

## **Noise Impact Assessment for Proposed Modification to Carpark Area C**

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*Prepared for:* Merthyr Motor Auctions  
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## Document Management

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## BRIEF FOR CONSULTANCY:

This report has been prepared by Acoustics & Noise Limited, Newport, South Wales, for Merthyr Motor Auctions under the instructions of Anna Cheyney c/o Herbert R Thomas Ltd (Planning).

**Order No:** n/a

## OBJECTIVES:

To investigate the noise impact from the proposed modifications (Area C) to an existing car park using CAD modelling techniques.

Where applicable recommend mitigation to the satisfaction of the Local Authority.

## NON TECHNICAL SUMMARY:

As a result of the A465 road widening scheme, part of the existing Merthyr Motors Auction (MMA) car park (Zones 1 and 2), to the north of the A465, will be lost. This car park is currently used to store HGV and for the delivery of vehicles to be auctioned. To enable the continuation of auction activities, MMA proposed to develop a small area of vacant ground to the north of the existing car park to replace the lost area. This area is designated as Area C and will be utilised, in addition to the remaining area of car park, for staff and visitor parking and to store HGV's.

The development proposal will generate noise which has the potential to affect noise sensitive receptors at The Hafod, a residential development located 10m east of Area C. This would be as a result of a potential increase in noise levels arising from the use of Area C.

Noise is an inevitable consequence of a mature and vibrant society. Most new developments, regardless of their scale, will generate noise which has the potential to affect people in terms of their health and quality of life. Although standards and guidance about noise are available, they have not been specifically developed to assist with the process of undertaking a noise impact assessment. To assist in the process, the Institute of Environmental Management and Assessment (IEMA) have released guidelines detailing the process of assessing noise impacts. This report present details of an assessment to determine the effect of any change in the acoustic environment arising from the proposed development.

The results of this assessment indicate that the proposed development will result in increased noise levels at the nearest noise sensitive dwellings at The Hafod. This increase is described as a noise impact and mitigation is required to ensure that ambient noise levels do not increase as a result of the proposed development.

This report demonstrates that implementing the recommended noise mitigation measures will result in no change to the cumulative ambient noise levels at the nearest sensitive receptors at The Hafod. Where there is no change to the noise levels as a result of a development, the magnitude of impact is described as negligible and considered not significant.

An acoustic barrier should be located along the north and east perimeter of new Area C. The acoustic barrier should be contiguous throughout its length and extend to a minimum height of

2.1m and should have a minimum superficial mass of 15 kg/m<sup>2</sup>. A typical barrier could comprise timber fencing, earth bund or a combination of both. For an acoustic barrier to achieve the calculated sound reduction performance, there must be no holes or weaknesses in the structure of the barrier. There should also be no gaps between the barrier and the ground in order to prevent sound passing underneath the barrier.

## 1.0 DESCRIPTION OF SITE

- 1.1 The site is located to the north of the existing carpark servicing Merthyr Motor Auctions along Pant Road, Merthyr Tydfil and is currently a vacant parcel of land.
- 1.2 The site is in a mixed residential/commercial area bounded by Merthyr Motor Auctions to the south, residential properties to the east, Pant Road to the west and green space to the north.
- 1.3 The significant noise source at the site is road traffic travelling along the A465 located 50m to the south.
- 1.4 A satellite view of the site is presented in Appendix 2.

## 2.0 RELEVANT GUIDANCE

### 2.1 Relevant Guidance

- 2.1.1 As a matter of best practice, this assessment has been undertaken based on the relevant guidance on noise. This includes:

### 2.2 Planning Policy Wales [1]

- 2.2.1 The foreword to the Planning Policy Wales (PPW) document states that *'PPW will help to ensure that the planning decisions taken in Wales, no matter how big, or how small, are going to improve the lives of both our current and future generations. It will support changing the way we live and work, and the buildings and environment of Wales, today, building a better environment to accommodate current and future needs'*.
- 2.2.2 PPW sets out the land use planning policies of the Welsh Government. The primary objective is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales. A well functioning planning system is fundamental for sustainable development and achieving sustainable places.
- 2.2.3 The planning system should create sustainable places (Placemaking) which are attractive, sociable, accessible, active, secure, welcoming, healthy and friendly. Development proposals should create the conditions to bring people together, making them want to live, work and play in areas with a sense of place and well-being, creating prosperity for all.
- 2.2.4 Placemaking in development decisions happens at all levels and involves considerations at a global scale, including climate change, down to the very local level, such as considering the amenity impact on neighbouring properties and people. Negative environmental impacts should be avoided in the wider public interest.
- 2.2.5 The environmental impact relevant to this assessment, will be from noise. PPW refers to the term 'soundscape' which it describes as *'the acoustic environment as*

*perceived or experienced and/or understood by a person or people, in context (ISO definition)'.*

- 2.2.6 An appropriate soundscape contributes to a positive experience of place as well as being necessary for public health, amenity and well-being. Conversely, noise pollution can have negative effects and should be reduced as far as possible.
- 2.2.7 Certain sounds, such as those created by trees, birds or water features, can contribute to a sense of tranquillity whilst others can be reassuring as a consequence of their association with the normality of everyday activities. Problematic forms of sound are generally experienced as noise pollution and can affect amenity and be prejudicial to health or a nuisance. Noise action plans drawn up by public bodies aim to prevent and reduce noise levels where necessary and preserve soundscape quality where it is good. Both high and low levels of noise, depending on context, can be annoying or disruptive and impact on amenity, health and well-being and as such should be protected through the planning process wherever necessary.
- 2.2.8 A key planning policy principle is to consider the effects which proposed developments may have on soundscape quality and the effects which existing soundscape quality may have on proposed developments. Soundscape influences the choice of location and distribution of development and it will be important to consider the relationship of proposed development to existing development and its surrounding area and its potential to exacerbate or create poor or inappropriate soundscapes.
- 2.2.9 The agent of change principle says that a business or person responsible for introducing a change is responsible for managing that change. In practice, for example, this means a developer would have to ensure that solutions to address noise from nearby pre-existing infrastructure, businesses or venues can be found and implemented as part of ensuring development is acceptable.
- 2.2.10 Proposed development should be designed wherever possible to prevent adverse effects to amenity, health and the environment but as a minimum to limit or constrain any effects that do occur.

## 2.3 Calculation of Road Traffic Noise (CRTN) [2]

2.3.1 This memorandum describes the procedures for calculating noise from road traffic. These procedures are necessary to enable entitlement under the Noise Insulation Regulations to be determined but they also provide guidance appropriate to the calculation of traffic noise for more general applications e.g. environmental appraisal of road schemes, highway design and land use planning.

2.3.2 Road traffic noise levels are expressed in terms of the index,  $L_{A10,t}$  dB. The value of  $L_{A10,t}$  is the noise level exceed for just 10% of the time over the time period  $t$ . For the purposes of CRTN [2], the time period,  $t$ , is 18 hours (06:00 – 00:00 hrs).

2.3.3 The procedures for calculating traffic noise, as described in the memorandum, comprise five main stages:

- *Division of road into a number of segments;*
- *Calculation of the Basic Noise Level (BNL), at a reference distance of 10m from the nearside carriageway edge, for each road segment using traffic flow data (number of vehicles, speed, %HGV);*
- *For each segment, calculate the noise level at the reception point (1m from exposed façade) by considering the distance to the reception point, ground attenuation and any screening from barriers and or buildings.*
- *Correction to the calculated noise level to account for site layout features including reflections from nearby buildings and facades and the source segment size;*
- *Calculate the total noise level at the reception point by combining the contributions from all road segments.*

2.3.4 The aim of this memorandum is to enable prediction in as many situations as possible, covering both free and non-free flowing traffic. Prediction is the preferred calculation technique and in complex situations is best carried out using appropriate computer software.

