Redevelopment of Porthcawl Waterfront

CHAPTER 8 – Noise

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8.1. Introduction

Background

8.1.1. The following Chapter has been prepared by Paul Gurney, Senior Acoustic Consultant at Stantec. Paul has 4 years' experience within acoustics, noise and vibration consultancy and is a Member of the Institute of Acoustics (MIOA). Paul has worked on assessment and planning of residential, healthcare, commercial, education and leisure projects. Paul has also supported design teams and contractors on these projects through later stage design development and construction stages.

8.1.2. This Chapter of the Environmental Statement (ES) assesses the likely significant effects of the Proposed Development, as described in **Volume 1, Chapter 4** of this ES, in terms of noise and vibration during the construction and operational phases. The main body of this chapter considers only the impact of the proposed development on existing noise and vibration sensitive uses.

8.1.3. A separate assessment of the suitability of the site for the proposed sensitive uses, in terms of the existing noise climate, is provided in **Volume 3, Appendix 8.3**. A summary of key decisions made during development of the proposed layout is provided in **Volume 3, Appendix 8.4**.

8.1.4. **Volume 3, Appendix 8.5** includes an assessment of noise and vibration risks associated with the co-location of noise generating and proposed sensitive uses, and guidance on addressing these risks as the design of each plot is brought forward.

8.1.5. Designers and planners engaged in developing the scheme, including the design of each building and those considering appropriate uses, should pay close attention to the mitigation advice in **Sections 0 – 0** of this Chapter and the guidance in **Volume 3, Appendix 8.5** to provide effective control of noise affecting existing and proposed sensitive uses.

8.1.6. A full list of the Technical Appendices is provided below:

- **Volume 3, Appendix 8.1:** Relevant legislation, standards and guidance.
- **Volume 3, Appendix 8.2:** Baseline noise survey methodology, locations, and results.
- **Volume 3, Appendix 8.3:** Noise impact of existing noise sources on proposed sensitive uses.

- **Volume 3, Appendix 8.4:** Description of the proposed layout and summary of the decisions that led to the final layout proposal.
- **Volume 3, Appendix 8.5:** Noise and vibration risks associated with the co-location of noise generating and new noise sensitive uses.

Proposed Development

8.1.7. The Proposed Development comprises the following:

- Up to 980 homes
- Approximately 20 ha of open space including a series of new significant public open spaces with different offers
- 2.2 ha of land for educational use
- Approximately 130,000 square feet of commercial and leisure floorspace including retail uses, a Hotel, Lido and Gym / Studio Space.
- Enhancement of Porthcawl Harbour environment
- New coastal defence works
- A flexible meanwhile leisure use space (approximately 23,500 square feet)
- Approximately 6,500 square feet of flexible community / civic space
- Provision of up to 600 public parking spaces within the site area
- New spine road access from the Eastern Promenade to Sandy Bay
- Enhancement of the Griffin Park and proposed new facilities including MUGA

8.2. Scope and Assessment Methodology

Study Area

8.2.1. The study area incorporates the application site (Porthcawl Waterfront) and the existing noise-sensitive receptors (NSR) adjacent to (and within) the application boundary. Generally, the impact of noise sources located on the Proposed Development site is considered at the closest or worst-affected sensitive use adjacent to (or within) the application boundary.

8.2.2. The impact of changes in traffic flow is considered across all road links where a significant change in flow is predicted. A significant change in road traffic flow (in terms of noise) is defined as a change that would result in a 1dB or more change in the Basic Road Noise Level (as defined in CRTN). A 1dB change in the Basic Road Noise Level would occur where traffic flow increases by 20% or decreases by 25% on a given link, with all other factors being unchanged.

Expected Noise and Vibration Sources

8.2.3. The proposed development will include residential dwellings, commercial and leisure uses. Dwellings are not significant sources of noise during operation but there could be an impact during construction and due to resulting increases in traffic flow. The proposed leisure uses will generate sound which, depending on the context, may be unwanted (i.e. noise). Commercial noise should be assessed against BS4142 to determine the likelihood of adverse impact, depending on the context.

8.2.4. A list of expected noise and vibration sources during construction is provided below:

i. Mobile and fixed plant on the construction site during ground works and site preparation, including piling and excavation

ii. Mobile and fixed plant during later construction stages (e.g. cranes, generators)

iii. High noise hand tools (e.g. grinders, saws)

iv. Construction traffic

8.2.5. Note, it is not known at this stage exactly what plant and equipment will be required during construction. For example, it will not be known until foundation designs are complete whether piling will be required or what form it will take. The assessment at this stage

provides a worst-case indication of the type of construction activities that could result in a significant impact and how this impact might be controlled.

8.2.6. There is also no information on construction traffic. For example, it is not known, at this stage, how much material will need to be brought to the site, or exported, and over what period. Therefore, a high-level assessment of the potential risks from construction traffic is provided. This will need to be expanded when more information is available.

8.2.7. A full list of all assessed noise and vibration sources during operation is provided below:

i. Road noise due to new traffic associated with the Proposed Development

ii. Car park noise activity at the Coney Beach public car park

iii. Fixed plant noise (from new mechanical units serving residential, commercial and leisure uses at the Proposed Development)

iv. Leisure noise (from the swimming pool, gym/studio, flexible community space, outdoor arena, funfair, MUGA, pump track/skate park, treetop adventure walk, mini golf course and community pavilion)

8.2.8. In addition to the noise and vibration sources listed above, the following noise and vibration sources are assessed at proposed residential dwellings in **Volume 3, Appendix 8.3**:

i. Bus station noise at the existing Porthcawl Metrolink

ii. Recreational noise from the proposed Splash Park

iii. Transport noise at the existing Porthcawl ALDI supermarket

iv. Fixed plant noise at the existing Porthcawl ALDI supermarket

8.2.9. In some cases, the exact details of proposed uses have not yet been defined. For example, the fair ground has been designated for fun-fair activities. The noise impact of this will depend on the scale and types of rides included, and whether the rides are temporary or permanent. A worst-case assessment is provided to allow limitations of proposed uses to be defined.

Legislation, Standards and Guidance

8.2.10. **Table 8.1** lists legislation relevant to the proposed scheme and discusses the way in which it is applicable.

Table 8.1: Summary of legalisation, standards and guidance relevant to noise and vibration

Document	Summary
Legislation	
The Building Regulations Approved Document E 2010 & Approved Document O 2022 (ADE & ADO)[i]	Approved Document E and O to the Building Regulations provide legal standards for sound insulation between spaces and noise control during overheating.
BB93 Acoustics Design of Schools: performance standards 2015 (BB93)[ii]	Sets acoustic performance standards for schools, supporting compliance with Building Regulations and education-specific legislation.
The Control of Pollution Act 1974 (COPA)[iii]	Provides a framework for setting and enforcing noise and vibration requirements for construction sites
Environmental Protection Act 1990 (EPA)[iv]	Provides a framework for dealing with noise nuisance complaints from individuals
Environmental Act (Wales) 2024 (EAW)[v]	Establishes duties for managing soundscapes and environmental noise across Wales.
Policy	
Planning Policy Wales (PPW)[vi]	National planning policy promoting sustainable development and placemaking.
Noise and Soundscape Plan for Wales (NSPW)[vii]	Strategic framework to improve sound environments and support public health and wellbeing.
Future Wales: National Plan 2040 (FWNP)[viii]	Long-term spatial strategy guiding development and land use across Wales.
Technical Advice Noise 11: Noise (TAN11)[ix]	Planning guidance on assessing noise impacts and site suitability for residential use.
Local Policy	
Bridgend Local Development Plan (BLDP)[x]	Statutory plan directing land use and development in Pembrokeshire, excluding the National Park.
Guidance	
British Standard BS5228 Part 1: 2009+A1:2014 – Construction Noise (BS5228-1)[xi]	Guidance on controlling noise emissions from construction sites
British Standard BS5228 Part 2: 2009+A1: 2014 – Construction Vibration (BS5228-2)[xii]	Guidance on controlling vibration from construction sites
British Standard BS 8233:2014 (BS8233)[xiii]	Guidance on control of noise in and around buildings, provides internal noise limits for various building types
British Standard 4142:2014+A1:2019 (BS4142)[xiv]	Sets out a standard methodology for assessing commercial and industrial noise emissions, such as plant noise, including from residences

World Health Organisation Guidelines on Community Noise (WHO)[xv]	Worldwide guidance on noise control to reduce adverse effects on humans
ProPG: Planning & Noise (ProPG)[xvi]	Guidance on controlling transportation noise for residential developments
Acoustics Ventilation and Overheating – Residential Design Guide (AVO)[xvii]	Guidance on controlling external noise ingress into residences during the overheating condition
Calculation of Road Traffic Noise (CRTN)[xviii]	UK method used to estimate noise levels from road traffic based on factors like traffic flow, speed, and road type.
Design Manual for Roads and Bridges LA111 Noise and Vibration Revision 2 (DMRB)[xix]	Guidance on assessing noise impact from roads
Sports England Artificial Grass Pitch Acoustics - Planning Implications (SEAGP)[xx]	Set out methodology to assess and mitigate noise impacts from AGPs, especially when located near residential or sensitive receptors.
Code of Practice on Environmental Noise Control at Concerts[xxi]	Guidance on noise limits for environmental noise at concerts on nearby receptors
Noise from Pubs and Clubs Final Report (Davies et al, March 2005)[xxii]	Guidance on noise limits for environmental noise at pubs and clubs on nearby receptors
VDI 3770 Emissionskennwerte von Schallquellen - Sport und Freizeitanlagen (VDI, September 2012)[xxiii]	Guidance on typical noise emission values for facilities providing recreational and sporting activities
Institute of Environmental Management and Assessment (IEMA) Guidelines: Environmental Assessment of Traffic and Movement[xxiv]	Guidance on the assessment of traffic and movement noise at noise sensitive receptors

8.2.11. Full summary information for each of the legislation, guidance and standard documents is provided in **Volume 3, Appendix 8.1**.

