

13 NOISE

13.1 Introduction

- 13.1.1 This chapter assesses the noise impacts associated with the proposed development of the Island Farm sports village and science park.
- 13.1.2 Full details of the development proposed are presented in Chapter 2.0 which sets the basis against which this assessment has been conducted.
- 13.1.3 As is normal at the outline planning stage full details of the construction phase and fixed plant and services are not available. However to inform this report the legislative background for both construction noise and vibration and fixed plant is included.
- 13.1.4 An assessment of the construction noise has however been carried out based on the indicative construction program contained in Volume 2 and summarised in Chapter 2.0.
- 13.1.5 Full details of construction are to be submitted to the Local Authority prior to the development commencing when the construction phase noise and vibration impacts will be fully evaluated and will be subject to the legislative framework particularly “The Control of Pollution Act (CoPA)” as described in Section 13.2. .
- 13.1.6 Whilst it is not anticipated there will be everyday use of significant noise producing sources (other than the public address system on match days) these also have not been assessed
- 13.1.7 The legislative background for these types of sources is also included in Section 1.2 and a detailed study of these sources will be undertaken and submitted to the Local Authority when the design of these facilities becomes available.
- 13.1.8 The assessment considers the potential for the operational use of the development to affect existing noise levels at the nearest noise sensitive receptors due to changes in traffic movements, the use of the smaller playing areas and the main stadia on match days.
- 13.1.9 The main receptors that have the potential to be affected by noise from the construction and operational phases of the development are considered to be the nearest noise sensitive receptors (NSR's) as follows:-
- The houses located on the opposite side of the A48 adjacent to Merthyr Mawr Road
 - The houses located at Island Farm Close and adjacent roads
 - The farmhouse known as Ty–Wrth-y-Coed and
 - The Dwelling at Claypits Pottery
 - This was confirmed by the Bridgend CBC in a response to a scoping request included in Volume 3, Appendices for Chapter 1-4.
- 13.1.10 Road traffic noise impacts of the proposed scheme have the potential to be felt over a wider area therefore the assessment covers the access roads to the site. Technology Drive is to be extended and used initially as access for the construction phase and on completion for the science park, and the Park and Ride scheme.

13.1.11 Whilst every effort has been made to ensure that this report is easily understood, it is of necessity technical in nature; to assist the reader the noise and vibration units associated with this assessment are defined in the Glossary provided at the end of this Chapter

13.1.12 The assessment is based on the design layouts, construction information, noise data and traffic flows supplied by other contributors to this assessment unless otherwise indicated

13.2 Policy and Legislation

13.2.1 A detailed review of the development plan documents and planning context in relation to the development proposals is provided in Chapter 3.

13.2.2 This section summarises those policies that are directly relevant to noise issues.

National Policy & Legislation

13.2.3 There are various standards and legislation applicable to construction activities associated with a development of this type and these are outlined below.

13.2.4 Standards applicable to construction are generally referred to within Annex 1 of TAN 11 (see below) and are described in more detail in Section 13.3 on Assessment Methodology.

The Control of Pollution Act (CoPA)

Section 60, Part III of Chapter 40 of the CoPA [1] – Control of noise on construction sites.

13.2.5 This provides legislation by which Local Authorities (LA,'s) can control noise from construction sites to prevent disturbance occurring.

Section 61, Part III of Chapter 40 of the CoPA – Prior consent for work on construction sites.

13.2.6 This provides a method by which a contractor can seek consent to undertake construction works in advance of their commencement. If consent is given, and the stated method and hours of work complied with, then the LA cannot take action under Section 60.

Planning Policy Wales March 2002

13.2.7 The purpose of Planning Policy Wales is to set the context for sustainable land use planning policy, within which local planning authorities' statutory Unitary Development Plans are prepared and development control decisions on individual applications and appeal taken and the introduction explains the purpose of the document.

“Planning Policy Wales (PPW) sets out the land use planning policies of the Welsh Assembly Government (The Assembly Government). It is supplemented by a series of Technical Advice Notes (TANs, listed in the Annex). Procedural advice is given in National Assembly for Wales / Welsh Office circulars. PPW, the TANs and circulars together comprise national planning policy which should be taken into account by local planning authorities in Wales in the preparation of unitary development plans (UDPs). They may be material to decisions on individual planning applications and will be taken into account by the National Assembly for Wales (the Assembly) and Planning Inspectors in the determination of

called-in planning applications and appeals. Detailed advice on the preparation of UDPs is contained in Unitary Development Plans Wales, 2001”.

- 13.2.8 Chapter B of Planning Policy Wales deals with Minimising and Managing Environmental Risks and Pollution. Reducing noise and light pollution contains the following general policy:

“Noise can affect people’s health and well-being and have a direct impact on wildlife and local amenity. Noise levels provide an indicator of local environmental quality. The objective of a policy for noise is to minimise emissions and reduce ambient noise levels to an acceptable standard.

- 13.2.9 More detailed guidance is given in: Welsh Assembly Technical Advice Notes

- 13.2.10 **Technical Advice Note (Wales) 11, Noise – October 1997** is the Welsh Assembly Government’s primary over-arching noise guidance. It provides guidance to local authorities in Wales on the use of their planning powers to minimise the adverse impact of noise and builds on the advice previously contained in DoE Circular 10/73. It outlines the considerations to be taken into account in determining planning applications, both for noise-sensitive developments and for those activities which will generate noise; introduces the concept of noise exposure categories for residential development, encourages their use and recommends appropriate levels for exposure to different sources of noise; and advises on the use of conditions to minimise the impact of noise.

- 13.2.11 Paragraph 3 provides the General Principles of the guidance as follows:

“This note provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business. It outlines some of the main considerations which local planning authorities should take into account in drawing up development plan policies and when determining planning applications for development which will either generate noise or be exposed to existing noise sources.”

- 13.2.12 With regard to Development Control and Noise generating development, it states:

“Paragraph 8. Local planning authorities must ensure that noise generating development does not cause an unacceptable degree of disturbance. They should also bear in mind that if subsequent intensification or change of use results in greater intrusion, consideration should be given to the use of appropriate conditions,” and

“Paragraph 9. Noise characteristics and levels can vary substantially according to their source and the type of activity involved. In the case of industrial development, for example, the character of the noise should be taken into account as well as its level. Sudden impulses, irregular noise or noise which contains a distinguishable continuous tone will require

special consideration.”

13.2.13 Paragraphs 11, 12 and 13 contain advice on measures to mitigate the impact of noise:

“Paragraph 11. Measures introduced to control the source of, or limit exposure to, noise should be proportional and reasonable, and may include:

i. engineering: reduction of noise at point of generation (e.g. using quiet machines and/or quiet methods of working); containment of noise generated (e.g. insulating buildings which house machinery and/or providing purpose-built barriers around sites); protection of surrounding noise-sensitive buildings (e.g. improving sound insulation in these buildings and/or screening them by purpose-built barriers);

ii. lay-out: adequate distance between noise source and noise-sensitive building or area; screening by natural barriers, other buildings, or non-critical rooms in a building;

iii. administrative: limiting operating time of noise source; restricting activities allowed on the site; specifying an acceptable noise limit.”

“Paragraph 12. Early consultation with the applicant about the possible use of such measures is desirable and may enable them to be incorporated into the design before a proposal is formally submitted for determination. Alternatively, a local planning authority may impose conditions. Conditions which set noise limits raise particular issues on which guidance is given in Annex D.”