## 2.4 Converting the UK traffic noise index $L_{A10,18h}$ to EU noise indices for noise mapping [3]

- 2.4.1 The UK national method for calculating road traffic noise is described in the document 'Calculation of Road Traffic Noise' (CRTN) [2]. The noise index derived using these procedures,  $L_{A10}$  is however, different from the more commonly used descriptor for environmental noise,  $L_{Aeq,T}$ .
- 2.4.2 Defra therefore commissioned TRL Limited to develop an interim computational method to convert  $L_{A10,18hr}$  to  $L_{Aeq,t}$  to be used in the UK.
- 2.4.3 For UK conditions, TRL recommends that the best interim approach is to adapt CRTN by applying an 'end correction' to obtain the relevant EU indices from calculated values of  $L_{A10}$ .
- 2.4.4 Three methods are described dependant on the detail of traffic data available:
- *Method 1: Where the user has available hourly traffic data;*
  - *Method 2: Where detailed hourly traffic data is not available, but the user has, or can estimate, traffic data for the relevant day, evening and night time periods;*
  - *Method 3: Where detailed hourly or period traffic data is not available, but the user has, or can estimate, traffic data for the full 18hr time period.*
- 2.4.5 Each method allows CRTN to calculate the  $L_{A10,18hr}$  using the available data and then convert to the relevant period  $L_{Aeq,T}$  using defined relationships.
- 2.5 **World Health Organization Guidelines for Community Noise [4]**
- 2.5.1 Community noise (also called environmental noise, residential noise or domestic noise) is defined as noise emitted from all sources except noise at the industrial workplace. Main sources of community noise include road, rail and air traffic, industries, construction and public work, and the neighbourhood.
- 2.5.2 The objective of the World Health Organization (WHO) is '*the attainment by all peoples of the highest possible level of health*'.
- 2.5.3 WHO defines 'health' as '*A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*'. This broad definition of health makes reference to the concept of well-being and thereby includes noise impacts

such as annoyance, speech interference, and impaired task performance as 'health' issues.

- 2.5.4 The WHO guidelines [4] deal with all aspects of environmental noise impact and provide guideline values for community noise in specific environments. Most of the noise guidelines are given as period  $L_{Aeq}$  values. The relevant values for Dwellings are summarized in Table 1 below.

**Table 1 – WHO Guideline Noise Levels for Dwellings**

| Residential Environment | Critical Health Effect(s)                                      | $L_{Aeq,T}$ (dB) | Time Base, T             |
|-------------------------|----------------------------------------------------------------|------------------|--------------------------|
| Outdoor Living Area     | Serious Annoyance, daytime and evening                         | 55               | 07:00 – 23:00 (16 hours) |
|                         | Moderate Annoyance, daytime and evening                        | 50               | 07:00 – 23:00 (16 hours) |
| Dwelling, indoors       | Speech intelligibility & moderate annoyance, daytime & evening | 35               | 07:00 – 23:00 (16 hours) |
| Inside Bedrooms         | Sleep disturbance, night-time                                  | 30               | 23:00 – 07:00 (8 hours)  |
| Outside Bedrooms        | Sleep disturbance, window open (outdoor values)                | 45               | 23:00 – 07:00 (8 hours)  |

- 2.5.5 These guideline values consider specific environments and identified health effects. Each value is set at the lowest levels that affect health such as annoyance and were derived from annoyance studies.
- 2.5.6 The guidelines, whilst not having any legal force in the UK, are commonly used by local authorities when setting environmental noise criteria for proposed developments.
- 2.6 **Guidelines for Environmental Noise Impact Assessment, I.E.M.A. [5]**
- 2.6.1 These guidelines address the key principles of noise impact assessment and are applicable to all development proposals where noise effects are likely to occur.

- 2.6.2 The principles in the guidelines are relevant to all types of project regardless of size.
- 2.6.3 The guidelines do not seek to be prescriptive but provide sufficient guidance to enable decision makers to understand the processes utilised in the noise impact assessment.
- 2.6.4 In this respect any noise impact assessment will include elements of scoping, baseline studies, noise prediction, assessment, mitigation and reporting.
- 2.6.5 Care must be taken in the terminology used in a noise assessment. The 'Guidelines for Environmental Noise Impact Assessment' uses the following definitions:

**Noise Impact**

*The difference in the acoustic environment before and after the implementation of the proposals (also known as the magnitude of change). This includes any change in noise level and in other characteristics/features and the relationship of the resulting noise level to any standard benchmarks. Note, the change could be an increase or decrease.*

**Noise Effect**

*The consequences of the noise impact. This may be in the form of a change in the annoyance caused, a change in the degree of intrusion or disturbance caused by the acoustic environment, or the potential for the change to alter the character of the area such that there is a perceived change in quality of life. This will be dependent on the receptor and its sensitivity.*

**Significance of Effect**

*The evaluation of the noise effect and, particularly if the noise impact assessment is part of a formal EIA, deciding whether or not that impact is significant. Note, noise impacts may be both increases and decreases, hence the effect may be negative or positive.*

- 2.6.6 The noise impact is described by considering the baseline sound levels, the predicted sound levels and the method of assessment and criteria including any mitigation that has been included in the proposals.

- 2.6.7 A comparison of the pre and post development sound levels is used to quantify the noise effect. The 'Guidelines for Environmental Noise Impact Assessment' [5] describes the effect in terms of the degree of change in sound level due to the development as detailed in Table 2 below.

**Table 2 – Noise Impact Descriptors**

| Effect               | Change in Noise Level                                                                                                                                                         |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Very Substantial     | Greater than 10 dB $L_{Aeq}$ change in sound level at a receptor of great sensitivity to noise                                                                                |
| Substantial          | 5 – 9.9 dB $L_{Aeq}$ change in sound level at a receptor of great sensitivity to noise                                                                                        |
| Moderate             | 3 – 4.9 dB $L_{Aeq}$ change in sound level at a receptor of great sensitivity to noise or greater than 5 dB $L_{Aeq}$ change in sound level at a receptor of some sensitivity |
| Slight               | 3 – 4.9 dB $L_{Aeq}$ change in sound level at a receptor of some sensitivity                                                                                                  |
| None/Not Significant | Less than 2.9 dB $L_{Aeq}$ change in sound level and/or all receptors are of negligible sensitivity to noise or marginal to the zone of influence of the proposal.            |

- 2.6.8 The presentation of changes in sound level to one decimal place in the table is not a reflection of the accuracy of any assessment undertaken but rather serves to provide a clear threshold between adjacent impact descriptions.
- 2.6.9 Once the change in sound level at a receptor has been determined, consideration of other factors should be taken into account that may or may not have an effect on the impact classification determined from the change in sound level alone.
- 2.6.10 Relying solely on the change in noise level is not appropriate because it risks ignoring the context of the noise change. It also gives scope for what is often called 'noise creep'. This is the gradual increase in the noise level in an area as a result of a succession of small increases in noise level which, if taken individually, might not be regarded as having a noticeable effect, but cumulatively lead to a noticeable effect which could be considered to be significant.

- 2.6.11 To address this issue the guidelines [5] recommend that consideration must also be given to the absolute levels being encountered and how they compare with any relevant standards and guidance.
- 2.6.12 The guidelines [5] state that '*A development proposal which would cause an increase in an existing level that is already well above an existing guideline should probably be regarded as worse than if the existing level were below the guideline. If the existing noise environment is already at a level where there might be significant risk of adverse quality of life and health effects, then any increase in noise level, regardless of how small, is an impact which should be taken into account*'.

### 3.0 DISCUSSION

- 3.1 The development proposal will generate noise which has the potential to affect noise sensitive receptors at The Hafod, a residential development located 10m east of Area C. This would be as a result of a potential increase in noise levels arising from the use of Area C.
- 3.2 Noise impact assessments are normally informed by the results of a noise survey carried out at the development site at the time of the assessment.
- 3.3 However, at the time of this assessment, the whole of the UK was subject to extensive 'lockdown', whereby normal social, non-essential commercial activity and travel were severely restricted due to the ongoing COVID-19 Pandemic. It was not possible to carry out any meaningful noise surveys that would be representative of normal conditions.
- 3.4 The significant sources of noise at the development site are associated with existing and proposed vehicle movements at the Merthyr Motor Auctions (MMA) facility and road traffic noise from traffic travelling along the A465.
- 3.5 During the current conditions, normal activity at MMA is significantly restricted. To enable a robust assessment of the MMA activity noise during a 'normal' day, this assessment utilises estimated maximum traffic movements that would occur at the site during a typical auction day.
- 3.6 When assessing road traffic noise levels, the requirements of current planning guidance are based on the results of an extensive noise survey. However, as discussed above, due to the current COVID restrictions and time constraints for the submission of the planning application it was not practicable to carry out a meaningful noise survey.
- 3.7 To enable a more robust assessment of the A465 road traffic noise levels at the site, this assessment has utilised the latest available traffic count data for the A465 which is described in terms of the long term Annual Average Daily Flow (AADF) of traffic.

- 3.8 The use of long term averages provides a more representative description of the road traffic noise levels at the site when compared with a more typical short-term 24-hour snapshot of the sound levels.
- 3.9 Traffic count data provides street level traffic data for every junction-to-junction link on the 'A' road and motorway network in Great Britain.
- 3.10 Traffic count data was obtained from traffic count point 10537 which is located on the A465, approximately 900m to the west of the development site (see Appendix 1).
- 3.11 The data was obtained from [www.dft.gov.uk](http://www.dft.gov.uk) for the years 2000 – 2019 and is presented as 24-hour Annual Average Daily Traffic Flows (AADF).
- 3.12 AADF figures give the number of vehicles that will drive on that stretch of the road on an average day of the year and are presented as vehicles per day broken down by vehicle type.
- 3.13 For the purposes of a noise assessment, the data is factored into 18-hour flow data for the prediction of road traffic noise as per CRTN [2].