Value and Sensitivity of Receptors

8.2.12. For the purposes of the construction and operational noise and vibration impact assessments, a number of Noise Sensitive Receptors (NSRs) adjacent to the application boundary have been identified from site investigations. The identified NSRs adjacent to the application boundary are used to produce a worst-case assessment. The impact at NSRs further from the application boundary will be less.

8.2.13. The existing and proposed NSRs which have been considered in the assessment are listed in **Table 8.2**, and shown in **Volume 3, Figure 8.1** and **Volume 3, Figure 8.2**.

Table 8.2: Nearest identified Noise Sensitive Receptors (NSRs)

Receptor reference	Receptor	Receptor type
NSR 1	Porthcawl Marina commercial buildings	Commercial
NSR 2	Glamorgan Holiday Home (currently derelict)	Residential
NSR 3	Residential dwellings and commercial premises located off Hillsboro Place and Dock Street.	Residential & Commercial
NSR 4	Porthcawl Police Station	Public Service Building
NSR 5	Porthcawl Fire Station, Awel-Y-Mor Community Centre, Residential Dwellings on Wellfield Avenue.	Residential & Public Service Buildings
NSR 6	Aldi Supermarket	Commercial
NSR 7	Residential dwellings on Mackworth Road, seafront café/restaurants.	Residential & Commercial
NSR 8	Residential dwellings on Mackworth Road and Glan Road, Kingdom Hall of Jehova's Witnesses.	Residential / Place of Worship
NSR 9	Newton Primary School	Educational Facility
NSR 10	Residential dwellings on New Road	Residential
NSR 11	Trecco Bay Caravan Park	Residential
NSR12	Sandy Bay Caravan Park	Residential

8.2.14. **Table 8.3** outlines the sensitivity descriptors used for the assessment of NSRs, which are based upon IEMA Guidelines for Environmental Noise Impact Assessment[xxiv] and the descriptions within the Noise Exposure Hierarchy in PPG-Noise and the context of the Proposed Development.

Table 8.3: Sensitivity descriptors

Sensitivity	Description
High	Receptor/resource has little ability to absorb change without fundamentally altering its present character, or of international or national importance. For example, hospitals, internationally and nationally designated nature conservation sites which are also known to contain noise sensitive species (i.e. noise may change breeding habits or threaten species in some other way).
Medium	Receptor/resource has moderate capacity to absorb change without significantly altering its present character. For example, residential dwellings, offices, schools, and play areas. Locally designated nature conservation sites which are also known to contain noise sensitive species (i.e. noise may change breeding habits or threaten species in some other way).
Low	Receptor/resources is tolerant of change without detriment to its character or is of low or local importance. For example, industrial estates.

Negligible	Receptor/resource is not sensitive to noise.

8.2.15. The identified NSRs adjacent to the application boundary are graded in terms of their sensitivity to noise in **Table 8.4**.

Table 8.4: Sensitivity of noise sensitive receptors (NSRs)

Receptor reference	Receptor type	Sensitivity
NSR 1	Commercial	Low
NSR 2	Residential	Medium
NSR 3	Residential & Commercial	Medium
NSR 4	Public Service Building	Low
NSR 5	Residential & Public Service Buildings	Medium
NSR 6	Commercial	Low
NSR 7	Residential & Commercial	Medium
NSR 8	Residential / Place of Worship	Medium
NSR 9	Educational Facility	Medium
NSR 10	Residential	Medium
NSR 11	Residential	Medium
NSR12	Residential	Medium

Magnitude – Noise from Construction & Demolition Activities

8.2.16. The likely significant effects of noise from construction and demolition works have been assessed in accordance with the 'ABC Method' of BS 5228-1 (British Standards, 2009)[xi].

8.2.17. This method defines category threshold values which are determined by the time of day and existing monitored ambient noise levels in the vicinity of the identified NSRs adjacent to (and within) the application boundary (rounded to the nearest 5dB). Noise likely to be generated by construction and demolition activities, known as the 'total noise level', is then compared with the 'threshold value'. If the total noise level exceeds the 'threshold value', a significant effect is deemed likely to occur.

8.2.18. **Table 8.5** summarises the significance effect threshold values at receptors, as recommended by BS 5228-1 (British Standards, 2009).

Table 8.5: Thresholds of significant effect at noise sensitive receptors (NSRs) in accordance with the 'ABC Method' of BS 5228-1

Assessment category threshold value period	Threshold Value, dB		
	Category A[1]	Category B[2]	Category C[3]
Weekday daytime (07:00 to 19:00) and Saturdays (07:00 to 10:00)	65	70	75

8.2.19. [1] Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than this value.

8.2.20. [2] Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as Category A values.

8.2.21. [3] Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are more than this value.

8.2.22. The construction noise limit category for each receptor is derived in **Table 8.6**.

Table 8.6: Thresholds of significant effect at noise sensitive receptors (NSRs) in accordance with the 'ABC Method' of BS 5228-1

Receptor reference	Sensitivity	Typical range of daytime ambient noise levels ($L_{Aeq,16hr}$, dB)	Construction noise category	Resultant construction noise threshold of potential significant effect (dB)
NSR 1	Low	53 – 56	A	65
NSR 2	Medium	62 – 64	B	70
NSR 3	Medium	53 – 56	A	65
NSR 4	Low	58 – 60	A	65
NSR 5	Medium	58 – 60	A	65
NSR 6	Low	58 – 60	A	65
NSR 7	Medium	44 – 47	A	65
NSR 8	Medium	51	A	65
NSR 9	Medium	45 – 47	A	65
NSR 10	Medium	45 – 47	A	65
NSR 11	Medium	45 – 47	A	65
NSR 12	Medium	45 – 47	A	65

8.2.23. **Table 8.7** below outlines the magnitude of impacts associated with demolition and construction noise with respect to the construction noise category values for NSRs.

Table 8.7: Magnitude of impact for noise from construction & demolition activities

Magnitude of impact	Construction & demolition noise level
Major	> Category threshold value +5 dB
Moderate	> Category threshold value
Minor	≤ Category threshold value
Negligible	< Existing ambient noise level

Magnitude – Vibration from Construction & Demolition Activities

8.2.24. For vibration from plant and machinery operations, a level of 1 mm/s represents the onset of significant effects (minor significance). According to BS 5228-2 (British Standards, 2009) [xii] this represents a level that can be tolerated if warning and explanation has been given to residents.

8.2.25. A level of 10 mm/s has been adopted to represent the onset of a major effect and is a point at which vibration is likely to be intolerable to humans for anything more than a very brief period of exposure inside buildings.

8.2.26. Whilst not directly referenced in the relevant guidance, an in between category of 5mm/s for a moderate effect has been used. If vibration levels are expected to exceed this threshold there is a risk of short periods of vibration exceeding the major significance threshold and therefore action should be taken.

8.2.27. The adopted magnitude of impact scale for vibration from plant and machinery is presented in **Table 8.8.** This considers potential impacts on building occupants. Note that it is possible for vibration to cause cosmetic damage and even structural damage to buildings, but this occurs at level already intolerable to occupants (i.e. 15mm/s for the onset of potential cosmetic damage to typical dwelling houses).

Table 8.8: Magnitude of impact for vibration from construction & demolition activities

Magnitude of impact	Free-field vibration (peak particle velocity, mm/s)	Comments
Major	≥10.0	**Building Occupants:** BS 5228-2 states that vibration is likely to be intolerable (for humans) for any more than a brief exposure to this level.
Moderate	5.0-9.9	**Buildings:** Cautious threshold of 5mm/s applied for threshold of moderate significance .
Minor	1.0-4.9	**Building Occupants:** BS 5228-2 states that a level of 1 mm/s in residential environments may cause complaint but can be tolerated if prior warning and explanation has been given to residents.
Negligible	<1.0	**Building Occupants:** BS 5228-2 states that vibration might just be perceptible in residential environments at 0.31mm/s.

