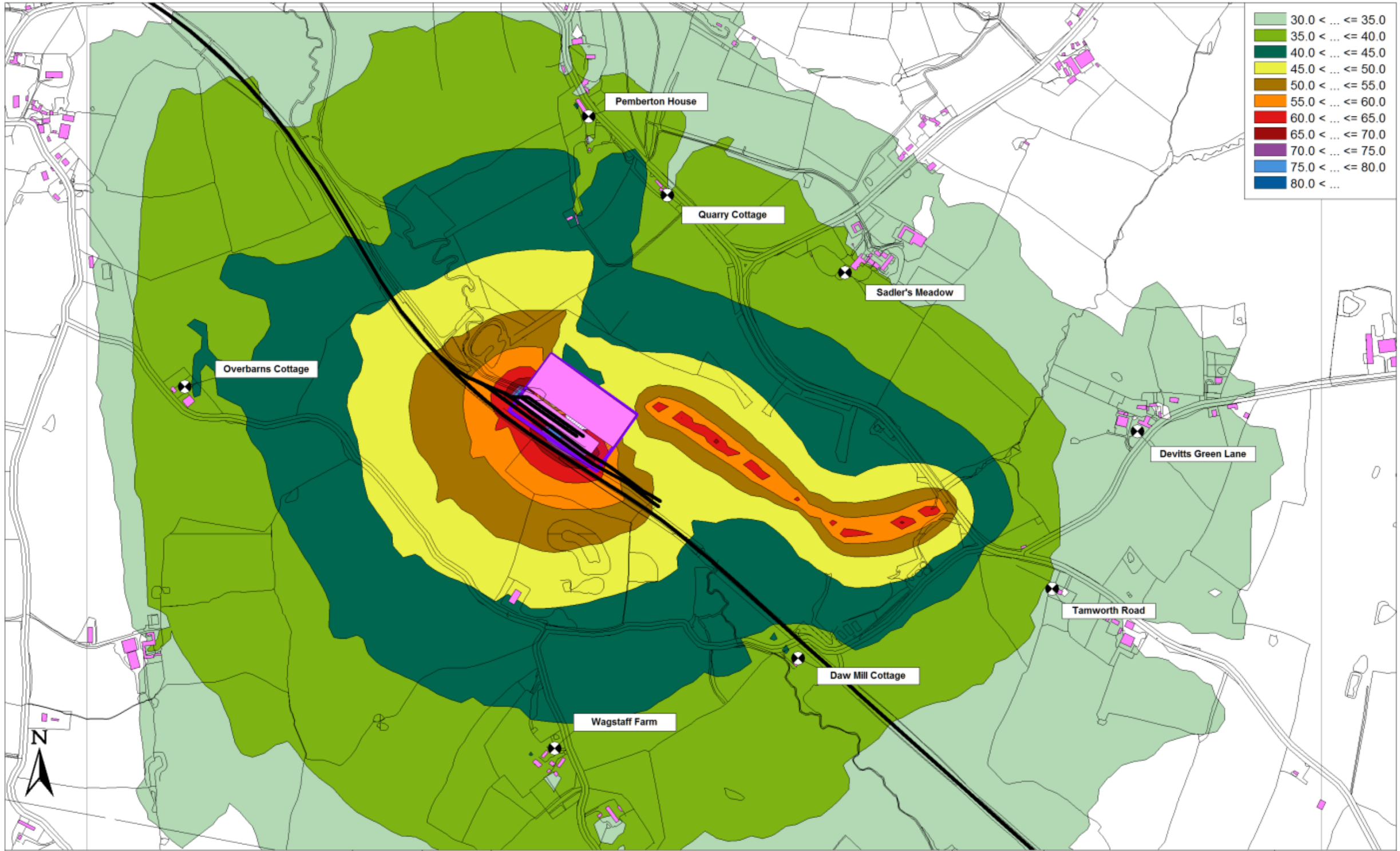

Harworth Estates

Author	SJS
Scale	1:7500@A3

Daw Mill Colliery
Noise Contours - Train Manufacture Depot
Daytime

Sheet 1 of 1

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Project Title	Daw Mill Colliery
Drawing No.	Figure A9
Date	25.01.17