“Paragraph 13. There may be circumstances when it is acceptable, or even desirable in order to meet other planning objectives, to allow noise generating activities on land near or adjoining a noise-sensitive development. In such cases, local planning authorities should consider the use of conditions or planning obligations to safeguard local amenity. Care should be taken to keep the noisiest activities away from the boundary or to take measures to reduce the impact of noise.”

13.2.14 Annex A of TAN11 explains the Noise Exposure Category (NEC) rating system, however, paragraph A3 in this appendix explains why this NEC rating system should not be applied in this case

“The NEC noise levels should not be used to assess the impact of industrial noise on proposed residential development because the nature of this type of noise, and local circumstances, may necessitate individual assessment and because there is insufficient information on people's response to industrial noise to allow detailed guidance to be given. However, at a mixed noise site where industrial noise is present but not

dominant, its contribution should be included in the noise level used to establish the appropriate NEC.” and paragraph A4 adds the following:

“The NEC procedure is applicable where consideration is being given to introducing residential development into an area with an existing noise source, but not the reverse situation where new noise sources are to be introduced into an existing residential area. This is because the planning system can be used to impose conditions to protect incoming residential development from an existing noise source but, in general, developers are under no statutory obligation to offer noise protection measures to existing dwellings which will be affected by a proposed new noise source. Moreover, there would be no obligation on individuals with an interest in each dwelling affected to take up such an offer, and therefore no guarantee that all necessary noise protection measures would be put in place.”

13.2.15 Paragraph A5 then gives the guidance for the procedures necessary in this case as follows:

“A5. Thus, where new industrial or commercial development is proposed near a residential area, the effect of the new noise source on the surrounding area will have to be assessed in accordance with existing procedures. In many cases where a new source of noise is to be introduced by a project that requires environmental assessment (EA) the effect of noise will be considered in this context; but it must be accepted that in these circumstances the options to control noise are likely to be more limited than where residential development is proposed in an area with an existing noise source.”

13.2.16 Paragraph B17 of Annex B provides guidance for “The Assessment of noise from different sources” as follows:

“Noise from industrial and commercial developments

The likelihood of complaints about noise from industrial development can be assessed, where the Standard is appropriate, using guidance in BS 4142: 1990. Tonal or impulsive characteristics of the noise are likely to increase the scope for complaints and this is taken into account by the "rating level" defined in BS 4142. This "rating level" should be used when stipulating the level of noise that can be permitted. The likelihood of complaints is indicated by the difference between the noise from the new development (expressed in terms of the rating level) and the existing background noise. The Standard states that, 'A difference of around 10 dB or higher indicates that complaints are likely. A difference of around 5 dB is of marginal significance'. Since background noise levels vary throughout a 24 hour period it will usually be necessary to assess the acceptability of noise levels for separate periods (e.g. day and night) chosen to suit the hours of operation of the proposed development..

Similar considerations apply to developments that will emit significant noise at the weekend as well as during the week. “

13.2.17 In Paragraph B20 Noise from construction sites there is the following guidance:

“Detailed guidance on assessing noise from construction sites can be found in BS 5228 parts 1-4. In particular, Part 1:1984, ‘Code of Practice for basic information and procedures for noise control’ describes a method for predicting noise from construction sites as well as giving general advice.”

13.2.18 BS 5288, Part 1:1984 has been superseded by a new version published in 2009 but the same principles apply. A more detailed description of BS 5288 is contained later in this Chapter.

13.2.19 Importantly for this development Paragraph B21 of TAN 11 contains guidance for “Noise from recreational and sporting activities” as follows:-

‘For these activities, the local planning authority will have to take account of how frequently the noise will be generated and how disturbing it will be, and balance the enjoyment of the participants against nuisance to other people. Partially open buildings such as stadia may not be in frequent use. Depending on local circumstances and public opinion, local planning authorities may consider it reasonable to permit higher noise emission levels than they would from industrial development, subject to a limit on the hours of use, and the control of noise emissions (including public address systems) during unsocial hours’.

13.2.20 Examples of planning conditions are provided in Annex C of TAN11. Within this section the following example conditions are relevant:-

“Conditions restricting noise emitted from industrial or commercial buildings and sites⁽¹⁾

C14. Before the use commences, the [specified building(s)] shall be insulated in accordance with a scheme agreed with the local planning authority.

(Authorities using this condition should advise the applicant on the degree of sound insulation considered necessary to achieve an acceptable external noise level).

C15. Before the development hereby permitted commences a scheme shall be agreed with the local planning authority which specifies the provisions to be made for the control of noise emanating from the site.

(These provisions could include physical and/or administrative

measures).

C18. The level of noise emitted from the site shall not exceed [A] dB between [T] and [T] Monday to Friday and [A] dB at any other time, as measured on the [specified boundary/boundaries] of the site at [location(s) of monitoring point(s)]. “

Specify: A - noise level expressed as LAeq, T over a time period X (e.g. 1 hour) T - time of day

13.2.21 Annex D of TAN11 contains advice on Specifying Noise Limits as follows:

“D1. If a local planning authority wishes to impose a planning condition which will specify an acceptable noise limit from a new source, the following points should be considered”

Type of limit

D2. Depending on circumstances, it may be appropriate to set either:

a) an absolute limit based on the average level of noise which should not be exceeded in a specified time period;

b) a relative limit based on the permitted increase in noise level with respect to the background level. This is the approach used in BS 4142: 1990.

D3. Generally, relative limits are not appropriate where the permitted increase in noise over background is substantial - e.g. 15 dB or more. Because background noise varies during the day, the background noise level determined should be representative of a typical quiet period during the working day.

D4. Either type of limit may be a single value over the relevant period, or different values for, say day and night. It may be appropriate to set an evening value as well where the noise source lends itself to fine control.

D5. A noise limit which is close to the background level will be difficult to monitor and the advice given in BS 4142 should be followed. This is particularly important at quiet sites where the LAeq,T may be 10 dB or more above the LA90,T - even when the noise source is not operating.

13.2.22 This use of this guidance is confirmed by the following extract from Planning Policy Wales March 2002

Development control and noise and lighting

13.15.1 Noise can be a material planning consideration, for example in proposals to use or develop land near an existing source of noise or

where a proposed new development is likely to generate noise. Local planning authorities should make a careful assessment of likely noise levels before determining such planning applications and in some circumstances it will be necessary for a technical noise assessment to be provided by the developer).

13.15.2 Special consideration is required where noise-generating development is proposed in or near statutorily designated areas or is likely to affect a protected species. The effect of noise on the enjoyment of other areas of landscape, wildlife and historic value should also be taken into account.

Local Policy

13.2.23 Bridgend CBC has in their UDP a specific policy for noise -EV28 which includes the following:

“Development proposals which, even after mitigation measures are taken into account, would still have an unacceptably noisy impact, or which would, themselves, suffer from unacceptable exposure to noise, will not be permitted.”