8.2.28. The values in **Table 8.8** relate to free-field vibration in the ground outside of a building, which can be assumed to be representative of vibration experienced at the point of entry to the body by building occupants (or humans in outdoor spaces). The free-field vibration also provides a likely overestimate of vibration at the foundation of the building.

Magnitude – Change in Road Traffic Noise

8.2.29. Noise predictions have been carried out in accordance with CRTN to ascertain any potential changes in road traffic noise at existing receptors associated with the Proposed Development.

8.2.30. Predictions have been carried out for 2033, with and without the proposed development (inc. Committed Developments), to determine the change in road traffic noise level at the NSRs.

8.2.31. The appointed Transport Consultant has provided the 18-Hour Annual Average Weekday Traffic (AAWT) data for the aforementioned assessment scenarios, including Heavy Good Vehicle (HGV) percentages. Predicted noise levels are based on known speed limits for each road link in the absence of average speed data.

8.2.32. The Design Manual for Roads and Bridges, LA111, Noise and Vibration, (DMRB) [xix] provides guidance on defining the magnitude and significance of noise impacts associated with changes in road traffic flows.

8.2.33. The magnitude of impact can be determined on the basis of a change in road traffic noise level, in terms of $L_{10,18hour}$, as detailed in **Table 8.9**. However, it is considered that the absolute level of road traffic noise is also relevant in the determining of noise impacts.

Table 8.9: Short-term and long-term magnitude of change in road traffic noise, according to DMRB

Magnitude of impact	**Short term change in noise level $L_{10,18hour}$ dB(A)**	**Long term change in noise level $L_{10,18hour}$ dB(A)**
Major	≥ 5.0	≥ 10.0
Moderate	3.0 - 4.9	5.0 - 9.9
Minor	1.0 - 2.9	3.0 - 4.9
Negligible	0.1 - 0.9	0.1 - 2.9

8.2.34. Note, the $L_{10,18hour}$ parameter used to define the magnitude of road noise changes by DMRB is defined within the Department for Transport document "The Calculation of Road Traffic Noise", 1988[xviii].

Magnitude – Noise from Public Car Parks

8.2.35. Public car parks (i.e. not associated with commercial or industrial use) are assessed in-line with the IEMA guidelines[xxiv], which determines the magnitude of impact at a receptor based on the relative change in sound level at the affected NSR. Table 8.10 details the relative change in sound level and the corresponding magnitude of change at a typical receptor of high sensitivity (e.g. a residential NSR).

Table 8.10: Magnitude of impact for relative change in sound level due to public car park noise

Magnitude of impact	Relative change in sound level	Description of effect
Major	Greater than 10dB change	Noticeable and very disruptive
Moderate	5 to 9.9dB change	Noticeable and intrusive
Minor	3 to 4.9dB change	Noticeable
Negligible	2.9dB or less change	Not intrusive

Magnitude – Noise from Commercial Uses and Building Services Plant

8.2.36. The standard method for assessing industrial and commercial sound in the UK is BS 4142:2014[xiv]. A BS4142 assessment is made by comparing the intrusive noise under consideration with the existing background sound level. The assessment then provides a numerical indication of the risk which should be considered against the specific site context to determine the impact.

8.2.37. Thresholds for impact magnitude are presented in **Table 8.11**, below, based on the numerical element of a BS4142 assessment. This is appropriate for typical plant noise emissions from operational buildings.

Table 8.11: Magnitude of impact for commercial uses and building services plant

Magnitude of impact	Difference between background sound level ($L_{A90,T}$ dB) and BS4142 Rating Level ($L_{Ar,T}$ dB)	Description of effect/significance
Major	> 10	Likely to be clearly audible at receptors and significantly change the noise environment. Normally considered a significant adverse impact but may depend on the context.
Moderate	5 to 9	Likely to be clearly audible at receptors some or most of the time. Significant risk of a moderate adverse impact, **depending on context.**
Minor	1 - 4	May be clearly audible in some conditions and therefore could result in a minor impact, **depending on the context.**
Negligible	≤ 0	Unlikely to be significant at receptors provided the sound does not have distinctive characteristics.

Magnitude – Noise from Leisure Uses

8.2.38. Potential noise sources at the Proposed Development that are classified as 'leisure uses' are as follows:

i. swimming pool

ii. gym/studio

iii. funfair

iv. sports facilities

v. pump track/skate park

vi. treetop adventure walk

vii. mini golf course

viii. events spaces including:

   a. flexible community space

   b. outdoor arena

   c. community pavilion

ix. campervan/motorhome parking area

8.2.39. There is no specific guidance or legislation in the UK that covers all leisure uses. BS4142:2014 explicitly scopes out sound from "recreational activities", "music and other entertainment", and "people".

8.2.40. BS4142 is essentially an assessment of audibility. It provides a useful baseline for considering typical commercial and industrial sound sources, particularly steady, continuous noise. The standard does include character corrections for intermittent, impulsive, and tonal sound from commercial and industrial sites, however these are not intended to be applied to sound from leisure uses.

8.2.41. There is a presumption inherent in the BS4142:2014 methodology that the assessed sound is unwanted. It is reductive to assess all sound associated with parks and leisure facilities (e.g. children playing, people engaging in sporting activities etc.) within a community in these terms.

8.2.42. Sound associated with leisure uses is not universally considered unwanted sound and, indeed, would be viewed by many as an appreciated component of a community soundscape. The Grimwood et. al.[xxv] reported the findings of a national survey that indicated the sound of laughing and children playing was typically enjoyed, appreciated, and welcomed, along with "a degree of noise from neighbours providing a sense of human contact". This contrasts with continuous noise and "hums, whines and rattles" that were likely to result in an adverse reaction.

8.2.43. Therefore, the psychoacoustic response to noise sources associated with community sports and leisure facilities, of the type proposed, differs significantly from noise sources associated with commercial and industrial uses and therefore a different approach should be used for the assessment of such uses.

8.2.44. For sound associated with leisure uses, the magnitude of impact will be considered in terms of annoyance criteria from the WHO Guidelines for Community Noise (World Health Organisation, April 1999)[xv]. The WHO guidelines report that "few people are highly annoyed at L_{Aeq} levels below 55dBA, and few are moderately annoyed at L_{Aeq} levels below 50dBA". These criteria are based on meta-analysis of studies that looked at human responses to a variety of noise sources which commonly affect communities. These levels apply outside receptor dwellings and are applicable to daytime leisure and sports activity. The WHO thresholds also form the basis of recommendations from Sports England on the

control of noise from sports pitches ("Artificial Grass Pitch (AGP) Acoustics - Planning Implications", Sports England, 2015[xx]).

8.2.45. The WHO guidelines also identify a level of 35dB L_{Aeq} within habitable rooms during the daytime as the onset of moderate annoyance. This threshold is widely implemented in the UK as it has been adopted within national design guidance (BS8233:2014[xiii]). The WHO guidelines states that a slightly open window typically provides 15dB of attenuation. The internal and external thresholds for moderate annoyance are aligned on this basis. However, recent guidance in the UK on the application of noise limits within Approved Documents O to the Building Regulations 2010 (Guide to Demonstrating Compliance with the Noise Requirements of Approved Document O, ANC, July 2022[i]) advises that 9dB of attenuation is more realistic for a window that is wide open to cool an overheating room. Therefore, there is a risk of a minor impact at levels of 44dBA externally as building occupants must choose between moderate noise annoyance or having to reduce window open areas.

8.2.46. The magnitude of impact criteria for leisure noise sources are summarised in **Table 8.12**.

Table 8.12: Magnitude of impact for non-event sound associated with leisure uses

Magnitude of Impact	**Criteria $L_{Aeq,16hour}$ dB**
Major	>55
Moderate	50-55
Minor	44-50
Negligible	<44

8.2.47. The flexible community space, outdoor arena, and community pavilion may be used for amplified music and other evening entertainment events. This type of noise has the potential to cause substantially more annoyance than sound from other leisure and sports uses. It is likely these will be occasional events and, in the outdoor spaces particularly, would be licenced individually under a Temporary Events Notice. Criteria are provided in **Table 8.13** overleaf indicating suitable event noise thresholds at dwellings based on the frequency of occurrence. These criteria are based on the guideline values in the 'Code of Practice on Environmental Noise Control at Concerts' (The Noise Council, May 1995[xxi]) and the 'Noise from Pubs and Clubs (Davies et al., March 2005[xxii]).