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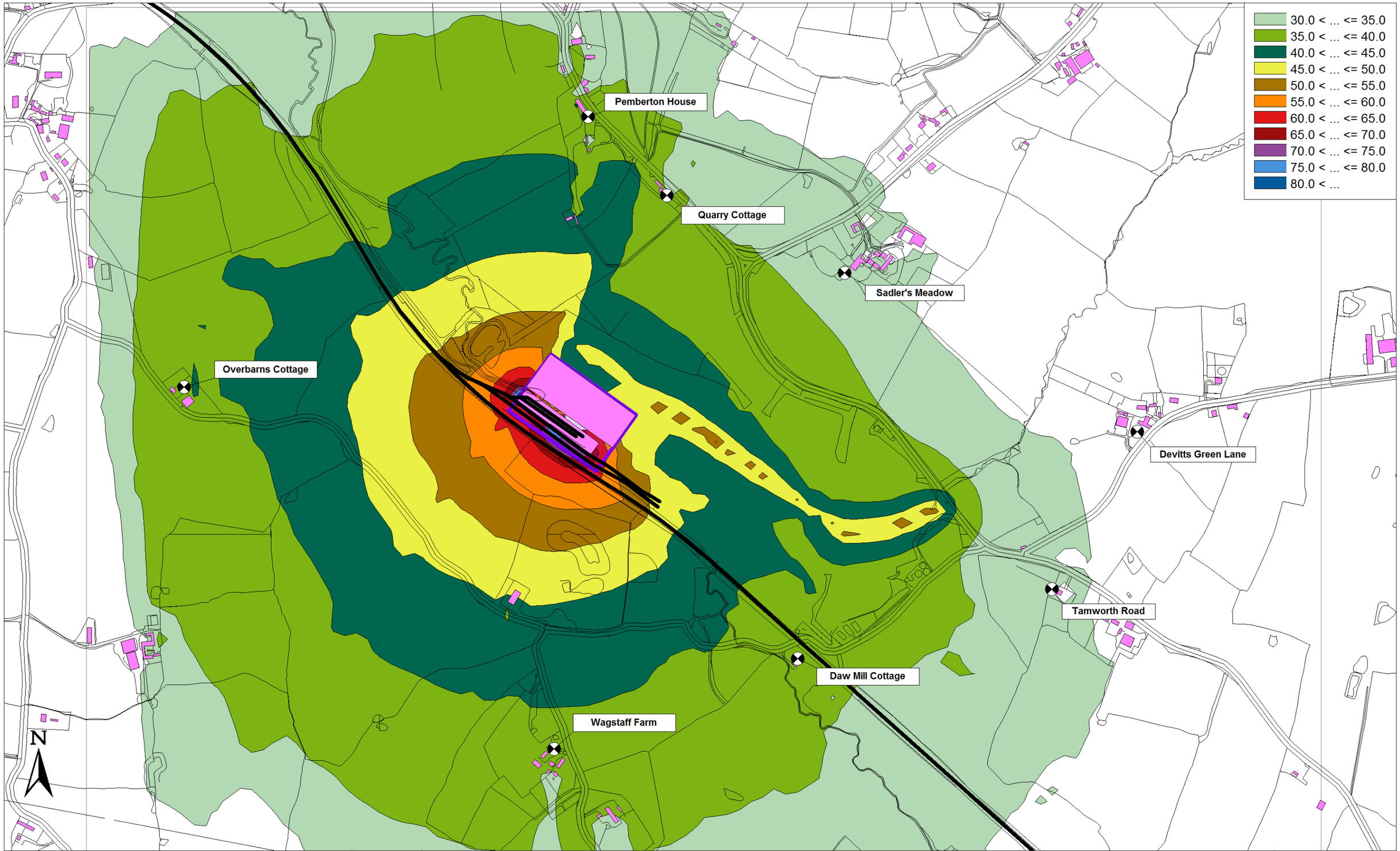

Harworth Estates

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Scale	1:7500@A3

Daw Mill Colliery
Noise Contours - Train Manufacture Depot
Night

Sheet 1 of 1

Project No.	JAT8968
Project Title	Daw Mill Colliery
Drawing No.	Figure A10
Date	25.01.17

RPS

References

1 Parnell, J., 2015. The generation and propagation of noise from large coal mines, and how it is managed in NSW. In Proc. of Acoustics 2015 Conf.

2 Department for Environment, Food and Rural Affairs. Noise Policy Statement for England. Defra. 2010.

3 Department for Communities and Local Government. National Planning Policy Framework: HMSO. March 2012.

4 Department for Communities and Local Government. National Planning Practice Guidance

5 British Standards Institution. British Standard 4142:2014. Methods for rating and assessing industrial and commercial sound.

6 British Standards Institution. British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings.

7 European Centre for Environment and Health. Night Noise Guidelines (NNGL) for Europe. World Health Organisation. 2009.

8 Berglund, B. et al. Guidelines for Community Noise. World Health Organisation. 2000.

9 Skinner C and Grimwood C. (2002). The National Noise Incidence Study 2000/2001 (United Kingdom): Volume 1 – Noise Levels. BRE report 206344f.

10 Institute of Environmental Management and Assessment Guidelines for Environmental Noise Impact Assessment, October 2014.

11 British Standards Institution. British Standard 7445-1:2003. Description and measurement of environmental noise - Part 1: Guide to environmental quantities and procedures.