## 4.0 ASSESSMENT PROCEDURES

- 4.1 Noise is an inevitable consequence of a mature and vibrant society. Most new developments, regardless of their scale, will generate noise which has the potential to affect people in terms of their health and quality of life.
- 4.2 Although standards and guidance about noise are available, they have not been specifically developed to assist with the process of undertaking a noise impact assessment. To assist in the process, the Institute of Environmental Management and Assessment (IEMA) have released guidelines detailing the process of assessing noise impacts.
- 4.3 The aim of this assessment is to determine the effect of any change in the acoustic environment arising from the proposed development.
- 4.4 **Development Proposal**
- 4.4.1 As a result of the A465 road widening scheme, part of the existing Merthyr Motors Auction (MMA) car park (Zones 1 and 2), to the north of the A465, will be lost. this car park is currently used for staff and visitor parking, and to store HGV's and for the delivery of vehicles to be auctioned
- 4.4.2 To enable the continuation of auction activities, MMA proposed to develop a small area of vacant ground to the north of the existing car park to replace the lost area. This area is designated as Area C and will be utilised, in addition to the remaining area of car park, for staff and visitor parking.
- 4.4.3 The current and proposed vehicle movements at the site were provided by Herbert R Thomas Ltd. (Planning) [6] following detailed discussions with MMA regarding estimated vehicle movements on site. Note that the MMA report indicates that no two days are the same and the vehicle movements are estimated MAXIMUM numbers. The relevant data are presented in Appendix 4.
- 4.5 **Noise Sensitive Receptors**
- 4.5.1 The development proposal will generate noise which has the potential to affect noise sensitive receptors at The Hafod, a residential development located 10m east

of Area C. This would be as a result of a potential increase in noise levels arising from the use of Area C.

#### 4.6 Significant Noise Sources

4.6.1 The current and proposed parking arrangements will be used by a mix of light vehicles and HGV's with Area C used to accommodate staff and customer parking.

4.6.2 Road traffic travelling along the A465, 55m to the south of The Hafod.

#### 4.7 Prediction of Noise Levels Across Proposed Development Site

4.7.1 As the site is relatively large with multiple noise sources, a 3D acoustic CAD model of the proposed development was constructed to aid in the identification of potential areas that may not meet the stated criteria. This process minimises unnecessary schemes of mitigation.

4.7.2 EMS B&K Predictor V2019 Software was utilised to model both the A465 road traffic noise levels across the whole of site plus the existing and proposed vehicle movements associated with the car park development to the north of the site. This noise prediction software allows for the investigation of noise emissions in complex or large outdoor environments. The software can be used to analyse road traffic movements to the latest European and U.K. Standards.

4.7.3 A major advantage of using this method is the ability to remodel changes and alterations to the site and/or sources.

##### 4.7.4 CAD Model Construction

4.7.4.1 Topographical information for the site was obtained from the online site '*Lle Geoportal for Wales*' in the form of Digital Terrain Model data (2m resolution). The '*Lle Geo-Portal*' has been developed as a partnership between Welsh Government and Natural Resources Wales. Lle serves as a hub for data and information covering a wide spectrum of topics, but primarily around the environment.

4.7.4.2 The topographical data was imported into the CAD software and used to construct the 3D terrain for the site.

- 4.7.4.3 'OS Open Zoomstack' was used as a background image for the model. 'OS Open Zoomstack' provides a single, customisable basemap of Great Britain made freely available in partnership with the UK government. The data was obtained from 'www.ordnancesurvey.co.uk' under the Open Government Licence (OGL) and contains OS data © Crown copyright and database right 2019.
- 4.7.4.4 A proposed draft site layout drawing, '581/01', was provided by Herbert R Thomas Ltd (Planning) to be used as a background for the model to locate the current and proposed carpark development.
- 4.7.4.5 To determine the baseline noise emissions at the nearest sensitive receptors, the model was updated to include the significant noise sources. These sources are identified as the road traffic travelling along the A465 and the vehicle movements within the existing car park, identified as Zone 1 and Zone 2 (see Appendix 4).

#### **A465 Road Traffic**

- 4.7.4.6 A 'road item' was positioned centrally along A465 using the basemap as a guide.
- 4.7.4.7 The modelling software defines a 'road item' as '*a line source used for modelling the sound level emissions of vehicles on a road*'. Calculations follow the methodology detailed in CRTN [2] and TRL Method 3 [3].
- 4.7.4.8 Using the latest available data from the traffic count point 10537, the total traffic flow over 18 hours,  $Q_{18}$ , the average vehicle speed,  $V$ , and the percentage of heavy vehicles,  $p_{HV}$  are entered into the model to define the 'road item'.
- 4.7.4.9 In this case,  $Q_{18} = 16038$ ,  $p_{HV} = 6\%$  and the average vehicle speed is estimated to be 88 km/hr as described in paragraph 14.2 in CRTN [2].
- 4.7.4.10 This data represents the average, two way, daily 18-hour vehicle flow on the A465 for the latest year for which data is available, which in this case was 2019 (see Appendix 1).

#### **Zone 1 and Zone 2 Vehicle Movements (Current)**

- 4.7.4.11 The vehicle movements within the existing car park were modelled as moving point sources located throughout each of the defined areas, Zone 1 and Zone 2.

### **Zone 1 and Area C Vehicle Movements (Proposed)**

- 4.7.4.12 The area known as Zone 2 will be lost to the A465 widening scheme. This lost area is proposed to be replaced with Area C. Note the replacement land is not just considered on a square metre replacement basis, but also to provide additional operational utility as a result of knock on effects across the site as a whole from the A465 widening scheme.
- 4.7.4.13 The vehicle movements within the proposed car park area were modelled as moving point sources located throughout the combined area, Zone 1 plus Area C.
- 4.7.4.14 Calculation for the noise propagation from the car park areas follow the procedures detailed in ISO 9613 [7].
- 4.7.4.15 For the purposes of this assessment, the estimated maximum number of vehicle movements occurring on an auction day were used to model the worst-case noise emissions associated with the use of the existing and proposed car park on a busy day.
- 4.7.5 **CAD Model Prediction**
- 4.7.5.1 The nearest sensitive receptor is located at The Hafod. Receivers were placed in the model at the south and north façade of the most exposed property to calculate the free field noise levels at a height of 1.5m.
- 4.7.5.2 A noise contour grid covering the assessment area is then constructed to display the external free field noise levels within the extended area. Each grid is a collection of receivers set 1m apart at a height of 1.5m.
- 4.7.5.3 Using EMS B&K Predictor V2019 software, calculations were made for each receiver using the defined 'road item' and car park vehicle movements as the noise sources.
- 4.7.5.4 The baseline noise levels at each receptor, are calculated as the cumulative noise level attributable to the A465 road traffic and the current maximum activities within Zones 1 and 2 on a busy auction day (08:00 – 22:00).
- 4.7.5.5 The post development noise levels at each receptor, are calculated as the cumulative noise level attributed to the A465 road traffic and the proposed maximum activities within Zone 1 and Area C on a busy auction day (08:00 – 22:00).

- 4.7.5.6 Calculations are made for the time period of site operation during a typical auction day and represent the baseline, or current, cumulative noise levels experienced at the Hafod.
- 4.7.5.7 The results of the assessment are presented in the form of easily understood noise contour maps and are shown in Appendix 5.
- 4.7.5.8 These contour maps indicate the cumulative free field noise levels across the whole of the assessment area with each contour colour boundary assigned a noise level so that the baseline and resultant noise levels from the proposed development can be compared.

#### 4.7.6 Noise Contour Maps

- 4.7.6.1 Colour coded noise contour maps are generated by the acoustic model to aid identification of the following:
- *External free-field baseline noise levels across the assessment area at a height of 1.5m. The contours represent the cumulative noise levels associated with the A465 road traffic plus the use of the current car park areas during a busy auction day.*
  - *External free-field noise levels across the assessment area at a height of 1.5m following the development of Area C. The contours represent the cumulative noise levels associated with the A465 road traffic plus the use of the proposed redeveloped car park area (including Area C) during a busy auction day.*
  - *Further contour maps are generated to demonstrate the effectiveness of any necessary scheme of mitigation identified from the initial maps described above.*

#### 4.8 Assessment of Impact from Proposed Development

- 4.8.1 Planning Policy Wales [1] states “The planning system should maximise its contribution to achieving the well-being goals, and in particular a healthier Wales, by aiming to reduce average population exposure to air and noise pollution”.