Table 8.13: Magnitude of impact for event sound associated with leisure uses

Magnitude of Impact	Event Days Per Calendar Year	Criteria (See Note 1)
Major	<13	ENL ($L_{Aeq,15mins}$) exceeds BNL ($L_{A90,15mins}$) by >20dB
	13-30	ENL ($L_{Aeq,15mins}$) exceeds BNL ($L_{A90,15mins}$) by >10dB
	>30 (Note 2)	ENL ($L_{Aeq,15mins}$) exceeds BNL ($L_{A90,15mins}$) by >10dB, and/or ENL ($L_{10,15mins}$) exceeds BNL ($L_{90,15mins}$) by >10dB in any 1/3 octave band between 40Hz and 160Hz
	>30 (Note 3)	ENL ($L_{Aeq,15mins}$) exceeds BNL ($L_{A90,15mins}$) by >5dB, and/or ENL ($L_{10,15mins}$) exceeds BNL ($L_{90,15mins}$) by >5dB in any 1/3 octave band between 40Hz and 160Hz
Moderate	<13	ENL ($L_{Aeq,15mins}$) exceeds BNL ($L_{A90,15mins}$) by 15-20dB
	13-30	ENL ($L_{Aeq,15mins}$) exceeds BNL ($L_{A90,15mins}$) by 5-10dB
	>30 (Note 2)	ENL ($L_{Aeq,15mins}$) exceeds BNL ($L_{A90,15mins}$) by 5-10dB, and/or ENL ($L_{10,15mins}$) exceeds BNL ($L_{90,15mins}$) by 5-10dB in any 1/3 octave band between 40Hz and 160Hz
	>30 (Note 3)	ENL ($L_{Aeq,15mins}$) exceeds BNL ($L_{A90,15mins}$) by up to 5dB, and/or ENL ($L_{10,15mins}$) exceeds BNL ($L_{90,15mins}$) by up to 5dB in any 1/3 octave band between 40Hz and 160Hz
Minor	<13	ENL ($L_{Aeq,15mins}$) exceeds BNL ($L_{A90,15mins}$) by 0-15dB
	13-30	ENL ($L_{Aeq,15mins}$) exceeds BNL ($L_{A90,15mins}$) by up to 5dB
	>30 (Note 2)	ENL ($L_{Aeq,15mins}$) exceeds BNL ($L_{A90,15mins}$) by up to 5dB, and/or ENL ($L_{10,15mins}$) exceeds BNL ($L_{90,15mins}$) by up to 5dB in any 1/3 octave band between 40Hz and 160Hz
	>30 (Note 3)	ENL ($L_{Aeq,15mins}$) does not exceed BNL ($L_{A90,15mins}$), and ENL ($L_{10,15mins}$) does not exceed BNL ($L_{90,15mins}$) in any 1/3 octave band between 40Hz and 160Hz
Negligible	≤30	ENL ($L_{Aeq,15mins}$) does not exceed BNL ($L_{A90,15mins}$)
	>30	ENL ($L_{Aeq,15mins}$) does not exceed BNL ($L_{A90,15mins}$), and ENL ($L_{10,15mins}$) does not exceed BNL ($L_{90,15mins}$) in any 1/3 octave band between 40Hz and 160Hz

Note 1: *Where the entertainment noise level (ENL) and background noise level (BNL) is measured at 1m from the façade of any noise sensitive premises, with and without amplified sound from leisure uses respectively*

Note 2: *Where events do not occur more than once a week and end before 23:00*

Note 3: *Where events occur more than once a week and/or continue after 23:00*

Significance of Magnitude of Impact Descriptors

8.2.48. **Table 8.14** describes the significance of noise and vibration impact effects. These magnitude of impact descriptors are based upon IEMA Guidelines for Environmental Noise Impact Assessment[xxiv], and the descriptions based on the Noise Exposure Hierarchy in PPG-Noise.

Table 8.14: Magnitude of impact descriptors

Magnitude of impact	Description
Major	Impact resulting in a considerable change in baseline environmental conditions predicted either to cause statutory objectives to be significantly exceeded or to result in severe undesirable/desirable consequences on the receiving environment.
Moderate	Impact resulting in a discernible change in baseline environmental conditions predicted either to cause statutory objectives to be marginally exceeded or to result in undesirable/desirable consequences on the receiving environment.
Minor	Impact resulting in a small change in baseline environmental conditions that can be tolerated.
Negligible	No observable change in baseline environmental conditions.

8.2.49. The significance of effect is determined by the interaction between the magnitude of impact and the sensitivity of receptor, as shown in the significance matrix in **Table 8.15**. Where the effect is Not Significant or Moderately Significant, professional judgement will be applied to determine the appropriate scale of effect.

Table 8.15: Significance matrix

Magnitude of impact	Sensitivity of receptor		
	High	Medium	Low
Major	Significant	Moderately significant	Moderately significant
Moderate	Moderately significant	Moderately significant	Moderately significant
Minor	Moderately significant	Moderately significant	Not significant
Negligible	Not significant	Not significant	Not significant

8.2.50. Based on IEMA guidance, effects of a moderate or major scale are considered to be significant in EIA terms.

8.2.51. In some instances, Negligible may be used on its own without a corresponding nature of effect. This is the case when achieving an absolute value or target.

8.3. Baseline Conditions

Baseline Noise Survey Monitoring Positions

8.3.1. Unattended environmental noise measurements were carried out between Tuesday 23rd September and Tuesday 30th September 2025 to determine the existing sound climate at the Proposed Development site. Additional attended environmental noise measurements were carried out on Thursday 25th September. Measurements were undertaken using Class 1 sound level meters and in full accordance with the guidance outlined in BS 4142:2014 and BS 7445-1:2003.

8.3.2. **Table 8.16** presents a summary of the noise monitoring positions. The noise monitoring locations are shown in the baseline noise survey report, which is included in **Volume 3, Appendix 8.2**.

Table 8.16: Noise monitoring positions

Monitoring location ID	Latitude	Longitude	Monitoring period
U1	51.481825	-3.692145	Start: 23/09/2025 12:00 End: 30/09/2025 11:00
U2	51.478962	-3.697512	Start: 23/09/2025 12:30 End: 25/09/2025 11:30
U3	51.480610	-3.695580	Start: 25/09/2025 12:00 End: 30/09/2025 11:00
U4	51.479596	-3.698754	Start: 25/09/2025 12:00 End: 30/09/2025 11:00
U5	51.475945	-3.702332	Start: 23/09/2025 13:00 End: 25/09/2025 12:00
U6	51.475995	-3.701435	Start: 25/09/2025 17:00 End: 29/09/2025 19:00
A1	51.481318	-3.687451	Start: 25/09/2025 12:50 End: 25/09/2025 13:50
A2	51.478298	-3.700989	Start: 25/09/2025 14:11 End: 25/09/2025 14:26
A3	51.477743	-3.702967	Start: 25/09/2025 14:36 End: 25/09/2025 15:36

8.3.3. The measurement microphones were located at a height of ~1.5m above local ground in all instances. Measurements were 'free field', i.e. the microphone was more than 3.5m from reflective elements except the ground.

8.3.4. Elevated noise levels were measured on Friday 26th (day and night), Saturday 27th (day and night) and Sunday 28th September (day only) due to entertainment noise at the Coney Beach amusement park. The Coney Beach amusement park was not operational for the remainder of the survey period; therefore, noise data measured outside of the weekend period (07:00 on Friday 26th September to 23:00 on Sunday 28th September) is deemed representative of typical prevailing noise levels at the Proposed Development site.

Baseline Noise Survey Results

8.3.5. A summary of the typical average ambient noise level ranges during daytime (07:00 – 23:00, $L_{Aeq,16hr}$) and night-time (23:00 – 07:00, $L_{Aeq,8hr}$) is provided in **Table 8.17**, which excludes elevated noise levels measured on Friday 26th (day and night), Saturday 27th (day and night) and Sunday 28th September (day only) to determine typical prevailing noise levels in the absence of entertainment noise.

Table 8.17: Summary of typical average ambient noise level ranges at unattended positions

Position	Period	Typical average ambient noise level ranges, $L_{Aeq,T}$ dB
U1	Daytime (07:00 – 23:00)	45 – 47
	Night-time (23:00 – 07:00)	36 – 40
U2	Daytime (07:00 – 23:00)	44 – 47
	Night-time (23:00 – 07:00)	38 – 42
U3	Daytime (07:00 – 23:00)	51
	Night-time (23:00 – 07:00)	43 – 45
U4	Daytime (07:00 – 23:00)	58 - 60
	Night-time (23:00 – 07:00)	47 – 51
U5	Daytime (07:00 – 23:00)	62 – 64
	Night-time (23:00 – 07:00)	52
U6	Daytime (07:00 – 23:00)	53 – 56

	Night-time (23:00 – 07:00)	47

8.3.6. The typical daytime & night-time background sound levels are presented in **Table 8.18** below. The typical background sound levels during daytime and night-time hours have been determined by observing the minimum consistent background sound levels measured at each position. Note that all background sound levels measured between 07:00 on Friday 26th September and 23:00 on Sunday 28th September have been excluded from the background sound level analysis; the noise levels measured during this period are omitted to exclude entertainment noise from the Coney Beach amusement park during the weekend period.