13.2.24 There is further guidance contained in the paragraphs 3.11.4 and 3.11.5 of this policy statement:

“3.11.4. Noise can be a material consideration in the determination of a planning application for development; for example, proposals may be submitted at a location near to an existing source of noise, alternatively, new development proposals may generate noise. In either event, the Council will carefully scrutinise such proposals, and it will expect those applications to be accompanied by sufficiently detailed independent Noise Impact Assessments etc. in order that expected levels of noise generation affecting noise sensitive developments can be properly assessed and do not exceed acceptable limits. Proposals must therefore be accompanied by full details of the measures which are intended to mitigate the impact of existing and proposed noise generation, for example:-

- The layout and design of the proposal;*
- The situation and nature of proposed noise barriers;*
- Noise insulation of proposed buildings;*
- Noise suppression measures from plant or machinery;*
- and Operational requirements (e.g. hours of operation).*

Relevant Guidance

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

British Standards

BS 5228: Noise and vibration control on construction and open sites, Parts 1 and 2

- 13.2.26 Provides guidance on the control of noise from construction and open sites. Part 1 deals specifically with noise and Part 2 specifically with vibration. This Standard has been updated in 2009 and replaces 4 earlier documents. Its various earlier parts had been adopted under s. 71 of CoPA (Codes of Practice for minimising noise) and this new version will replace those 4 parts.
- 13.2.27 It includes sections on: legislative background; community relations; training; occupational noise effects; neighbourhood nuisance; project supervision; and control of noise and vibration. Annexes include: a list of EC and UK legislation; an extensive database of noise sources, remedies and their effectiveness (mitigation options); guide to sound level data on site equipment and site activities (source terms that are used for modelling); estimating noise from sites (calculation procedures which form the basis of the modelling packages); and noise monitoring.
- 13.2.28 Part 1 Annexe give guidance on the significance of noise effects and contains the following:
“A pragmatic approach needs to be taken when assessing the noise effects of any construction project”, It continues in this section to list the reasons for and the possible extents of assessing the noise impact. Of particular relevance to this assessment is the following paragraph:

Most major developments now need to be assessed in accordance with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 . This is where the development might result in significant effects upon the environment. Therefore, criteria are needed to allow these assessments to be undertaken. The assessments can include likely eligibility for noise insulation or temporary re-housing, as forms of mitigation, but such eligibility needs to be confirmed later in the process when a contractor is appointed and detailed method statements and programme information are available. and later in the annexe it refers to CoPA as follows: :

c) Control of Pollution Act (CoPA) 1974 [9], Section 61, “Applications for prior consent for work on construction sites”.

Applications under this section of the CoPA are often found to be desirable and useful by both the local authority and the contractor. The applications would usually include (as identified in the CoPA):

1) details of the works and the method by which they are to be carried out; and

2) the steps proposed to be taken to minimize noise resulting from the works.

However, it is good practice to carry out construction noise predictions to provide additional information and to determine, for projects of significant size, any eligibility for noise insulation

or temporary re-housing. By gaining consent under Section 61, the contractor gains protection from action under Section 60 of the CoPA, whereby a stop or enforcement notice cannot be served on the contractor, as long as the works are carried out in accordance with the details in the application. This annex describes methods to identify the likely significance of noise levels from surface construction activity.

13.2.29 Following the above advice an indicative construction program was used to evaluate and assess noise and vibration impacts anticipating that a detailed program will be evaluated when available. This indicative program included compact piling techniques. Subsequent investigations have show that this type of piling is not suitable for the ground conditions and that Continuous Flight Auger (CFA) will be used this type of piling is inherently quieter and generates less vibration than compact piling. The effect of this change is dicussed in more detail later in this Chapter.

13.2.30 Most of the development ,other than the science park, takes place at significant distances from the NSR's and Annex F Section 2.2.2.2 Distance Adjustment of BS 5228 Part 1 contains the following caveat:

"At distances over 300 m noise predictions should be treated with caution, especially where a soft ground correction factor has been applied, because of the increasing importance of meteorological effects"

BS 6472: Guide to Evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz)

13.2.31 Provides guidance on human response to vibration experienced in buildings. The standard includes weighting curves related to the sensitivity of human response to vibration..

BS 7385: Parts 1 and 2

13.2.32 Provides guidance on the evaluation and measurement for vibration in buildings.

13.2.33 **Part 1, Guide for measurement of vibrations and evaluation of their effects on buildings**, provides advice on measurement, measurement instrumentation, location and fixing of transducers and data evaluation. Annexes also provide advice on classifying buildings with regard to their likely sensitivity; estimating peak stress from peak particle velocity; random data; a bibliography is also provided.

13.2.34 **Part 2, Guide to damage levels from ground borne vibration**, provides guidance on the levels of vibration above which building structures could be damaged. It identifies the factors that influence the vibration response of buildings, and describes the basic procedure for carrying out measurements. Critically it highlights that there is a major difference between the sensitivity of people feeling vibration and the onset of levels of vibration, which damage structures; **and that levels of vibration at which adverse comment from people is likely are below levels of vibration, which damage buildings**, except at lower frequencies.

13.2.35 These guidance and methodology documents are discussed in the following sections in relation to construction and operation.

13.2.36 Furthermore where agreements with regard to noise criteria have been made with either the

local councils or the County Council these are also referenced within the following sections as appropriate.

Evaluation of Construction noise and vibration

- 13.2.37 There are no current British Standards or other recognised criteria for the assessment of construction noise; the Control of Pollution Act 1974, the Act that governs such activities, leaves it to Local Authorities to recommend criteria appropriate to their area of jurisdiction.
- 13.2.38 A figure that is often quoted as being an acceptable level of noise from construction or demolition sites is 75dB L_{Aeq} measured at the external façade of an occupied building over the normal working day. This figure was first quoted in the 1963 Wilson Report on Noise and is referred to BS 5288 Part 1.
- 13.2.39 Annexe E2 of BS 5288 Part 1 2009 contains expanded guidance on the likely significance of noise levels generated by construction activity.

For projects of significant size such as the construction of a new railway or trunk road, historically, there have been two approaches to determining whether construction noise levels are significant or not. The older and more simplistic is based upon exceedance of fixed noise limits which were originally promoted by the Wilson Committee in their report on noise [60] as presented to Parliament in 1963. These noise limits were then included in Advisory Leaflet 72 [61], first published in 1968; the accompanying wording was subsequently revised and the 1976 version is quoted below:

“Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut. The noise can be measured with a simple sound level meter, as we hear it, in A-weighted decibels(dB(A))– see note below. Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:

- 70 decibels (dBA) in rural, suburban and urban areas away from main road traffic and industrial noise;*
- 75 decibels (dBA) in urban areas near main roads in heavy industrial areas.*

These limits are for daytime working outside living rooms and offices. In noise-sensitive situations, for example, near hospitals and educational establishments – and when working outside the normal hours say between 19.00 and 22.00 hours – the allowable noise levels from building sites will be less: such as the reduced values given in the contract specification or as advised by the Environmental Health Officer (a reduction of 10 dB(A) may often be appropriate). Noisy work likely to cause annoyance locally should not be permitted between 22.00 hours and 07.00 hours.”

The above principle has been expanded over time to include a suite of noise levels covering the whole day/week period taking into account the varying sensitivities through these periods. An example is provided in E.3

and these levels are also often used as limits above which noise insulation would be provided if the temporal criteria are also exceeded.

- 13.2.40 Table 13.1 below is extracted from Table E.1 in BS 5288 and “shows an example of the threshold of significant effect at dwellings when the total noise level, rounded to the nearest decibel, exceeds the listed value. The table can be used as follows: for the appropriate period (night, evening/weekends or day), the ambient noise level is determined and rounded to the nearest 5 dB. This is then compared with the total noise level, including construction. If the total noise level exceeds the appropriate category value, then a significant effect is deemed to occur”.

Table 13.1 Example threshold of significant effect at dwellings

Assessment category and threshold value period (L _{Aeq})	Threshold value, in decibels (dB)		
	Category A ^{A)}	Category B ^{B)}	Category C ^{C)}
Night-time (23.00–07.00)	45	50	55
Evenings and weekends ^{D)}	55	60	65
Daytime (07.00–19.00) and Saturdays (07.00–13.00)	65	70	75

NOTE 1 A significant effect has been deemed to occur if the total L_{Aeq} noise level, including construction, exceeds the threshold level for the Category appropriate to the ambient noise level.