4.8.2 Proposed development should be designed, wherever possible, to prevent adverse effects to amenity, health and the environment. As a minimum, measures should be implemented to limit or constrain any effects that may occur.

#### 4.8.3 **Change in Noise Levels as a Result of the Proposed Development**

4.8.3.1 The results of the modelling are presented in Appendix 5. The operational noise levels from the proposed development layout (Area C) are calculated at the southern and northern façade of the nearest noise sensitive property, at The Hafod, and compared with the operational noise levels from current activities within the existing car park. The results are summarised in Table 3 below.

**Table 3 – Calculated Change in Operational Noise Levels Arising from the Proposed Development**

| Receptor    | Current Operation<br>L <sub>Aeq,t</sub><br>(dB) | Proposed Operation<br>L <sub>Aeq,t</sub><br>(dB) | Change in Noise Levels<br>(dB) |
|-------------|-------------------------------------------------|--------------------------------------------------|--------------------------------|
| Hafod South | 46.8                                            | 49.4                                             | 2.6                            |
| Hafod North | 38.5                                            | 47.5                                             | 9.0                            |

4.8.3.2 The effect in terms of the degree of change in sound level due to the development proposal is described as substantial for the receptor at the north of The Hafod and not significant for the receptor at the south of The Hafod (see Table 2).

4.8.3.3 However, relying solely on the change in noise level is not appropriate because it risks ignoring the context of the noise change. The context, in this case, is that the area is also exposed to significant levels of road traffic noise from the A465. Therefore, the change in noise level should be considered in relation to the existing ambient noise levels at the receptors.

4.8.3.4 The pre and post development cumulative ambient noise levels at the receptors were calculated using the model with the results summarised in Table 4 below.

**Table 4 – Calculated Change in Cumulative Noise Levels Arising from the Proposed Development**

| Receptor    | Cumulative Ambient Noise Levels Pre-Development<br>$L_{Aeq,t}$ (dB) | Cumulative Ambient Noise Levels Post-Development<br>$L_{Aeq,t}$ (dB) | Change in Cumulative Noise Levels (dB) |
|-------------|---------------------------------------------------------------------|----------------------------------------------------------------------|----------------------------------------|
| Hafod South | 56.0                                                                | 56.4                                                                 | 0.4                                    |
| Hafod North | 53.3                                                                | 54.2                                                                 | 0.9                                    |

- 4.8.3.5 The effect in terms of the degree of change in cumulative ambient noise levels due to the development proposal would normally be described as not significant for both receptors at The Hafod.
- 4.8.3.6 However, the IEMA guidelines [5] state that where existing noise levels are *'...already at a level where there might be significant risk of adverse quality of life and health effects, then any increase in noise level, regardless of how small, is an impact which should be taken into account'*.
- 4.8.3.7 The World Health Organisation recommends that external ambient noise levels at dwellings should not exceed 50 dB  $L_{Aeq,t}$  during the daytime and evening to prevent moderate annoyance with the onset of serious annoyance occurring at noise levels of 55 dB  $L_{Aeq,t}$  and above. These guideline values consider specific environments and identified health effects. Each value is set at the lowest levels that affect health, such as annoyance, and were derived from annoyance studies.
- 4.8.3.8 The results, detailed in Table 4 above clearly, indicate that the existing ambient noise levels are already above the threshold for moderate annoyance for the receptor on the north elevation of The Hafod and above the threshold for serious annoyance for the receptor on the south elevation. Therefore, following the IEMA guidance, *'...any increase in noise level, regardless of how small, is an impact'*.
- 4.8.3.9 In light of the above, the proposed development results in an impact at the dwellings at the Hafod and a scheme of mitigation is required to ensure that the ambient noise levels do not increase as a result of the proposed development.

#### 4.8.4 Mitigation

4.8.4.1 The model was updated to assess the extent and effectiveness of an acoustic barrier located along the north and east site perimeter.

4.8.4.2 The resultant ambient noise levels following mitigation are summarised in Table 5 below.

**Table 5 – Calculated Change in Cumulative Noise Levels Arising from the Proposed Development Following Mitigation**

| Receptor    | Cumulative Ambient Noise Levels Post-Development<br>$L_{Aeq,t}$ (dB) | Cumulative Ambient Noise Levels Post-Development (Following Mitigation)<br>$L_{Aeq,t}$ (dB) | Change in Cumulative Noise Levels Following Mitigation (dB) |
|-------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Hafod South | 56.0                                                                 | 55.8                                                                                        | -0.2                                                        |
| Hafod North | 53.3                                                                 | 53.3                                                                                        | 0.0                                                         |

4.8.4.3 The results detailed in Table 5 demonstrate that the recommended mitigation is effective in ensuring that the proposed development of Area C will not result in any increase in the existing ambient noise levels at the nearest noise sensitive receptors.

4.8.4.4 Where there is no change to the noise levels as a result of a development, the magnitude of impact is described as negligible and considered not significant.

4.8.4.5 Mitigation is recommended in the form of an acoustic barrier located along the north and east perimeter of Area C. The barrier should be contiguous throughout its length and extend to a minimum height of 2.1m. It should have a minimum superficial mass of 15 kg/m<sup>2</sup>. A typical barrier could comprise timber fencing, earth bund or a combination of both.

4.8.4.6 For an acoustic barrier to achieve the calculated sound reduction performance, there must be no holes or weaknesses in the structure of the barrier. There should also be no gaps between the barrier and the ground in order to prevent sound passing underneath the barrier.

## 5.0 CONCLUSIONS

- 5.1 The proposed redevelopment of the existing carpark by extending onto land to the north will result in increased noise levels at the nearest noise sensitive dwellings at The Hafod, 10m to the east of the proposed new Area C.
- 5.2 This increase is described as a noise impact and mitigation is required to ensure that ambient noise levels do not increase as a result of the proposed development.
- 5.3 The results of the modelling demonstrate that implementing the recommended noise mitigation measures results in no change to the cumulative ambient noise levels at the nearest sensitive receptors at The Hafod.
- 5.4 Where there is no change to the noise levels as a result of a development, the magnitude of impact is described as negligible and considered not significant.

## 6.0 RECOMMENDATIONS

- 6.1 An acoustic barrier should be located along the north and east perimeter of new Area C. The acoustic barrier should be contiguous throughout its length and extend to a minimum height of 2.1m and should have a minimum superficial mass of 15 kg/m<sup>2</sup>. A typical barrier could comprise timber fencing, earth bund or a combination of both.
- 6.2 For an acoustic barrier to achieve the calculated sound reduction performance, there must be no holes or weaknesses in the structure of the barrier. There should also be no gaps between the barrier and the ground in order to prevent sound passing underneath the barrier.