Table 8.18: Measured typical background sound levels at unattended positions

Position	Period	Typical background sound level
U1	Daytime (07:00 – 23:00)	37dB $L_{A90,1hr}$
	Night-time (23:00 – 07:00)	34dB $L_{A90,15mins}$
U2	Daytime (07:00 – 23:00)	38dB $L_{A90,1hr}$
	Night-time (23:00 – 07:00)	31dB $L_{A90,15mins}$
U3	Daytime (07:00 – 23:00)	37dB $L_{A90,1hr}$
	Night-time (23:00 – 07:00)	32dB $L_{A90,15mins}$
U4	Daytime (07:00 – 23:00)	45dB $L_{A90,1hr}$
	Night-time (23:00 – 07:00)	34dB $L_{A90,15mins}$
U5	Daytime (07:00 – 23:00)	53dB $L_{A90,1hr}$
	Night-time (23:00 – 07:00)	40dB $L_{A90,15mins}$
U6	Daytime (07:00 – 23:00)	48dB $L_{A90,1hr}$
	Night-time (23:00 – 07:00)	43dB $L_{A90,15mins}$

Baseline Noise Survey Uncertainty

8.3.7. All noise sources measured during the survey (excluding measurements between 07:00 on Friday 26th September and 23:00 on Sunday 28th September) are considered to be typical of the surrounding noise environment.

8.3.8. Measurement sampling periods were selected to provide a typical representation of the existing noise sources within and around the Site.

8.3.9. Noise measurements were undertaken during suitable weather conditions for environmental monitoring.

8.3.10. Noise measurements were made using Class 1, integrating sound level meters, which are precision grade.

8.3.11. The noise measurement locations were selected to be representative of the noise levels at the closest (and therefore worst-affected) locations of the noise-sensitive receptors to existing sources.

8.4. Assessment of Potential Effects, Mitigation Measures and Residual Effects

Potential Effects – Noise from Construction & Demolition Activities

8.4.1. Construction noise will include noise from plant and equipment used on-Site and noise from construction traffic on local roads. The effects are varied and are complicated further by the nature of the site works, which would be characterised by mobile noise sources that would change location throughout the construction period, resulting in varying levels of acoustic screening from the site itself. The duration of construction works is also an important consideration when determining the significance of an effect. Higher noise levels may be acceptable if it is known that the levels would occur for a limited period.

8.4.2. During the demolition and construction phase, any work carried out at the site is likely to generate noise that may propagate beyond the site boundary. Detailed information regarding the nature and timescales of activities likely to take place during the demolition and construction phase is not currently available, therefore construction noise limits have been set.

8.4.3. Activities on the site that could give rise to construction-related noise impacts may include (but are not limited to) the following:

- Demolition and site preparation (e.g., demolition, ground excavation, levelling of ground, trenching, trench filling, unloading and levelling of hardcore and compacting filling)
- Construction activities, including piling, the creation of access roads, fabrication processes (e.g., planing, sanding, routing, cutting, drilling and laying foundations)

- Landscaping (e.g., ground compacting, turf laying, planting and associated vehicle movements)

8.4.4. It is recommended good practice that the appointed contractor's working hours to be limited to the following to minimise the impact on nearest existing sensitive receptors:

- 07:30 – 18:00 Monday to Friday
- 08:00 – 13:00 Saturday (when required)
- Construction on Sundays and Public Holidays is prohibited except for emergencies, with a system for requesting emergency work permits to be arranged.

8.4.5. It is not known at this stage exactly what plant will be required during construction. The database of noise levels from BS5228-1:2009+A1:2014 has been used to identify the highest noise levels likely at identified NSRs. Noise levels for typical plant and construction activities are presented in **Table 8.19** overleaf.

8.4.6. The sound pressure levels are presented at 10 metres to provide an indication of the highest noise levels that might occur at receptors when plant is operating close to the site boundary.

8.4.7. The noise levels at 150 metres from plant is also presented to provide an indication of the noise levels from plant operating in the middle of the site or moving around the entire site.

Table 8.19: Indicative construction phase noise levels

Description	**BS5228 reference**	**Noise level at 10m L_{Aeq}, dB**	**Noise level at 150m L_{Aeq}, dB**
Substructures and site preparation			
Piling: Soilmec CM48 (CFA) 2m fill	C.12.44	77	53
22t tracked excavator	C.4.64	75	51
71t tracked excavator	C.2.2	77	53
9t dumper	C.4.5	76	52
Articulated dump truck (23t)	C.4.2	78	54
Concrete pump and cement mixer truck	C.4.24	67	43
Poker vibrator	C.4.34	69	45
Diesel generator	C.4.85	65	41

Foundations			
Concrete pump and cement mixer truck	C.4.24	67	43
Poker vibrator	C.4.34	69	45
Petrol hand-held circular saw cutting concrete	C.4.72	79	55
Diesel generator	C.4.85	65	41
Above ground			
Handheld nail gun	C.4.95	73	49
Angle grinder grinding steel	C.4.93	80	56
Diesel generator	C.4.85	65	41
22t tower crane	C.4.48	76	52
Hand held nail gun	C.4.95	73	49

8.4.8. When compared to the criteria set out in **Table 8.6** & **Table 8.7**, construction activities occurring close to the nearest/worst-affected NSRs (i.e. properties at approx. 10m from the site boundary) may result in a Major or Moderate impact. However, each activity should only occur for a short duration, and therefore is expected to be less significant when considered as part of an entire working day. Nevertheless, mitigation should focus on avoiding these activities being carried out near the site boundary or using alternative quieter methods where possible.

8.4.9. Where it is not possible to avoid a Major noise impact by selection of alternative methods, potential mitigation options include limiting the duration of noisy activities within each day as far as possible, organising works to be carried out at the least sensitive times of the day (usually the middle of working days), and informing affected residents of the need for the noisy activity and consulting on the schedule.

8.4.10. A best practicable means approach to noise mitigation specific to the project and contractor should be documented within a Construction Engineering Management Plan (CEMP).

Potential Effects – Vibration from Construction & Demolition Activities

8.4.11. BS 5228-2 provides some case history on measured vibration levels during piling activity but not for general construction activity. The highest levels of vibration from non-piling activity would likely be caused by the movement and operation of large plant. Measured data published by Crossrail during the operation of a range of excavators with breaker attachments has been reproduced in **Table 8.20**.

Table 8.20: Summary of measured maximum component PPVs

Plant	**Measured distance from source**			
	3.1m	**5.8m**	**7.6m**	**11.3m**
	Level of vibration measured at nearest point (mms^{-1})			
3t Excavator + Breaker	2.86	-	-	0.14
8t Excavator + Breaker	12.54	0.96	0.48	0.39
13t Excavator + Breaker	-	2.03	0.51	-
20t Excavator + Breaker	-	7.91	2.37	-

8.4.12. It should be noted that the vibration levels listed above are from demolition operations with a breaker. Vibration levels during normal ground works activity, and all other non-piling construction activity, are likely to be lower.

8.4.13. Vibration levels from non-piling construction activity across the Site are unlikely to exceed the minimum significance threshold (1 mms^{-1}) at receptors at least 10m away and would not normally be perceptible (i.e. <0.3 mms^{-1}). As such, there should be no significant effects associated with vibration from general construction activity.

8.4.14. BS 5228-2:2009+A1:2014 provides some case history on measured vibration levels from driven piles. Vibration levels exceeding 1 mms^{-1} can occur at distances of 30m or more. At small distances vibration from percussive and vibratory piling can become intolerable and damage buildings. The impact is dramatically reduced by using augured piles but this is not always possible. If percussive or vibratory piling is used a vibration impact assessment must be carried out and specific control measures defined. These will often include continuous vibration monitoring. The vibration impact assessment would provide details of the actions necessary to by site management at defined action levels, e.g. stop work at major significance threshold.

8.4.15. Construction vibration is expected to be negligible from most construction activity. There is potential for major impacts if piling is required close to existing buildings. However, as it is not known at this stage what sort of piling would be required (if any) and competent contractors will generally consider the risks before carrying out percussive or vibratory piling works, this is not considered further here. Assuming a competent contractor, the risk of major impacts from piling are minimal.

Potential Effects – Change in Road Traffic Noise

8.4.16. The DMRB describes a method for the assessment of changes in road traffic noise. Noise levels in the 2033 Future Base (No Dev) and with Development Traffic (Do-Something) scenarios are compared. Only roads with a ≥10% change in traffic levels are assessed; traffic changes on any links not listed in **Table 8.21** will be negligible, in terms of noise impact.