NOTE 2 If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a significant effect is deemed to occur if the total L_{Aeq} noise level for the period increases by more than 3 dB due to construction activity.

NOTE 3 Applied to residential receptors only.

A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.

C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.

D) 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.

- 13.2.41 At the time of this assessment the exact details of the construction phase i.e. types of plant and operations are not available but based upon experience of similar projects an indicative programme of works has been evaluated against this criterion. This programme is shown in Volume 2. It is proposed also to use this criteria when more detailed information of the construction phase is available

- 13.2.42 Similarly there are currently no British Standards that provide a methodology to predict levels

of vibration from construction activities, other than that contained within BS 5228: Part 2, which relates to percussive, vibratory piling and tunnelling activities only.

- 13.2.43 Vibrations, even of very low magnitude, can be perceptible to people and it is generally accepted that for the majority of people vibration levels in excess of between 0.15 and 0.3 mms⁻¹ peak particle velocity are just perceptible supported by Table B1 reproduced as Table 13.2 below.

Table 13.2 Guidance on effects of vibration levels

Vibration level	Effect
0.14 mm·s ⁻¹	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm·s ⁻¹	Vibration might be just perceptible in residential environments.
1.0 mm·s ⁻¹	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10 mm·s ⁻¹	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

- 13.2.44 Table 13.3 below details the distance at which certain activities give rise to a just perceptible level of vibration; these figures are based on historical field measurements

- 13.2.45 Whilst it can be seen from Table 13.3, given the distances to the nearest properties, there is very little risk of the construction phase causing any perceptible vibrations it is proposed to evaluate them when the detailed construction plan is available.

Table 13.3 Distances at which Vibration may just be Perceptible

Construction Activity	Distance from activity when vibration may just be perceptible (M)
Excavation	10 to 15
Compaction	30 to 40
Heavy Vehicles (e.g. dump trucks)	5 to 10
Hydraulic Breaker	15 to 20
Auger Piling (e.g. CFA piling)	15 to 20

Calculation of Road Traffic Noise

- 13.2.46 In England and Wales, the standard method for predicting traffic noise levels is given in the Calculation of Road Traffic Noise 1988 (CRTN). The index used to characterise traffic noise in CRTN is the $L_{A10,18hrs}$. This is the average of the 18-hourly A-weighted sound pressure level exceeded for 10% of the time over the period 06.00 to 24.00 hours on a normal weekday.

- 13.2.47 The use of $L_{A10,18hrs}$ as a UK traffic index has been replaced with noise indices based on $L_{Aeq,T}$

descriptors for the EU. Where applicable for the assessment of road traffic noise impact in this report ; conversion to the EU noise indices particularly 16 Hour day and 8 Hour night noise levels has been undertaken using the methods in the TRL report **Converting the UK Traffic Noise Index $L_{A10, 18hr}$ to EU Noise Indices For Noise Mapping**. The methodology in this report has been accepted as the standardised method for this purpose by DEFRA.

- 13.2.48 Design manual for roads and Bridges. Vol 11 Environmental Assessment Section 3. Environmental Assessment Techniques Part 7 Noise and Vibration
- 13.2.49 This Advice Note provides guidance on the assessment of the impacts that road projects may have on levels of noise and vibration. The advice may also be applied to existing roads where appropriate.
- 13.2.50 Chapter 3 outlines procedures for assessing impacts and recommends obtaining date for a baseline year *“taken as that immediately prior to the start of the works”*.
- 13.2.51 This baseline year is taken as the opening year of the project and future assessment years for *“the operation is typically the 15th year after the opening of the project, but in some circumstance this may occur before the 15th year”*.
- 13.2.52 Para 3.12 and Table 3.1 (reproduced below) give guidance for classifying the *“magnitude of noise impact from a project”*.

<u>Noise change, $L_{A10,18h}$</u>	<u>Magnitude of Impact</u>
0	No change
0.1 – 0.9	Negligible
1 – 2.9	Minor
3 – 4.9	Moderate
5+	Major

Evaluation of operational plant

- 13.2.53 At the time of this assessment the exact details of the operational plant i.e. types of plant and operations are not available but as per the scoping reply from Bridgend CBC its noise impact will be assessed using this standard.
- 13.2.54 British standard BS 4142 is used to evaluate the likelihood of a noise provoking nuisance complaints not the evaluation of the existence of a nuisance. However Local Authorities will use its criteria to substantiate the existence of a nuisance or to evaluate the potential for a nuisance from new installations of plant.
- 13.2.55 In general, a noise is liable to provoke complaints whenever its level exceeds, by a certain margin that of the pre-existing background noise level. Measurements are taken near, but outside the noise sensitive property to the source in question usually 3m from the façade.
- 13.2.56 The specific noise level, in terms of L_{Aeq} is measured from the noise source in question during the period when noise complaints are most likely to arise, e.g., late evenings.
- 13.2.57 The ambient noise level i.e., all noises near and far measured without the specific noise level

present is termed the residual level. If the residual level is close to the specific noise level, the specific noise level is corrected to account for the addition of the background noise to the specific noise level measured.

- 13.2.58 If the specific noise level has a character which makes it particularly notice-able, e.g., a tonal or impulsive character, a penalty of 5 dB is added to the measured level in order to account for its more noticeable nature. Guidance for the addition of this penalty is usually taken from BS 7445. This indicates that “a prominent tonal component may be detected in one-third octave spectra if the level of a one-third octave band exceeds the level of the adjacent bands by 5 dB or more”. If tonal components are clearly audible and their presence can be detected by a one-third octave analysis, the adjustment may be 5 to 6 dB. In the case of BS 4142 this is a fixed penalty of 5 dB.
- 13.2.59 This corrected level (termed the rating level, $L_{Ar Tr}$) is then compared with the background level, L_{A90} , measured in absence of the specific noise source. The term, relates to the duration of the measurement period.
- 13.2.60 The background level, $L_{A90,T}$ is subtracted from the rating level, $L_{Ar Tr}$ and the result assessed as per Table 13.4:

Table 13.4 – BS 4142 Significance Criteria

<u>Condition</u>	<u>BS 4142 Semantic</u>
Rating level, $L_{Ar Tr}$ more than 10 dB below L_{A90} background level	"If the rating level is more than 10 dB below the measured background level then this is a positive indication that complaints are unlikely"
Rating level, $L_{Ar Tr}$ from 10 dB below to 5 dB(A) above L_{A90} background level	No BS description but the lower the value the less likely that complaints will occur
Rating level, $L_{Ar Tr}$ around 5 dB above L_{A90} background level	"A difference of around +5 dB is of marginal significance"
Rating level, $L_{Ar Tr}$ from 5 dB above to 10 dB above L_{A90}	No BS description but the more positive the difference, the greater the likelihood of complaints
Rating level, $L_{Ar Tr}$ 10 dB or more above L_{A90} background level	"Complaints are likely". "The greater this difference the greater the likelihood of complaints."

Evaluation of match days

- 13.2.61 The exact prediction of noise from match day crowds and use of the stadia has been based on an assessment of the worst case scenario of a capacity attendance at the main stadium i.e. a Celtic Crusaders home game. As the other playing areas are significantly smaller and

will not be used when the Crusaders are playing the cumulative impact of the use all areas has not been assessed.

13.2.62 However the impact of the increased traffic for the limited peak periods when the Crusaders play at home has been assessed in detail.