**P.A.T. 24/06/2021**

**M.Sc., I.Eng., M.I.O.A.,**

**M.Inst.SCE., M.A.E.S.**

## Appendix 1 Road Traffic Count Point Details

## A1.0 ROAD TRAFFIC COUNT POINT DETAILS

**Figure 1 – Location of Traffic Count Point 10537 (A465)**



Table 6 – Traffic Count Data for A465

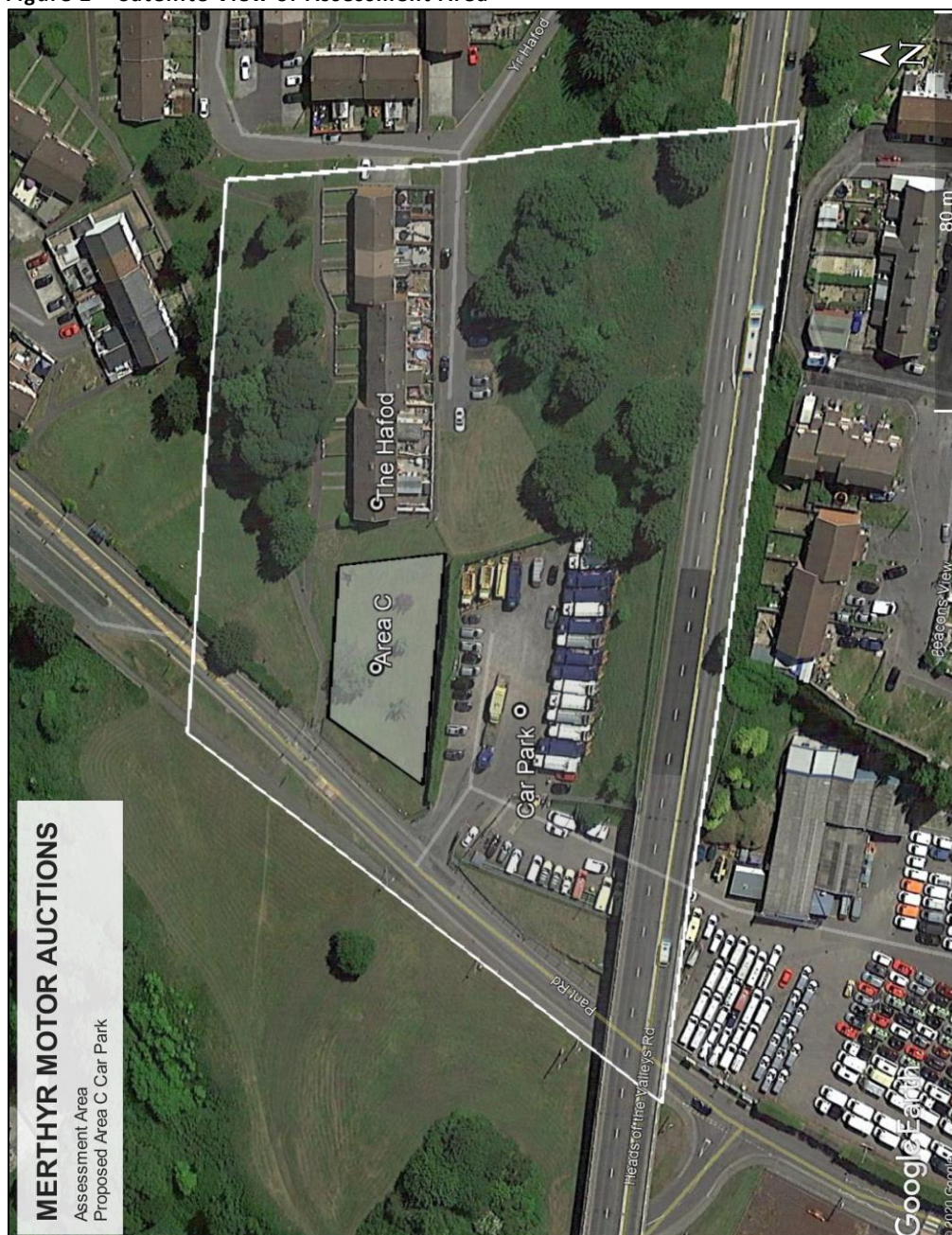
| Count Point | AADF Year | Road | All HGVs | All Motor Vehicles | 18 hr Flows* | %HGV |
|-------------|-----------|------|----------|--------------------|--------------|------|
| 10537       | 2019      | A465 | 956      | 17007              | 16038        | 6    |
| 10537       | 2018      | A465 | 957      | 16916              | 15952        | 6    |
| 10537       | 2017      | A465 | 942      | 16805              | 15847        | 6    |
| 10537       | 2016      | A465 | 1153     | 18538              | 17481        | 6    |
| 10537       | 2015      | A465 | 1104     | 17837              | 16820        | 6    |
| 10537       | 2014      | A465 | 1041     | 17072              | 16099        | 6    |
| 10537       | 2013      | A465 | 1033     | 16703              | 15751        | 6    |
| 10537       | 2012      | A465 | 997      | 16642              | 15693        | 6    |
| 10537       | 2011      | A465 | 980      | 16608              | 15661        | 6    |
| 10537       | 2010      | A465 | 1224     | 17037              | 16066        | 7    |
| 10537       | 2009      | A465 | 1213     | 17282              | 16297        | 7    |
| 10537       | 2008      | A465 | 1294     | 17455              | 16460        | 7    |
| 10537       | 2007      | A465 | 1293     | 17543              | 16543        | 7    |
| 10537       | 2006      | A465 | 1048     | 16703              | 15751        | 6    |
| 10537       | 2005      | A465 | 1040     | 16246              | 15320        | 6    |
| 10537       | 2004      | A465 | 906      | 13778              | 12993        | 7    |
| 10537       | 2003      | A465 | 862      | 13718              | 12936        | 6    |
| 10537       | 2002      | A465 | 1258     | 13153              | 12403        | 10   |
| 10537       | 2001      | A465 | 1226     | 12858              | 12125        | 10   |
| 10537       | 2000      | A465 | 1457     | 12013              | 11328        | 12   |

\* A COBA factor (0.943) is used convert the flows from 24 hour to 18 hour

## Appendix 2 View of Assessment Area

## A2.0 VIEW OF ASSESSMENT AREA

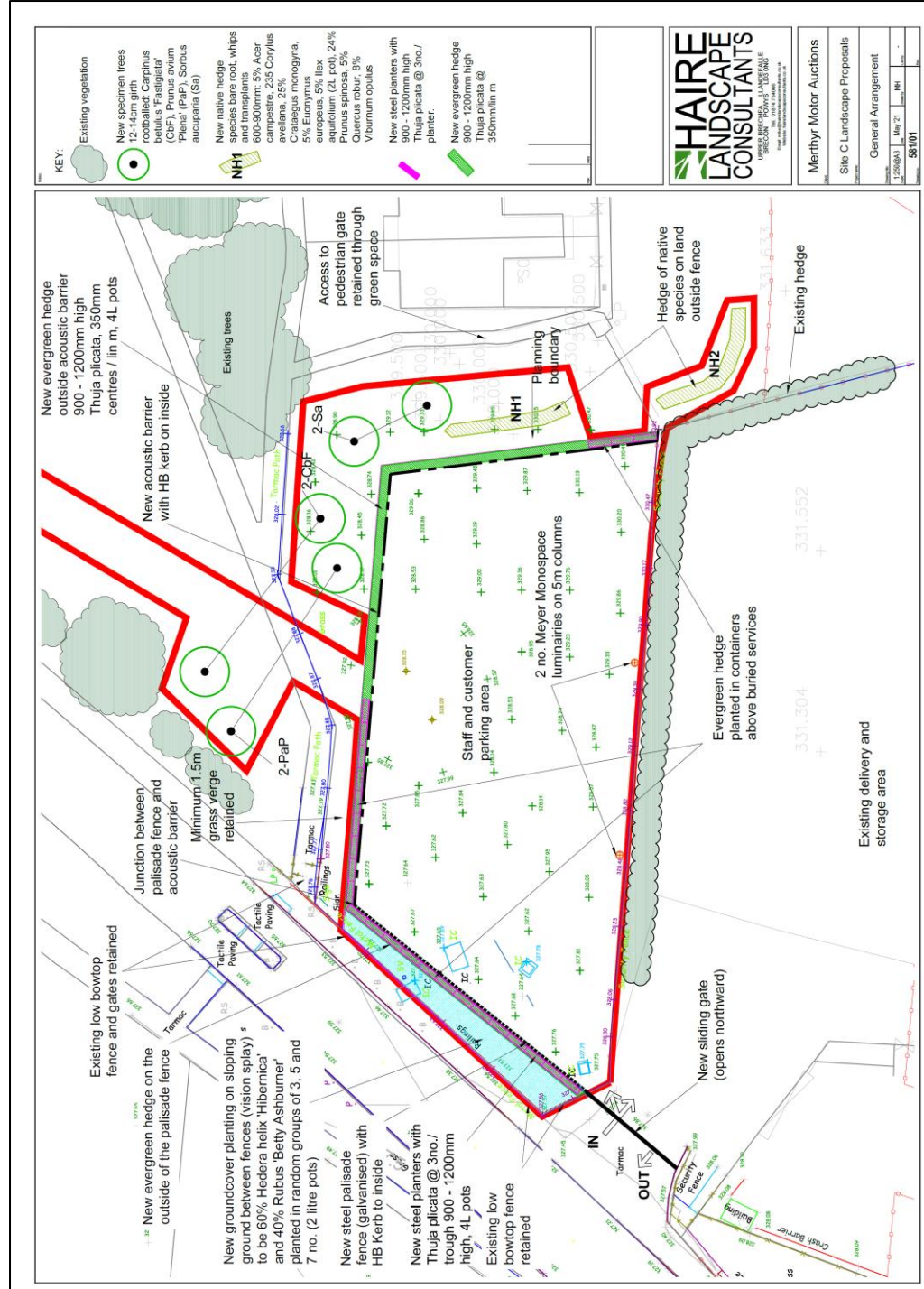
Figure 2 – Satellite View of Assessment Area