8.4.17. Based on the above, **Table 8.21** summarises the calculated Basic Road Noise Level (BNL) for each modelled road link. The BNL has been calculated based on the methodology described in CRTN[xviii] and traffic data provided by the transport planners. The BNL describes the annual average road noise level (dB L_{A10}) over 18-hours at a normalised distance of 10m from the kerb. The BNL change indicates the change in road traffic noise that will be experienced by dwellings along the link.

Table 8.21: Summary of noise level changes as per DMRB

Link	Name	Predicted basic noise level at 10m, dB $L_{A10,18hr}$		Change in noise level due to proposed development, dB
B	The Portway (South)	63.7	65.6	1.9
D	Eastern Promenade (West)	64.2	65.7	1.5
G	New Road (N3-N4)	62.4	63.0	0.6
H	New Road (N4-Rhych Ave)	60.7	62.1	1.4
I	New Road (Rhych Ave – N5)	61.7	62.9	1.2
K	Aldenham Road	63.4	64.2	0.8
L	Bridgend Road (South)	63.7	64.5	0.8
M	Bridge Road (North)	65.5	66.0	0.5
N	A4106 (N9a-N6)	65.3	66.5	1.2
O	A4106 (N6-N15)	65.6	67.0	1.4
P	A48	67.2	67.7	0.5
Q	A473	65.7	66.7	1.0
R	A4106 (N2-N7)	66.7	68.5	1.8
T	A4106 (N7 – Heol Y Goedwig)	67.2	68.0	0.8
U	A4229 (N7-N12)	67.3	68.4	1.1

8.4.18. The impact of the noise change due to the proposed scheme is Low on all assessed existing links in the short term, and Negligible in the long term. On this basis, the variation in traffic flows on the public highway will constitute a Negligible Adverse effect, which is Not Significant.

8.4.19. Four scenarios are modelled to show the change in road traffic and car park noise at the nearby existing NSRs:

i. Future base road traffic (2023) and existing car park noise at the NSRs during daytime hours (**Volume 3, Figure 8.3**)

ii. Future base road traffic (2023) at the NSRs during night-time hours (**Volume 3, Figure 8.4**)

iii. Future base + dev road traffic (2033) and proposed car park noise at NSRs during daytime hours (**Volume 3, Figure 8.5**)

iv. Future base + dev road traffic (2033) at NSRs during night-time hours (**Volume 3, Figure 8.6**)

8.4.20. In addition to the above, the Proposed Development will introduce new flows along The New Link Road (Link Z), which has the potential to cause significant effects to approx. 5no. residential houses located on Mackworth Road. Since a new road is proposed in an area where there previously was not one, south and east facing façades at 40-50 Mackworth Road are predicted to experience significantly higher noise levels compared to the existing layout. If assessed in accordance with DMRB, a Major impact would be determined in the short-term at these properties and the significance of this would be determined by considering the number of affected properties against the net benefit of the scheme.

8.4.21. It is also informative to consider the absolute post-development road traffic noise at these properties in terms of thresholds for significant effects on health and quality of life. TAN 11[vii] provides the basis for considering the suitability of areas for residential use in terms of noise in Wales and is, therefore, useful for considering the post-development road traffic noise levels at affected dwellings in the context of other residential areas in the country.

8.4.22. As shown in **Volume 3, Figure 8.5** and **Volume Figure 8.6**, the predicted daytime and night-time noise levels at the worst-affected façades due to development traffic are predicted to be up to 56dB(A) $L_{Aeq,16hr}$ during daytime and up to 50dB(A) $L_{Aeq,8hr}$ during night-time. Based on the TAN 11 noise exposure categories, this would place the affected properties within the 'NEC B' noise exposure category. Noise mitigation measures for

residential properties within this category would typically comprise standard glazing and ventilation configurations, and would not normally require acoustically enhanced façade elements. Therefore, although the change in road traffic noise at the worst-affected façades is a Major magnitude of impact, the absolute predicted noise levels are still deemed to be Not Significant when compared to the TAN 11 noise exposure categories, i.e. the noise change is large because these properties current enjoy very low road traffic noise levels, not because post-development road traffic noise will be significant for a residential dwelling.

8.4.23. The number of properties that will see a major change in road traffic noise (approx. 5no.) is low for the creation of a new town centre link road and large redevelopment, such as this. Alternative options are expected to have a more significant impact.

Potential Effects – Noise from Public Car Parks

8.4.24. Existing car park noise at the now-defunct Coney Beach amusement park has been modelled in SoundPlan 9.1 to predict façade noise levels at the nearest existing NSRs during daytime hours when the car park was fully operational (prior to the closure of the amusement park). It is estimated that the existing car park comprised approximately 126 car parking spaces based on satellite imagery.

8.4.25. Proposed car park noise at the new Coney Beach public car park has been modelled in SoundPlan 9.1 to predict façade noise levels at the nearest existing NSRs during daytime hours when the new car park is fully operational. It is estimated that the proposed car park will comprise approximately 165 car parking spaces based on the architectural and landscape drawings.

8.4.26. Each car parking space is assumed to have a sound power level of 95dB(A) L_w when a car is manoeuvring into or out of it. This accounts for the engine noise and the slams of car doors as people leave and enter the car. For a typical daytime assessment, it is assumed that 80% of car parking spaces are used within the peak hour period for the existing and proposed car parking scenarios.

8.4.27. The resultant noise levels at the nearby NSRs due to existing Coney Beach car park noise (prior to the closure of the amusement park) is shown in **Volume 3, Figure 8.7**. The resultant noise levels at the nearby NSRs due to proposed Coney Beach car park noise is shown in **Volume 3, Figure 8.8**.

8.4.28. Based on the results of noise modelling, the highest change in noise level at the worst-affected existing NSR is predicted to be 3dB between the existing and proposed scenarios,

which corresponds with a Minor magnitude of impact. A Minor magnitude of impact is deemed to be Not Significant.

Potential Effects – Noise from Commercial Uses and Building Services Plant

8.4.29. Residential and commercial elements of the Proposed Development may incorporate electrical and mechanical building services plant such as (but not limited to) substations, mechanical heating, ventilation and cooling (HVAC). Both cooling and modern electric heating systems (i.e. Air Source Heat Pumps) require an outdoor condenser unit which are a source of noise, as are gas boilers.

8.4.30. The plant noise limits in **Table 8.22** should be considered as the design develops and plant selections are made. These have been set based on the significance criteria in **Table 8.11** and the noise survey results to target a Negligible impact.

Table 8.22: Proposed plant noise limits

Receptor reference	Period	Typical background sound level	Proposed plant noise limit
NSR7, NSR8, NSR9, NSR10 & NSR11	Daytime (07:00 to 23:00)	37dB $L_{A90,1hr}$ (U1/U3)	≤ 37dB $L_{Ar,1hr}$
	Night-time (23:00 to 07:00)	31dB $L_{A90,15mins}$ (U2)	≤ 31dB $L_{Ar,15mins}$
NSR5 & NSR6	Daytime (07:00 to 23:00)	45dB $L_{A90,1hr}$ (U4)	≤ 45dB $L_{Ar,1hr}$
	Night-time (23:00 to 07:00)	34dB $L_{A90,15mins}$ (U4)	≤ 34dB $L_{Ar,15mins}$
NSR1, NSR2, NSR3 & NSR4	Daytime (07:00 to 23:00)	48dB $L_{A90,1hr}$ (U6)	≤ 48dB $L_{Ar,1hr}$
	Night-time (23:00 to 07:00)	40dB $L_{A90,15mins}$ (U5)	≤ 40dB $L_{Ar,15mins}$

8.4.31. The noise limits above are 'free-field' levels at any height above ground and 1.0m from the nearest noise sensitive property façade. They apply to the overall cumulative operation of building services plant without any specific tone or character. Character corrections may be applicable if plant is deemed to be tonal, intermittent and/or impulsive.

8.4.32. A typical air source heat pump (ASHP) unit might generate 50dB L_{Aeq} at 1m. Using normal best siting practices, it should be relatively straightforward to ensure noise levels from such

a condenser unit are below 30dB L_{Aeq} at the closest existing receptors, which is negligible even when operating at night.

8.4.33. Detailed assessment of noise generation from proposed commercial units may be required at a later stage depending on proposed usage, which is currently unknown.

Potential Effects – Noise from Leisure Uses

8.4.34. External noise emissions from the outdoor swimming pool have been modelled in SoundPlan 9.1 based on guideline external noise levels presented in VDI 3770 'Emissionskennwerte von Schallquellen - Sport- und Freizeitanlagen', which states that a typical outdoor swimming pool has a sound power level of 108dB(A). The resultant noise levels at the nearby NSRs are shown in **Volume 3, Figure 8.9**. Based on the results of the noise modelling, the external noise level 1m from the worst-affected existing NSR is predicted to be 54dB, which is indicative of a Moderate impact.