13.2.63 There are no criterion for assessing the impact of crowd and Public Address noise and it is anticipated from the scoping response that Bridgend CBC may refer to the guidelines in BS4142 even though they do not strictly apply i.e no increase over the background noise levels of more than 10dB. There is additional guidance referred to earlier in this Chapter from Tan 11 (Noise) that suggests that “ *local planning authorities may consider it reasonable to permit higher noise emission levels than they would from industrial development, subject to a limit on the hours of use, and the control of noise emissions (including public address systems) during unsocial hours*’.

Evaluation of concerts and events

The Noise Council Code of Practice on environmental noise control at concerts

13.2.64 The evaluation of music based events has not been undertaken at this stage as these will be the subject of a separate licensing application if required. It is likely that this type of event will be regulated using the guideline noise limits contained in this Code of Practice. This document recommends noise levels that should not be exceeded at noise sensitive properties as the result of music as per Table 13.5

Table 13.5 - Guideline Noise Limits

Concert calendar venue	days year, per per	Venue Category	Guidelines
1 to 3		Urban Stadia and Arenas	The MNL* should not exceed 75dB(A) over a 15 minute period
1 to 3		Other Urban and Rural Venues	The MNL should not exceed 65dB(A) over a 15 minute period
4 to 12		All Venues	The MNL should not exceed the background noise level #by more than 15dB(A) over a 15 minute period

Notes to Table 13.5

The Music Noise Level (MNL) value is the L_{Aeq} due to music measured at a distance of 1 metre from the facade of any noise sensitive premises.

The background noise level is the $L_{A(90)_t}$ measured at a time indicative of when events are to take place at the Stadium.

13.2.65 The code also includes a footnote which states that:-

‘Although no precise guidance is available the following may be found

helpful (ref 8): A level up to 70dB in either the 63Hz or 125 Hz octave frequency band is satisfactory; a level of 80dB or more in either of these octave frequency bands causes significant disturbance’.

- 13.2.66 For all events the code recommends that between 23:00 hrs and 09:00 hrs the MNL should not be audible within noise sensitive premises with the windows partially open for ventilation **and it is very unlikely that the licensing committee will licence any events during these hours.**

13.3 Methodology and Assessment Criteria

- 13.3.1 The assessment methods used for the proposed development are summarised below. For assessment purposes, the project has been divided into distinct elements, as follows:

- Construction Phase
- Operation of the facility under normal circumstances; and
- Traffic movements associated with operational activities.
- Traffic movements associated with match days.
- Noise generation on match days

- 13.3.2 All of the calculated and assessed noise and vibration levels are then compared with the noise and vibration levels created by the existing noise and vibration sources. The most significant existing sources are

- Traffic and
- Rail bypass .

Construction Phase

- 13.3.3 With regard to noise and vibration from construction activities, at the EIA stage of a project, there is often insufficient information to carry out a definitive noise and vibration assessment.

- 13.3.4 However in this case, and as per the guidance contained in BS 5288 using an indicative construction plan shown in Volume 2, the noise likely to be generated by the construction phase has been assessed.

- 13.3.5 The noise levels were calculated using the methodology in BS 5288 Part 1. The indicative noise data used in the calculations was taken from Annexes C and D. These calculations are reported in Appendix 13.1.

- 13.3.6 To establish the criteria to be used to assess the impact reference is made to the baseline ambient noise levels shown in Table 13.8. These calculated results are then compared with the criterion shown in Table 13.6 below

- 13.3.7 Using the BS 5288 “Threshold of significant effect Table 13.1 shown previously gives the

following classifications and maximum noise construction noise levels :

Table 13.6 Maximum construction noise before significant impact

Location	Ambient rounded level to nearest 5(dB)	Category as per Table 13.1	Maximum construction noise dB
Island Farm Close	45	A	65
Merthyr Mawr Road	75	C	75
Ty-Wrth-Y-Coed	55	C	55
Claypits Pottery	70	C	70

Operational Phase

13.3.8 Noise and vibration from the operation of the facility has been assessed as follows:

- Operational vibration not required as the site inherently will not generate significant vibration levels
- Operational Traffic noise –assessed by comparing increase in traffic flows due the normal operation of the site with existing traffic flows
- Match day Traffic noise –assessed by comparing increase in traffic flows on match days with existing traffic flows
- Plant operation will be assessed when detailed design is available.

Operational Traffic

13.3.9 This assessment considers the noise impact due to increased traffic flow associated normal daily activities (not main stadium match days)

13.3.10 Traffic survey data was collated to establish the existing baseline transport context of the site. See Chapter 6 prepared by OPUS for more detail

13.3.11 A traffic growth factor of 1.042 has been applied to the current figures to forecast the flows in the year of opening in 2012. These are the baseline traffic flow figures to be used in the impact assessment. (Source: NRTF and TEMpro).

13.3.12 A traffic growth factor of 1.142 has been applied to the baseline figures to forecast the flows in the future assessment year, 2027. These are the baseline traffic flow figures to be used in the impact assessment. (Source: NRTF and TEMpro).

13.3.13 Using the TRICS data supplied by OPUS, hourly traffic flows for each of the leisure facilities have been calculated. It is assumed that all traffic generated by the leisure facilities will use the main site entrance off the A48.

13.3.14 It has been proposed by OPUS that 31.7% of newly generated traffic to the science park will redirect through the main entrance off the A48. The remainder will use the entrance at

Technology Drive. It is assumed that the science park will not be operational on weekends.

Match Day and Event Traffic

- 13.3.15 Using the assessment method for operational traffic as per above to generate baseline traffic flows. The impact of the hourly peak flows for the arrival and departure of the spectators is assessed assuming a worst case scenario of 100% attendance

Noise generation on match days due to crowd and public address

- 13.3.16 There is no recommended or accepted method for assessing noise from spectator sports. A possible approach would be for the potential disturbance to be assessed using the BS4142 method, even though its prime purpose is for the assessment of industrial noise.
- 13.3.17 This method would provide a “best fit” with the scoping response from the local authority, i.e. no greater than a 10dB increase over the background noise. In this case the assessment is divided into a consideration of the main stadium, which is substantially an enclosed construction and the open playing area. As previously mentioned there is guidance in TAN 11 that allows the Local Authority considerable flexibility in setting noise limits for this type of use.

Main Stadium

- 13.3.18 The main stadium will be the primary noise producing source on the site. There will be two main sources of noise, the crowd and the public address systems.
- 13.3.19 The crowd noise will vary with crowd size and tempo of the game.
- 13.3.20 The propagation of this noise to neighbouring properties will be strongly controlled by the final design of the stadium. It is anticipated that the stadium will be designed to provide dry weather resistant accommodation for the spectators.
- 13.3.21 This type of design will inherently assist in minimising noise leakage. This may be as much as 20dB due to the structure coupled with the distance to the NSR's i.e. 400 to 500m could result in reductions of up to 70dB.
- 13.3.22 The actual reduction achieved will be dependant on the size of the crowd and its location in the stadium.
- 13.3.23 The public address (PA) system will be designed to control and focus announcements on the spectator areas. This concept is aided by the anticipated design of the stadium.
- 13.3.24 Sound levels from the PA should be designed as per BS7827:1996 Code of Practice for Designing specifying maintaining and operating emergency sound systems at sports venues.
- 13.3.25 The British Standard recommends that sound levels are 6dB above the $L_{A10,T}$ for 95% of the public areas.

Where $L_{A10,T}$ = the sound pressure exceeded for 10% of the time T.