## Appendix 3 Proposed Development Drawings

## A3.0 PROPOSED DEVELOPMENT DRAWINGS

Figure 3 – Plan of Proposed Development, Area C including Recommended Mitigation



## Appendix 4 Vehicle Movements, Current and Proposed

## A4.0 VEHICLE MOVEMENTS, CURRENT AND PROPOSED

Figure 4 – Zoned Areas of MMA Site



Table 7 – Vehicle Movements, Auction Day Maximum Scenario (Current)

| Scenario                    | Zone | Vehicle | 0800-0900 | 0900-1000 | 1000-1100 | 1100-1200 | 1200-1300 | 1300-1400 | 1400-1500 |       |
|-----------------------------|------|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------|
| Auction Day Maximum Current | Z1   | Cars    | 35        | 4         | 5         | 9         | 4         | 4         | 4         |       |
|                             |      | HGV     | 2         | 0         | 0         | 2         | 0         | 0         | 0         |       |
|                             | Z2   | Cars    | 9         | 3         | 3         | 9         | 2         | 2         | 2         |       |
|                             |      | HGV     | 0         | 0         | 0         | 0         | 0         | 0         | 0         |       |
|                             |      |         | 1500-1600 | 1600-1700 | 1700-1800 | 1800-1900 | 1900-2000 | 2000-2100 | 2100-2200 | Total |
|                             | Z1   | Cars    | 1         | 34        | 50        | 40        | 25        | 30        | 56        | 301   |
|                             |      | HGV     | 0         | 2         | 0         | 0         | 0         | 0         | 0         | 6     |
|                             | Z2   | Cars    | 1         | 9         | 0         | 0         | 0         | 0         | 0         | 40    |
|                             |      | HGV     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0     |

Table 8 – Vehicle Movements, Auction Day Maximum Scenario (Proposed)

| Scenario                     | Zone   | Vehicle | 0800-0900 | 0900-1000 | 1000-1100 | 1100-1200 | 1200-1300 | 1300-1400 | 1400-1500 |       |
|------------------------------|--------|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------|
| Auction Day Maximum Proposed | Z1 + C | Cars    | 35        | 4         | 5         | 9         | 4         | 4         | 4         |       |
|                              |        | HGV     | 2         | 0         | 0         | 2         | 0         | 0         | 0         |       |
|                              | Z2     | Cars    | 0         | 0         | 0         | 0         | 0         | 0         | 0         |       |
|                              |        | HGV     | 0         | 0         | 0         | 0         | 0         | 0         | 0         |       |
|                              |        |         | 1500-1600 | 1600-1700 | 1700-1800 | 1800-1900 | 1900-2000 | 2000-2100 | 2100-2200 | Total |
|                              | Z1 + C | Cars    | 1         | 34        | 50        | 40        | 25        | 30        | 56        | 301   |
|                              |        | HGV     | 0         | 2         | 0         | 0         | 0         | 0         | 0         | 6     |
|                              | Z2     | Cars    | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0     |
|                              |        | HGV     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0     |

Table 9 – Change in Vehicle Movements, Auction Day Maximum Scenario (Proposed – Current)

| Scenario                           | Zone   | Vehicle | 0800-0900 | 0900-1000 | 1000-1100 | 1100-1200 | 1200-1300 | 1300-1400 | 1400-1500 |       |
|------------------------------------|--------|---------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-------|
| Auction Day<br>Maximum<br>Proposed | Z1 + C | Cars    | 0         | 0         | 0         | 0         | 0         | 0         | 0         |       |
|                                    |        | HGV     | 0         | 0         | 0         | 0         | 0         | 0         | 0         |       |
|                                    | Z2     | Cars    | -9        | -3        | -3        | -9        | -2        | -2        | -2        |       |
|                                    |        | HGV     | 0         | 0         | 0         | 0         | 0         | 0         | 0         |       |
|                                    |        |         | 1500-1600 | 1600-1700 | 1700-1800 | 1800-1900 | 1900-2000 | 2000-2100 | 2100-2200 | Total |
|                                    | Z1 + C | Cars    | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0     |
|                                    |        | HGV     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0     |
|                                    | Z2     | Cars    | -1        | -9        | 0         | 0         | 0         | 0         | 0         | -40   |
|                                    |        | HGV     | 0         | 0         | 0         | 0         | 0         | 0         | 0         | 0     |
|                                    |        |         |           |           |           |           |           |           |           |       |

## Appendix 5 Modelling Results

A5.0 MODELLING RESULTS

Figure 5 – Cumulative Noise Levels, A465 Road Traffic/Current Operations

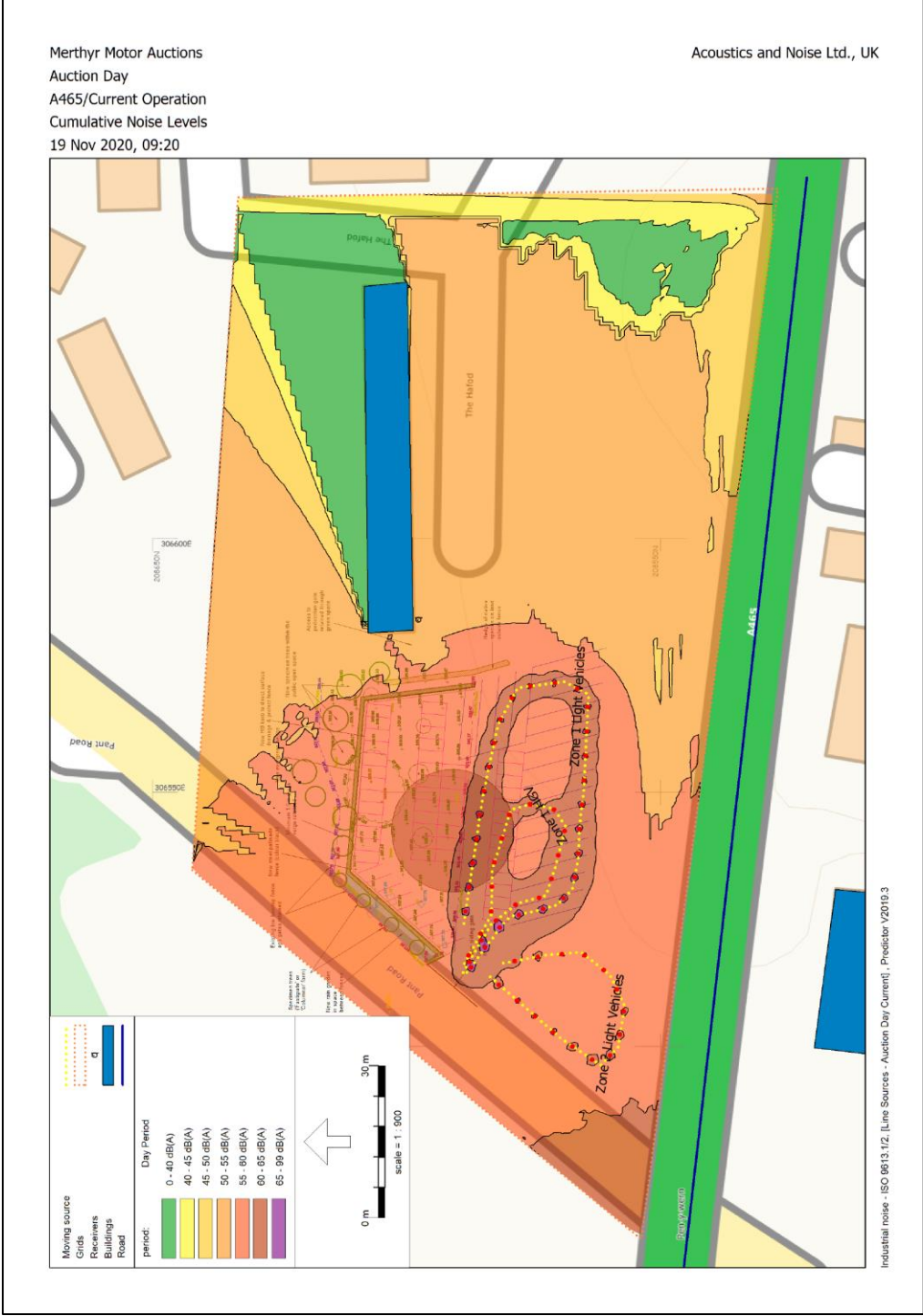
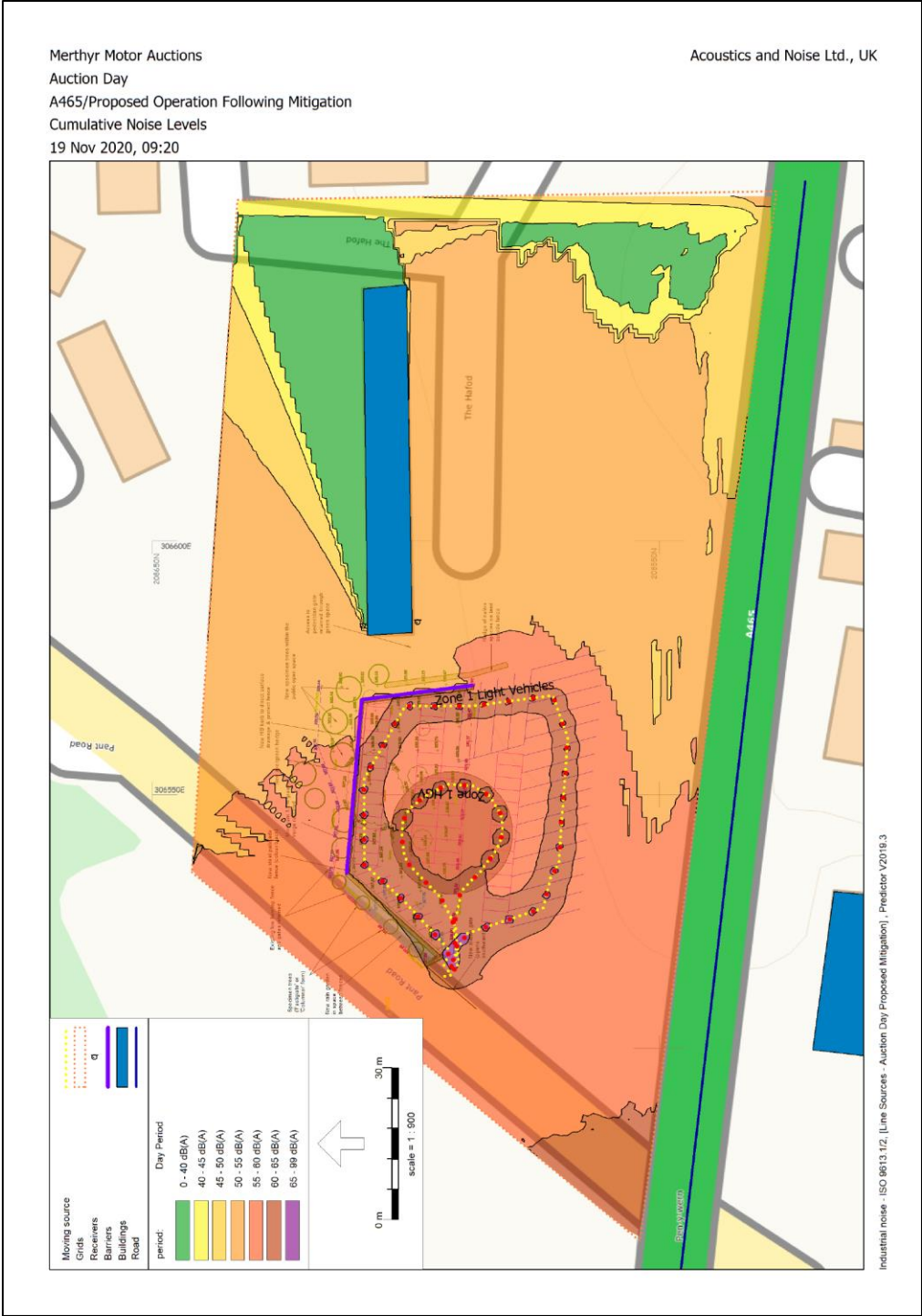