8.4.35. Breakout noise emissions from the gym/studio are expected to be mitigated via the external building façade. The non-glazed external building fabric and glazed elements (e.g. windows, rooflights) should be specified so as to prevent excessive noise breakout via the building façade during worst-case operations (e.g. high music noise during spin classes), and should aim to achieve the noise criteria for a Negligible impact from leisure uses, as shown in **Table 8.12**. It is further advised that any music noise from the gym is designed to the most onerous (lowest) limit from **Table 8.13.** These are entirely feasible design requirements for a gym in this location.

8.4.36. Breakout noise emissions from the flexible community space and community pavilion are expected to be mitigated via the external building façade. The non-glazed external building fabric and glazed elements (e.g. windows, rooflights) should be specified so as to prevent excessive noise breakout via the building façade during worst-case operations (e.g. busy events with music noise), and should aim to achieve the noise criteria for a Negligible impact due to event sound, as shown in **Table 8.13.** The specific limit to be applied will depend on the frequency of events and additional terms set out in the premises licence.

8.4.37. The nature and frequency of events at the outdoor arena are not yet confirmed. Events at the outdoor arena should be managed under the Licence process to achieve a Minor or Negligible impact due to event sound from leisure uses, as shown in **Table 8.13**. Depending on the nature and frequency of events at the outdoor arena, operating restrictions may be required to prevent a Moderate or Major impact on the existing NSRs.

8.4.38. The funfair area is understood to be a flexible leisure area that could be used for various events that range in size and scope throughout the year, e.g. seasonal fairground rides, an outdoor cinema in summer, an ice rink in winter etc. The predicted noise emissions during each of these events will vary considerably, and no events are yet confirmed. Therefore, an absolute worst-case assessment is used to determine the viability of the proposed space, and whether any limitations on the operation of the space should be imposed. Individual events should be managed under the Licence process to achieve a Minor or Negligible impact due to sound from leisure uses, as shown in **Table 8.12**.

8.4.39. External noise emissions from the funfair have been modelled in SoundPlan 9.1 based on guideline external noise levels presented in VDI 3770 'Emissionskennwerte von Schallquellen - Sport- und Freizeitanlagen', which states that an adventure-oriented park with many funfair rides should have a sound power level of 67dB(A)/m^2. The resultant noise levels at the nearby NSRs are shown in **Volume 3, Figure 8.10**. Based on the results of the noise modelling, the external noise level 1m from the worst-affected existing receptor façade is predicted to be 54dB; this is indicative of a Moderate impact. Note that based on the current expected use of this area, the noise modelling is a worst-case scenario, and the impact may be much less. The impact could be controlled to low with modest restrictions on the type of rides and controls on the number of people.

8.4.40. It should be noted that L_{Amax} noise events at the funfair could exceed 100dB(A) SWL depending on the proposed rides; the standard states that L_{Amax} noise events from a rollercoaster can range between 112-127dB(A) SWL, which would likely result in a Major impact on the nearby existing NSRs. Therefore, a detailed assessment of funfair noise (including L_{Amax} noise events) will be required at the Reserved Matters stage to determine the viability of medium to large-sized rides and rollercoasters within the designated funfair area. It is understood that the rollercoaster being considered is a small ride for younger children, and therefore this may overstate the potential impact.

8.4.41. Potential effects on the adjacent ALDI supermarket due to funfair noise emissions are not assessed for the following reasons:

i. The ALDI supermarket is identified as having low sensitivity (see **Table 8.4**), therefore other nearby residential receptors with medium sensitivity are considered more critical

ii. The worst-affected façades of the ALDI supermarket due to funfair noise are the northeast and southeast façades, which both represent 'back-of-house' areas (contains a turning yard for HGVs and a plant compound respectively) and are not deemed sensitive to noise

iii. Both the northeast and southeast façades are bounded by a min. 3m tall close-boarded fence that will act as an effective noise barrier for funfair noise emissions

8.4.42. On the basis of the above, the ALDI supermarket is not considered to be a critical receptor due to funfair activity, however should still be considered for potential effects when a detailed assessment of funfair noise is carried out at the Reserved Matters stage.

8.4.43. External noise emissions from the proposed MUGA have been modelled in SoundPlan 9.1 based on the guideline external noise levels presented in the 'Artificial Grass Pitch (AGP) Acoustics – Planning Implications' guidance document published by Sports England (2015)[xx], which states that a 'typical free-field noise level from an AGP (at 10m from the sideline halfway marking) = 58dB $L_{Aeq,1hr}$'. The resultant noise levels at the nearby NSRs are shown in **Volume 3, Figure 8.11**. Based on the results of the noise modelling, the external noise level 1m from the worst-affected existing receptor façade is predicted to be 45dB; this is indicative of a Minor impact.

8.4.44. External noise emissions from the pump track/skate park have been modelled in SoundPlan 9.1 based on guideline external noise levels presented in VDI 3770 'Emissionskennwerte von Schallquellen - Sport- und Freizeitanlagen' for a variety of skateboarding activities (fun box, bank ramp, ollie box, curb, rail, flatland), which is deemed to be the worst-case (i.e. nosiest) use of the space. The average ambient sound power level of the pump track/skate park is assumed to be 98dB(A). The resultant noise levels at the nearby NSRs are shown in **Volume 3, Figure 8.12**. Based on the results of the noise modelling, the external noise level 1m from the worst-affected existing receptor façade is predicted to be 55dB; this is indicative of a Moderate impact.

8.4.45. It should be noted that L_{Amax} noise events at the pump track/skate park could likely exceed over 100dB(A) SWL depending on how the pump track is used. Impact noise from skateboards interacting with the terrain is likely to be far louder than impact noise from bikes interacting with the pump track; the standard states that L_{Amax} noise events from skateboarding activities can range between 111-118dB(A) SWL. Therefore, a detailed assessment of pump track/skate park noise (including L_{Amax} noise events) will be required at the Reserved Matters stage once the proposed use has been finalised.

8.4.46. External noise emissions from the treetop adventure walk have been modelled in SoundPlan 9.1 based on the typical sound power level for a raised voice for an adult (76dBA) presented in ANSI/ASA S3.5-1997 'Methods of Calculation of the Speech Intelligibility Index (Acoustical Society of America, 1997), and a shouting voice for a child (91dBA) presented in 'Average Speech Levels and Spectra in Various Speaking/Listening

Conditions: A Summary of the Pearson, Bennet & Fidell (1977) Report' (O. Olsen, 1998). 5no. adult raised voice point sources and 5no. child shouting point sources are modelled at a height of 4m above ground, randomly distributed around the proposed treetop adventure walk area. The resultant noise levels at the nearby NSRs are shown in **Volume 3, Figure 8.13**. Based on the results of the noise modelling, the external noise level 1m from the worst-affected existing receptor façade is predicted to be 53dB; this is indicative of a Moderate impact. However, it should be noted that this is a worst-case assessment. It is not expected that users would ordinarily talk loud or shout.

8.4.47. External noise emissions from the mini golf course have been modelled in SoundPlan 9.1 based on the typical sound power level for a raised voice for an adult (76dBA) presented in ANSI/ASA S3.5-1997 'Methods of Calculation of the Speech Intelligibility Index (Acoustical Society of America, 1997), and a shouting voice for a child (91dBA) presented in 'Average Speech Levels and Spectra in Various Speaking/Listening Conditions: A Summary of the Pearson, Bennet & Fidell (1977) Report' (O. Olsen, 1998). 5no. adult raised voice point sources and 5no. child shouting point sources are modelled at a height of 1.5m (for an adult) and 0.5 (for a child) above ground, randomly distributed around the mini golf course area. The resultant noise levels at the nearby NSRs are shown in **Volume 3, Figure 8.14**. Based on the results of the noise modelling, the external noise level 1m from the worst-affected existing receptor façade is predicted to be 44dB; this is indicative of a Minor impact.

8.4.48. The impact of the proposed camper van and motorhome parking area has been considered. During consultations, the local authority raised concerns that noise from people parked in this area may impact on existing dwellings. Noise from the area will depend on how it is used and managed. If it is managed as a typical campsite, no significant noise is expected from the parking area, i.e. music would not be allowed, and large gatherings that might result in raised voices would be broken up after circa 23:00 hours (or earlier) to protect other users and residents. Running of engines to charge batteries should also be avoided. It is assumed that suitable management controls would be put in place, or be retained from the existing campsite, and therefore noise from this will not be significant.

Mitigation Measures – Noise from Construction & Demolition Activities

8.4.49. In order to reduce the potential impact of noise generated by the construction phase of the Proposed Development at existing sensitive receptors, mitigation measures will be required. A best practicable means approach should be implemented.

8.4.50. Activities that have the largest impact, and can be carried out further from receptors, should be. Activities that might be moved further from receptors include some cutting operations, other preparatory work, and fixed plant servicing the site such as generators. Activities that cannot be moved, such as the activities carried out directly to plots, ought to be managed accordingly with activity carried out at the least noise sensitive times of day or time limited to reduce the impact.