- 13.3.26 Hence, the level that the PA is operated at will also be commensurate with the crowd size.
- 13.3.27 Indicative levels for the crowd, based upon measurements made at other sports facilities, show levels between 65dB and 100dB $L_{Aeq5mins}$. Though it should be stressed that the upper limits are only achieved at very large capacity football league grounds.

13.3.28 Therefore, the potential noise levels at the NSR's could vary from 5dB to 50dB $L_{Aeq5mins}$.

Plant operation

13.3.29 Plant Noise has not been assessed as at this stage as typically there is no detailed information available for the fixed items of plant to be used. These however are likely to be services orientated i.e. ventilation, coolers pumps etc and not significant noise sources on an individual basis.

13.3.30 A detailed assessment of the impact of these sources using the methodology contained in BS4142 will be undertaken at the detailed design stage. The final choice of plant items will be driven by selection of suitable items where adverse impacts are identified. To minimise disturbance this assessment and subsequent specification of plant will include an assessment and subsequent mitigation of any tonal noise.

13.4 Baseline Data and Assessment

13.4.1 With any assessment, there will be a degree of uncertainty regarding the results. In the case of this noise and vibration assessment, the uncertainties are as follows:

Baseline noise survey data

13.4.2 The baseline survey was carried out over a limited period albeit as per the requirements of Bridgend CBC. However there is a limited risk that such a small data sample does not robustly reflect more typical noise levels extant over a longer period. A summary of the results is shown in Table 13.7 This table summarises the lowest values of background noise collected as a series of round robin tests. These results will be used to evaluate the impact of plant noise . Table 13.8 Summarises ambient noise collected at the same time and is used to evaluate the impact of the construction phase. Note that in this case only day levels are shown as construction is not expected to take place at night. The full set of results and the survey method is contained in Appendix 13.3

Table 13.7 Summary of lowest background noise levels

Location	Time	$L_{A90,Tmins}$ (dB)
Island Farm Close	Day	36.6
	Evening	33.8
Merthyr Mawr Road	Day	67.0
	Evening	46.4
Ty-Wrth-Y-Coed	Day	37.0
	Evening	39.7
Claypits Pottery	Day	46.6
	Evening	34.6

Table 13.8 Day ambient noise levels

Location	Start Time (hrs:mins)	L _{Aeq,5mins} (dB)
Island Farm Close	15:44	43.7
Merthyr Mawr Road	16:06	76.4
Ty-Wrth-Y-Coed	17:58	54.2
Claypits Pottery	16:50	69.1

13.5 Predicted Effects

Consultations

13.5.1 A overall screening opinion which is included in Volume 3 Appendices for Chapters 1-4 from Bridgend CBC highlighted any concerns for the impact of noise and vibration.

13.5.2 The following informal consultations and discussions have informed this chapter:

- A telephone conversation with Mr Phillip Stanton of Bridgend CBC and subsequent email confirmed the following views on the assessment of noise and vibration for the development:
- The operational plant noise levels are not to increase current background noise levels measured or calculated as a L_{Aeq} by more than 10dB when assessed using BS4142 methodology.

13.5.3 The following is an extract from an email received from Mr Stanton on 02/07/2009

"I can confirm that the noise survey to assess current levels surrounding the site should include monitoring during the early hours of the morning. Monitoring can be carried out using short period monitoring as long as it can be demonstrated that the noise is representative of typical situations.

13.5.4 The agreed locations for monitoring are as follows:

- The southern end of Methyr Mawr Road.
- The southern end of either Island Farm Road or Island Farm Close.
- The western side of Ewenny Road in the area adjacent to Claypits Pottery.
- The area adjacent to Ty-Wrth-Y-Coed on the south western boundary of the proposed development

13.5.5 Hence the baseline noise levels at the NSR's specified in Para 1.3.35 above are to be taken as the lowest value of a series of 3 times 5 minute night time and 1 Hour daytime "round robin" measurements at each of the locations.

- 13.5.6 As there are no current proposals to use the site for live entertainment and it is anticipated that any such use would be the subject of separate licensing applications. Mr Stanton confirmed that such applications would be subject to the normal requirements of Bridgend CBC based upon the Code of Practice on Environmental Noise Control at Concerts

Assessment of Significance

Construction Phase

- 13.5.7 See Appendix 13. 1 for detailed calculations of the construction of the stadia and main buildings. The calculated noise levels vary from a minimum of 37dB to a maximum of 59dB. See Table 13.9 below which summarises the noise levels on a weekly basis. Note that these figures assume that compact piling would be used but subsequent investigations have shown that the ground conditions are not suitable. It is now proposed to use Continuous Flight Auger (CFA) piling which is inherently quieter than compact piling hence the noise levels in Table 13.9 should be taken as worst case.

Table 13.9– Summary of indicative Construction Phase noise assessment

Week No	Merthyr L_{Aeq} (dB)	Mawr L_{Aeq} (dB)	Ty-Wrth-Y-Coed L_{Aeq} (dB)	Island Close L_{Aeq} (dB)	Farm L_{Aeq} (dB)	Claypits Pottery L_{Aeq} (dB)
5--9	50		50	53		54
10--11	51		51	55		57
12	49		46	56		59
13--14	50		48	56		58
15	50		49	56		58
16	52		51	55		58
17	51		50	55		55
18	51		51	55		56
19	51		50	55		55
20	53		52	57		58
21--22	53		52	57		58
23	55		55	58		59
24	53		53	56		59
25	52		53	55		57
26	54		55	55		54
27	55		56	57		55
28	55		56	57		58

Week No	Merthyr L _{Aeq} (dB)	Mawr	Ty-Wrth-Y-Coed L _{Aeq} (dB)	Island Close L _{Aeq} (dB)	Farm	Claypits Pottery L _{Aeq} (dB)
29	55		56	57		55
30	53		54	56		55
31--32	52		52	55		54
33	52		52	55		54
34	47		47	50		51
35	47		48	50		49
36	49		49	51		50
39	49		50	51		49
40	49		50	51		49
41	47		47	49		48
42--43	45		45	47		46
44	44		44	45		45
45-50	37		37	42		44

- 13.5.8 Comparing these values with the guidelines shows that they are significantly less than the criterion for each reference location.
- 13.5.9 The development of the science park buildings has not been assessed for noise or vibration for the following reasons. They are to be over a period of 60 months and will use building techniques more akin to traditional domestic development. This is particularly important when looking at the foundations which will be poured concrete raft type rather than piled.
- 13.5.10 Vibration levels will be negligible at all locations given the separating distance of 15m - as an exclusion zone (See the Development Framework Plan)- between the development and the nearest properties and the proposed use of Continuous Flight Auger (CFA) piling techniques rather than compact piling that requires the use of impacting piles into the ground.
- 13.5.11 BS 5288 Part 2 confirms the use of CFA as inherently low vibration in Annex F

"F.3.2.4 Continuous flight auger injected piling and pressed-in piling

The levels of vibration associated with continuous flight auger injected piling and pressed-in piling are minimal, as the processes do not involve rapid acceleration or deceleration of tools in contact with the ground but rely to a large extent on steady motions. "

Operational Traffic

- 13.5.12 The predicted impact from noise assessed as per Table 3.1 DMRB(Volume 11, Section 3, Part 7 HA213/08,) due to the operational traffic is shown in Table 13.10 below.