Figure 6 – Cumulative Noise Levels, A465 Road Traffic/Proposed Operations



Figure 7 – Cumulative Noise Levels, A465 Road Traffic/Proposed Operations Following Mitigation



**Table 10 – External Noise Levels at Receptors, Auction Day Maximum Scenario (Current)**

| Receptor    | Receptor Height (m) | External Noise Level Current Operation<br>$L_{Aeq,t}$ (dB) | External Noise Level A465 Road Traffic<br>$L_{Aeq,t}$ (dB) | Cumulative External Noise Level<br>$L_{Aeq,t}$ (dB) |
|-------------|---------------------|------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------|
| Hafod South | 1.5                 | 46.8                                                       | 55.5                                                       | 56.0                                                |
| Hafod North | 1.5                 | 38.5                                                       | 53.2                                                       | 53.3                                                |

**Table 11 – External Noise Levels at Receptors, Auction Day Maximum Scenario (Proposed)**

| Receptor    | Receptor Height (m) | External Noise Level Proposed Operation<br>$L_{Aeq,t}$ (dB) | External Noise Level A465 Road Traffic<br>$L_{Aeq,t}$ (dB) | Cumulative External Noise Level<br>$L_{Aeq,t}$ (dB) |
|-------------|---------------------|-------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------|
| Hafod South | 1.5                 | 49.4                                                        | 55.5                                                       | 56.4                                                |
| Hafod North | 1.5                 | 47.5                                                        | 53.2                                                       | 54.2                                                |

**Table 12 – Change in External Noise Levels at Receptors, Auction Day Maximum Scenario (Proposed – Current)**

| Receptor    | Receptor Height (m) | Change in External Noise Level Due to Proposed Operation<br>$L_{Aeq,t}$ (dB) | Change in External Noise Level A465 Road Traffic<br>$L_{Aeq,t}$ (dB) | Change in Cumulative External Noise Level<br>$L_{Aeq,t}$ (dB) |
|-------------|---------------------|------------------------------------------------------------------------------|----------------------------------------------------------------------|---------------------------------------------------------------|
| Hafod South | 1.5                 | 2.6                                                                          | 0                                                                    | 0.4                                                           |
| Hafod North | 1.5                 | 9.0                                                                          | 0                                                                    | 0.9                                                           |

**Table 13 – External Noise Levels at Receptors Following Mitigation, Auction Day Maximum Scenario (Proposed)**

| Receptor    | Receptor Height (m) | External Noise Level Proposed Operation Following Mitigation<br>$L_{Aeq,t}$ (dB) | External Noise Level A465 Road Traffic<br>$L_{Aeq,t}$ (dB) | Cumulative External Noise Level<br>$L_{Aeq,t}$ (dB) |
|-------------|---------------------|----------------------------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------|
| Hafod South | 1.5                 | 43.7                                                                             | 55.5                                                       | 55.8                                                |
| Hafod North | 1.5                 | 36.9                                                                             | 53.2                                                       | 53.3                                                |

**Table 14 – Change in External Noise Levels at Receptors Following Mitigation, Auction Day Maximum Scenario (Proposed – Current)**

| Receptor    | Receptor Height (m) | Change in External Noise Level Due to Proposed Operation Following Mitigation<br>$L_{Aeq,t}$ (dB) | Change in External Noise Level A465 Road Traffic Following Mitigation<br>$L_{Aeq,t}$ (dB) | Change in Cumulative External Noise Level Following Mitigation<br>$L_{Aeq,t}$ (dB) |
|-------------|---------------------|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Hafod South | 1.5                 | -3.1                                                                                              | 0                                                                                         | -0.2                                                                               |
| Hafod North | 1.5                 | -1.6                                                                                              | 0                                                                                         | 0                                                                                  |

## Appendix 6 Source Data used in Model

## A6.0 SOURCE DATA USED IN MODEL

**Table 15 – Vehicle Source Noise Input Data (Moving Point)**

| Source         | Flow(D) | Avg.speed | 63Hz<br>L <sub>WA</sub><br>(dB) | 125Hz<br>L <sub>WA</sub><br>(dB) | 250Hz<br>L <sub>WA</sub><br>(dB) | 500Hz<br>L <sub>WA</sub><br>(dB) | 1kHz<br>L <sub>WA</sub><br>(dB) | 2kHz<br>L <sub>WA</sub><br>(dB) | 4kHz<br>L <sub>WA</sub><br>(dB) | 8kHz<br>L <sub>WA</sub><br>(dB) | Total<br>L <sub>WA</sub><br>(dB) |
|----------------|---------|-----------|---------------------------------|----------------------------------|----------------------------------|----------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|----------------------------------|
| Light Vehicles | 301     | 5         | 69.0                            | 76.0                             | 78.0                             | 81.0                             | 84.0                            | 84.0                            | 78.0                            | 71.0                            | 89.11                            |
| HGV            | 6       | 10        | 79.1                            | 87.8                             | 91.9                             | 96.5                             | 100.2                           | 97.5                            | 90.5                            | 83.6                            | 103.8                            |

**Table 16 – A465 Road Input Data**

| Name | Desc.     | Surface | Q <sub>18h</sub> | pHv <sub>18h</sub><br>% | V <sub>18h</sub><br>(km/h) | E <sub>18h</sub><br>(dBA) |
|------|-----------|---------|------------------|-------------------------|----------------------------|---------------------------|
| A465 | A465 2019 | Macadam | 16038            | 6                       | 88                         | 75.9                      |

### A6.1 Assumptions Made in Model

A6.1.1 The ground attenuation was modelled as hard with a ground factor value of 0.0.