Table 13.10 Potential noise impact due to operational traffic flow increases

Location	Year	Period	% flow increase	dB increase	Impact Significance
A48/Site Junction	2012	Saturday	21	0.8	negligible
		Sunday	24	0.9	negligible
		Weekdays	23	0.9	negligible
	2027	Saturday	19	0.8	negligible
		Sunday	21	0.8	negligible
		Weekdays	20	0.8	negligible
Technology Drive	2012	Saturday	1	0.0	negligible
		Sunday	1	0.0	negligible
		Weekdays	24	0.9	negligible
	2027	Saturday	1	0.0	negligible
		Sunday	1	0.0	negligible
		Weekdays	21	0.8	negligible

Match Day and Event Traffic

13.5.13 Similarly the predicted impact from noise due to the match day traffic is shown in Table 11 below.

Table 13.11 Potential noise impact due to match day traffic flow increases

Location	Year	Period	% flow increase	dB increase	Significance
A48/Site Junction	2012	Saturday pre-match	86	2.7	minor
		Sunday pre-match	113	3.3	moderate
		Saturday post-match	178	4.4	moderate
		Sunday post-match	68	2.3	minor
	2027	Saturday pre-match	76	2.5	minor
		Sunday pre-match	99	3.0	moderate
		Saturday post-match	156	4.1	moderate
		Sunday post-match	60	2.0	minor
Technology	2012	Saturday pre-match	33	1.2	minor

Location	Year	Period	% flow increase	dB increase	Significance
Drive		Sunday pre-match	37	1.4	minor
		Saturday post-match	85	2.7	minor
		Sunday post-match	90	2.8	minor
	2027	Saturday pre-match	29	1.1	minor
		Sunday pre-match	32	1.2	minor
		Saturday post-match	75	2.4	minor
		Sunday post-match	79	2.5	minor

Match day crowd and PA Activities

13.5.14 As the noise levels from the crowd could vary at the NSR's from 5 to 50 dB this would represent a subjective impact of negligible for most of the time to significant for very limited periods.

Operational Activities

13.5.15 The local authority has specified no more than 10dB increase in existing noise levels as BS4142.

13.5.16 All plant will be designed to meet this requirement when individual noise levels are combined as an overall level at the NSR's.

Cumulative Impacts

13.5.17 The cumulative effects of the development have been assessed by adding noise and vibration levels to those anticipated from committed developments in the area. The same NSR's have been considered for the cumulative impacts as for the direct impact of the proposed development. The confirmed developments considered in this section are:

- 365 residential properties at The Broadlands

Operational Vibration

13.5.18 Whilst there are no very large items of plant required for this type of development, vibration effects arising from operational plant usually do not occur, or should not occur, and are resolved during commissioning testing

13.5.19 On this basis, and due to the separation distances between the site and NSR's, it is most unlikely that significant adverse effects would occur, i.e. vibration levels in/at NSR's will not cause even cosmetic building damage and will not be detectable by residents.

Operational Activities

13.5.20 The site will not operate on a 24 hour basis, rather seven days a week, between 07:00 to

23:00 hrs. On this basis, it is appropriate to assess the impact of operational noise during the weekend day and night-time which is the most sensitive time of day that the facility will operate.

- 13.5.21 In general, noise propagation techniques usually favour worst-case conditions (i.e. light downwind propagation from sources towards receivers). It is therefore worth noting that for conditions when the site is downwind of the residential properties, the expected noise contribution from the plant at the properties would be approximately 10 dB(A) less than when the properties are upwind.

Match Day Activities

- 13.5.22 These will result in increased noise from traffic and crowd noise during a match
- 13.5.23 The duration of both of these activities is very limited with peak traffic flows for 1 hour and crowd noise for possibly 90 minutes at the most and then controlled by the size of the crowd and the tempo of the game

Noise

- 13.5.24 As the noise from residential developments are subject to planning conditions to ensure that they have a minimal impact on the NSRs' adjacent to them ; given the distance to the NSRs assessed in this chapter they are not considered to have any impact on the NSRs' identified in this chapter.
- 13.5.25 As the predicted levels meet or exceed anticipated Bridgend CBC conditions there are no unforeseen cumulative impacts from the operation of the site.

Vibration

- 13.5.26 Given the distances to sensitive receptors vibration is unlikely to be detectable from this development.
- 13.5.27 By inference if the vibration levels are undetectable there will be no likelihood of structural damage as a result of the proposed development.

13.6 Summary and Conclusions

Assessment of Impact Significance

Operation

- 13.6.1 The site will be designed to cause no increase in current ambient noise levels or background vibration at the nearest sensitive receptors.
- 13.6.2 The exception to this will be the match day crowd noise which for a very limited period and crowd levels approaching capacity may result in noise level increases that would subjectively be significant but more likely to be marginal to noticeable See Table 13.12 below
- 13.6.3 The public address system use will be commensurate with crowd size and number of events and again would be for very limited periods and result in subjectively significant for peak capacities and marginal to noticeable for smaller crowds

Table 13.12 Subjective Response to Noise

Change in Sound Level dB(A)	Subjective Impression	Human Response to Noise
0 - 2	Imperceptible change in loudness	Marginal
3 – 5	Perceptible change in loudness	Noticeable
6 - 10	Up to a doubling of halving or loudness	Significant
11 - 15	More than a doubling or halving of loudness	Substantial
16 – 20	Up to quadrupling or quartering	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial

Mitigation

Construction

- 13.6.4 The construction of the sports village has the most predicted impact but Crucially for this development only for very limited periods of the 20 months construction program and this impact will be controlled in two ways.
- 13.6.5 Impact will be minimised where necessary through environmental controls defined in a Construction Environmental Management Plan or Code of Construction Practice, either of which can contain specific plans or procedures to address aspects such as waste or traffic.
- 13.6.6 Additionally the Local Authority can specify working hours and noise and vibration limits using the powers of The Control of Pollution Act (CoPA). Before the development commences Island Farm will submit for approval a detailed construction plan for approval by Bridgend CBC to be agreed with the local authority prior to development when detailed construction plans are available.
- 13.6.7 There are no predicted adverse impacts from the daily traffic flows due to the normal operation of the site.

Operation

- 13.6.8 The whole of the proposed site will be designed using equipment, production methods and layout to minimise the impact of noise on neighbouring residential properties.

Residual Impact

Construction

- 13.6.9 None predicted.

Operation

- 13.6.10 There is only a minor to moderate residual impact predicted for the daily operational activities. due to noise and then only for large match day events. for relatively short periods.
- 13.6.11 In the event of concerts taking place the controls available to Bridgend CBC through licensing will ensure only a minor to moderate residual impact from entertainment noise.
- 13.6.12 There is no residual vibrational impact predicted.

Table 13.7 Summary of Residual Impacts

Resource	Phase	Residual Effect	Sensitivity of Receptor	Magnitude of Impact	Duration	Nature	Significance	Geographical Level of Importance of Issue				
								I	N	R	D	L
Operation	Road Traffic Noise	Low	Low	Perm.		Neutral					X	
	Daytime Operational Noise	Med	Low	Perm.		Neutral					X	
	Night time Operational Noise	High	Low	Perm.		Neutral					X	

Key: I: International N: National R: Regional D: District L: Local

13.7 References

ISO 9613 Acoustics – Attenuation of sound propagation outdoors. Parts 1 & 2

BS 4142 1997 Rating Industrial noise affecting mixed residential and industrial area

Planning Guidance (Wales) TAN (Wales) 11 Noise 1997

British Standards Institution. BS 5228. Noise and Vibration Control on Construction and Open Sites. Part 1 – Code of Practice for Noise and Vibration Control on Construction and open sites 2009.

British Standards Institution. BS 5228. Noise and Vibration Control on Construction and Open Sites. Part 2 – Vibration.

British Standards Institution. BS 6472. Guide to evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz), 1992.

British Standards Institution. BS 7385-1 (ISO 4866). Evaluation and measurement for vibration in buildings. Guide for measurement of vibrations and evaluation of their effects on buildings, 1990

British Standards Institution. BS 7385-2. Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration. 1993.

Calculation of Road Traffic Noise

D.O.T.

Noise Council Code of Practice on environmental noise control at concerts

1995

BS7445:1996 "Description and Measurement of Environmental Noise"

13.8 Glossary

Acoustics - The science of the production, control, transmission, reception and effects of sound and of the phenomenon of hearing.

Ambient noise - Totally encompassing sound in a given situation at a given time, composed of sound from many sources.

A-weighting - Frequency response curve which approximates to the sensitivity of the ear.

Background noise level $L_{A90, T}$ - Usually described in terms of the L_{A90} level: the level exceeded for 90% of the time.

Decibel (dB) - Unit of sound-pressure level; one tenth of a bel. A logarithm unit for measuring the relative loudness of noise, i.e. the sound level. The reference value is taken as the quietest sound that can be heard by someone with normal hearing at a frequency of 1,000 Hz

Frequency - The number of times in one second that a cyclic fluctuation repeats itself.

Hertz (Hz) - Unit of frequency, cycles per second.

L_{AN} - The A-weighted sound pressure level which is exceeded for N% of the time.

(eg., L_{90} level exceeded for 90% of the time, commonly called background noise

L_{A10} level exceeded for 10% of the time, used for traffic noise calculations)

Equivalent continuous sound level, $L_{eq,T}$ (dB): - The continuous equivalent sound level, $L_{eq,T}$ is a notional sound level. It is the sound level which if maintained for a given length of time would produce the same acoustic energy as a fluctuating noise over the same period.

This is implemented electronically in all good sound level meters and it is customary to measure rather than calculate the equivalent continuous sound level. It should be remembered that any value of $L_{eq,T}$ should be accompanied by the time over which it was measured. $L_{eq,T}$ is widely used to measure environmental noise which varies considerably with time.

Level - Of a quantity related to power: the ratio, expressed in decibels, of the magnitude of the quantity to a specified reference magnitude.

Maximum sound pressure level L_{max} - This is the maximum value of the sound pressure level that occurs during any given period. Its value will depend upon the frequency weighting and meter time characteristic. The maximum slow A-weighted sound level during an aircraft flyover is used in the

assessment of aircraft noise.

Noise - Sound which is undesired by the recipient.

Noise emission level - The dB(A) level measured at a specified distance and direction from a noise source, in an open environment, above a specified type of surface. Generally follows the recommendation of a national or industry standard.

Noise Exposure Categories for Dwellings (NECs) - When assessing a proposal for residential development near a source of noise, local planning authorities should determine into which of the four noise exposure categories the proposed site falls, taking account of both day and night-time noise levels. Local planning authorities should then have regard to the advice in the appropriate NEC, as below:

NEC	
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

Octave - A frequency ratio of 2.

Pascal - A unit of pressure corresponding to a force of 1 newton acting on an area of 1m².

Peak value - Of a varying quantity in a specific time interval: the maximum numerical value attained, whether positive or negative.

Peak Particle Velocity - Greatest instantaneous particle velocity during a given time interval.

Particle Velocity- Velocity of particles set into motion by the propagation of a disturbance through the ground and a structure by a source of vibration.

Point source - A sound source which can be idealised as a point in space.

Rating level $L_{Aeq,Tr}$ - The specific noise level plus any adjustment for the characteristic features of the noise.

Reference time interval (T_r) - The specified interval over which an equivalent continuous A-weighted sound pressure level is determined.

Residual noise - The ambient noise remaining at a given position in a given situation when the

specific noise source is suppressed to a degree such that it does not contribute to the ambient noise.

Sound level - *The level of sound measured with a sound level meter and one of its weighting networks. When A-weighting is used, the sound level is given in dB(A).*

Sound power - *The total sound energy radiated by a source per second.*

Sound power level (PWL) - *The fundamental measure of sound power. Defined as*

$$L_W = 10 \log P/P_0 \text{ dB}$$

where P is the RMS value of sound power in watts, and P₀ is 1 pW

Sound pressure - *A dynamic variation in atmospheric pressure. The pressure at a point in space minus the static pressure at that point.*

Sound pressure level (SPL) - *The fundamental measure of sound pressure defined as:*

SPL = 10 log (p/p₀)² dB, where p is the RMS value of sound pressure in pascals, and p₀ is 0.00002 pascals.

Sound propagation - *The wave process whereby sound energy is transferred from one part of a medium to another.*

Specific noise level (L_{Aeq,Tr}) - *The equivalent continuous A-weighted sound pressure level in decibels at the measurement position produced by the specific noise source over a given reference time interval. The specific noise level is quoted to the nearest whole number of decibels.*

Specific noise source - *The noise source under investigation for assessing the likelihood of complaints.*

Statutory Nuisance is defined as “an inconvenience materially interfering with the ordinary comfort, physically, of human existence, not merely according to elegant or dainty modes of living, but according to plain and sober and simple notions amongst English people.”

a) *it must be prejudicial [injurious] to people's health or interfere with a person's legitimate use and enjoyment of land. This is most relevant to nuisance to neighbours in their homes and gardens. The problem would have to be persistent and regular to be considered a statutory nuisance - for instance, a one off bonfire or noisy party would not normally be considered a nuisance.*

b) *it must included in the list of statutory nuisances defined in Part III s.79 of the Environmental Protection Act 1990*

For a matter to qualify and be actionable as a nuisance in law it must be a serious matter.

One-off events are rarely sufficient. Also, specific sensitivities of those suffering cannot be taken account of in deciding whether a matter is a nuisance.

Tone

(a) A sound giving a definite pitch sensation.

(b) Sometimes, also, the physical stimulus giving rise to the sensation.

Vibration - An oscillation wherein the quantity is a parameter that defines the motion of a mechanical

0 dB is regarded as the threshold of hearing, 120 dB as the threshold of pain. Normal conversation (at 1 meter) is approximately 60 to 65 dB. A 1dB increase is the theoretical smallest audible change in level. This would only be noticed if the two sounds were presented in quick succession, or under controlled conditions. A change of less than 3 dB is difficult for the human ear to detect. It is the minimum of perceptible under normal conditions and is the smallest audible change which could be detected over a period of time. Doubling the energy level increases the noise level by 3dB. A change of 5dB would correspond to a clearly noticeable change loudness. A change of 10dB corresponds roughly to halving or doubling the perceived loudness of a sound.

Sound Pressure Level dB	Typical Environment Average	Subjective Description
140	30m from military aircraft at take off	Threshold of pain
130	Pneumatic chipping and riveting (operator's position)	Intolerable
120	Boiler shop (maximum levels) Ships engine room (full speed)	
110	Automatic punch press (operator's position) Sheet metal shop - hand grinding Textile weaving room	
100	Automatic lathe shop Platform of underground station (maximum levels) Printing press room	Very noisy
90	Heavy lorries at 6m. Construction site – pneumatic drilling	
80	Kerbside of busy street Office with tabulating machines	
70	Loud radio (in average domestic room)	Noisy

Sound Pressure Level dB	Typical Environment Average	Subjective Description
60	Restaurant Department Store	
50	Conversational speech at 1m.	
40	Average suburban area Whispered conversation at 2m. Residential area at night	Quiet
30	Bedroom at night	
20	Background in TV and recording studios	Very Quiet
10		
0	'Normal' threshold of hearing	Barely Audible