A6.1.2 Acoustic barriers were modelled as reflective.

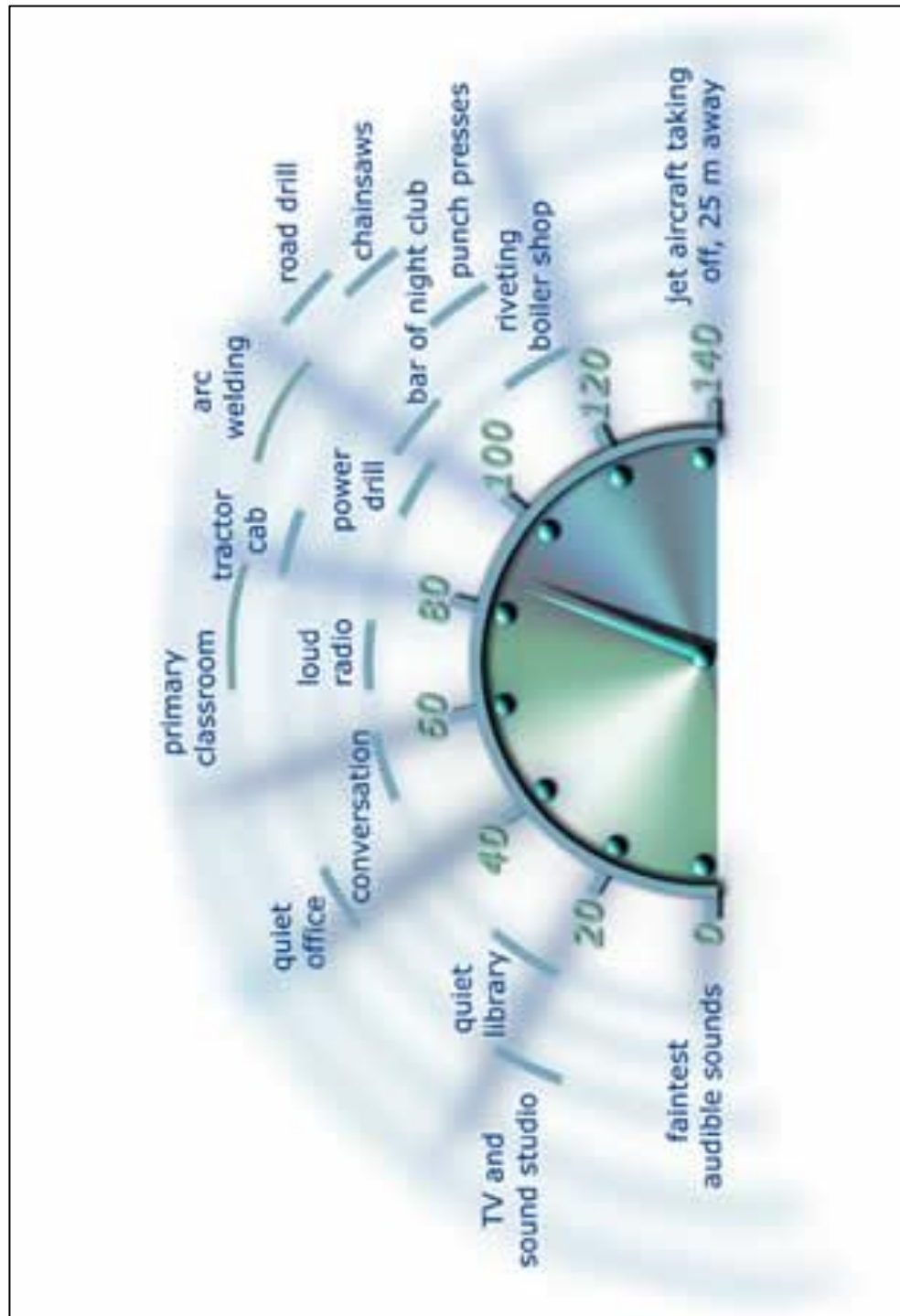
A6.1.3 Atmospheric conditions were modelled as

- Temperature: 293.15 K
- Pressure: 101.33 kPa
- Air Humidity: 60%

## Appendix 7 Range of Typical Noise Levels

## A7.0 RANGE OF TYPICAL NOISE LEVELS

Figure 8 – Range of Typical Noise Levels



## Appendix 8 Glossary of Acoustic Terms

## A8.0 GLOSSARY OF ACOUSTIC TERMS

### A8.1 Acoustic Environment:

*Sound from all sound sources as modified by the environment.*

### A8.2 Ambient Sound:

*Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far.*

*NOTE: The ambient sound comprises the residual sound and the specific sound when present.*

### A8.3 Ambient Sound Level, $L_a = L_{Aeq,T}$ :

*Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the measurement location over a given time interval, T.*

*NOTE: The ambient sound level is a measure of the residual sound and the specific sound when present.*

### A8.4 A-Weighting:

*Normal hearing covers the frequency (pitch) range from about 20 Hz to 20,000 Hz but sensitivity is greatest between about 500 Hz and 5,000 Hz. The 'A-weighting' is an electrical circuit built into noise meters to approximate this characteristic of human hearing.*

### A8.5 Background Sound Level, $L_{A90,T}$ :

*A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.*

### A8.6 Decibel (dB):

*The logarithmic measure of sound level. 0dB (A) is the threshold of normal hearing. 140 dB (A) is the level at which instantaneous damage to hearing is caused. A change of 1 dB is detectable only under laboratory conditions.*

**A8.7 dB(A):**

*Decibels measured on a sound level meter incorporating a frequency weighting (A-weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with an individual's assessment of loudness. A change of 3 dB (A) is the minimum perceptible under normal conditions and a change of 10 dB(A) corresponds roughly to doubling or halving the loudness of a sound.*

**A8.8 Equivalent Continuous A-weighted Sound Pressure Level,  $L_{Aeq,T}$** 

*Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval,  $T = t_2 - t_1$ , has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:*

$$L_{Aeq,T} = 10 \lg_{10} \left\{ \left( \frac{1}{T} \right) \int_{t_1}^{t_2} \left[ \frac{p_A(t)^2}{p_0^2} \right] dt \right\}$$

*where*

*$p_0$  is the reference sound pressure (20  $\mu$ Pa); and*

*$p_A(t)$  is the instantaneous A-weighted sound pressure at time  $t$*

*NOTE: the equivalent continuous A-weighted sound pressure level is quoted to the nearest whole number of decibels.*

**A8.9 Free Field:**

*A sound field in which no significant sound reflections occur*

**A8.10 Frequency:**

*The number of cycles per second of a vibration usually expressed in units of Hertz, Hz*

**A8.11 Hertz:**

*Unit of frequency, equal to one cycle per second. Frequency determines the pitch of a sound.*

**A8.12  $L_{A10,T}$ :**

*The 'A-weighted' noise level exceeded for 10% of the specified measurement period (T). It gives an indication of the upper limit of fluctuating noise such as that from*

road traffic.  $L_{A10,18hr}$  is the arithmetic average of the 18 hourly  $L_{A10,1hr}$  values from 06:00 - 24:00.

**A8.13  $L_{Amax}$ :**

The maximum 'A-weighted' level of noise recorded during a noise event. The time weighting used (Fast or Slow) should be stated.

**A8.14 Measurement Time Interval,  $T_m$ :**

Total time over which measurements are taken.

NOTE: This may consist of the sum of a number of non-contiguous, short-term measurement time intervals.

**A8.15 Rating Level,  $L_{Ar,Tr}$ :**

Specific sound level plus any adjustment for the characteristic features of the sound.

**A8.16 Reference Time Interval,  $T_r$ :**

Specified interval over which the specific sound level is determined.

NOTE: This is 1h during the day from 07:00 h to 23:00 h and a shorter period of 15min at night from 23:00 h to 07:00 h.

**A8.17 Residual Sound:**

Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.

**A8.18 Residual Sound Level,  $L_r = L_{Aeq,T}$ :**

Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval,  $T$ .

**A8.19 Specific Sound Level,  $L_s = L_{Aeq,T}$ :**

Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval,  $T_r$ .

**A8.20 Specific Sound Source:**

Sound source being assessed.

**A8.21      Tonality:**

*The degree to which a noise contains audible pure tones. Broadband noise (across a wider range of frequencies) is generally less annoying than noise with identifiable tones.*

## Appendix 9 References

## A9.0 REFERENCES

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- 1 Planning Policy Wales, Edition 10, Welsh Government, December 2018
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