8.4.51. A best practicable means approach to controlling construction noise is recommended. This may include:

i. Selection of the quietest possible plant where possible

ii. Limiting the duration of noisy activities within each day as far as possible

iii. Noisy works carried out at the least sensitive times of the day (usually the middle of working days)

iv. Informing affected residents of the need for the noisy activity

8.4.52. Continuous monitoring of construction noise levels in locations representative of the closest sensitive receptors is often the best way to manage construction noise. Monitors can be set to alert the site manager of exceedances to allow immediate action to be taken to reduce noise emissions.

8.4.53. The construction works would follow the guidelines in BS 5228-1 and the guidance in BRE Controlling particles, vapour and noise pollution from construction sites, Parts 1 to 5, 2003. The following measures will be put in place to minimise noise emissions and implemented via a Construction Environmental Management Plan (CEMP):

i. When works are taking place close to the sensitive receptors, the screening of noise sources via the erection of temporary screens should be employed

ii. All machinery will be regularly maintained to control noise emissions, with particular emphasis on lubrication of bearings and the integrity of silencers

iii. Site staff will be made aware that they are working adjacent to a sensitive area and avoid all unnecessary noise due to misuse of tools and equipment, unnecessary shouting and radios

iv. As far as possible, the avoidance of two noisy operations occurring simultaneously in close proximity to the same sensitive receptor

v. Adherence to any time limits imposed on noisy works by the local authority

vi. Implement set working hours during the week and at weekends

vii. Ensure engines are turned off when possible

viii. Should demolition and construction activities need to be carried out during night-time hours, the local authority may include a planning condition that requests advance notice and details of any night working to provided

Mitigation Measures – Vibration from Construction & Demolition Activities

8.4.54. The risk of significant vibration from most construction activities is low. However, percussive and vibratory piling can generate significant levels of ground-borne vibration. Whilst it is recognised that the piling process would need to be selected on the basis of the strata to be encountered, the loads to be supported and the economics of the system, design teams will give consideration to the type of piling to be used in order to minimise the potential for vibration impact.

8.4.55. If vibratory or percussive piling is necessary, the contractor must undertake a vibration risk assessment. This will identify control measures necessary to minimise the impact and avoid the most significant impacts.

Mitigation Measures – Noise from Commercial Uses and Building Services Plant

8.4.56. Provided that new building services plant is designed to achieve the plant noise limits outlined in **Table 8.22** at the nearby receptors (i.e. do not exceed the existing background sound level), noise from new building services plant is indicated to be Not Significant at the nearby existing NSRs.

8.4.57. The following mitigation measures could be considered to reduce noise emissions from new building services plant:

i. Selection of lower noise emission building services plant

ii. Operating plant at reduced duty during quieter periods, or when demand is lower

iii. Use of in-duct attenuators to reduce noise emissions to atmosphere from duct termination points.

iv. Use of acoustically treated louvres to reduce noise emissions to atmosphere from plant rooms

Mitigation Measures – Noise from Leisure Uses

8.4.58. Noise from the swimming pool is predicted to have a Moderate impact on the nearby existing NSRs. It should be noted that the assessment assumes worst-case scenario noise levels during the peak operational period, therefore the predicted noise levels at the nearest existing NSRs would likely be lower when measured over a normal daytime period, which would include periods of time where the pool is not busy or not in use entirely. Noise from the swimming pool should be managed under the Licence process, and operational hours should be confirmed to determine if noise emissions are predicted to have a Negligible, Minor or Moderate impact on the nearest existing NSRs. Noise mitigation measures may need to be considered if a Moderate impact is predicted on the nearest existing NSRs. Provided the swimming pool is designed to achieve a Minor or Negligible impact at the nearest existing NSRs, noise from the swimming pool is indicated to be Not Significant at the nearby existing NSRs.

8.4.59. Provided that the non-glazed external building fabric and glazed elements (e.g. windows, rooflights) of the gym/studio are specified so as to prevent excessive noise breakout via the building façade during worst-case operations (e.g. high music noise during spin classes), and provided that a Minor or Negligible magnitude of impact is achieved at the worst-affected receptor, noise from the gym/studio is indicated to be Not Significant at the nearby existing NSRs.

8.4.60. Provided that the non-glazed external building fabric and glazed elements (e.g. windows, rooflights) of the flexible community space and community pavilion are specified so as to prevent excessive noise breakout via the building façade during worst-case operations (e.g. busy events with music noise), and provided that a Minor or Negligible magnitude of impact is achieved at the worst-affected receptor, noise from the flexible community space and community pavilion is indicated to be Not Significant at the nearby existing NSRs.

8.4.61. Provided that events at the outdoor arena are managed under the Licence process to achieve a Minor or Negligible magnitude of impact at the nearby receptors (e.g. by limiting the frequency, size and noise level of events), noise from the outdoor arena is indicated to be Not Significant at the nearby existing NSRs.

8.4.62. Noise from the funfair is predicted to have a Moderate impact on the nearby existing NSRs, and it is also noted that loud short-term noise events at the funfair could have a Major or Moderate impact on the nearby receptors depending on the rides/rollercoasters included in the fair ground. Therefore, the design proposals will need to be scrutinised at the

Reserved Matters stage, and restrictions may need to be placed on the following aspects of the design to achieve a Minor or Negligible magnitude of impact:

i. Restriction on operating hours

ii. Noise limits for entertainment/music noise

iii. Restrictions on size/scale of rides and rollercoasters

8.4.63. It should be noted that the existing soundscape of the waterfront was in-part defined by the now-defunct Coney Beach amusement park. Based on current proposals, the now-defunct Coney Beach amusement park is to be demolished, meaning the new funfair area would effectively replace the old Coney Beach amusement park. Considering the context of the site, and the association of amusement park noise with Porthcawl Waterfront, significantly diminishing (or outright removing) sounds associated with the amusement park seems unnecessarily restrictive. Therefore, the context of the site and the existing sound climate should be carefully considered when noise from the funfair is assessed at the Reserved Matters stage and the focus should be on avoiding significant impacts on health and quality of life, rather than limiting the audibility of noise associated with this use.

8.4.64. Noise from the MUGA is predicted to have a Negligible impact on the nearby existing NSRs. The AGP planning implications guidance document outlines several noise mitigation measures which can be implemented to reduce ball impact sound, which is often the loudest aspect of a MUGA when left untreated. Provided the MUGA is designed to incorporate the ball impact sound mitigation measures outlined in the AGP planning implications guidance document, noise from the MUGA is indicated to be Not Significant at the nearby existing NSRs.

8.4.65. Noise from the pump track/skate park is predicted to have a Moderate impact on the nearby existing NSRs; it is also noted that L_{Amax} noise events at the pump track/skate park could have a Major or Moderate impact on the nearby receptors depending on the activities that occur in the area (e.g. skateboarding, which is associated with loud impact noise). If the proposed use is confirmed to be a pump track instead of a skate park, it is expected that noise from a pump track would be significantly lower based on noise measurement data for skateboarding activities and biking activities. Therefore, the design proposals will need to be scrutinised at the Reserved Matters stage once the proposed use is confirmed, and the area may need to incorporate impact sound mitigation measures (e.g. soft ground instead of hard ground) and other control measures (restrictions on hours of use) to

achieve a Minor or Negligible magnitude of impact. Provided the pump track/skate park is designed to achieve a Minor or Negligible magnitude of impact at the nearest existing NSRs, noise from the pump track is indicated to be Not Significant.

8.4.66. Noise from the treetop adventure walk is predicted to have a Moderate impact on the nearby existing NSRs, based on an absolute worst-case assessment of 5no. children shouting and 5no. adults speaking with raised voices simultaneously across the site. It should be noted that the area is not proposed to be a paid attraction, but rather a communal park area with natural play features. Furthermore, the predicted noise levels at the nearest existing NSRs would likely be lower when measured over a normal daytime period, which would include periods of time where the treetop adventure walk is not busy or not in use entirely. Restrictions on operating hours and capacity could be considered to reduce the predicted magnitude of impact at the nearest existing NSRs. Provided that a Minor or Negligible magnitude of impact is achieved at the nearest existing NSRs, noise from the treetop adventure walk is indicated to be Not Significant.

8.4.67. Noise from the mini golf course is predicted to have a Minor impact on the nearby existing NSRs. The assessment assumes that the mini golf course does not include amplified music, which may elevate noise levels at the nearby receptors. If amplified music is included, noise limits may need to be set on said music to prevent a Moderate or Major impact on the nearby receptors. Provided that amplified music is suitably controlled, noise from the mini golf course is indicated to be Not Significant at the nearby existing NSRs.

8.4.68. Noise from the proposed camper van and motorhome parking area will be negligible provided anti-social behaviour is managed effectively.

Residual Effects During Construction – Noise

8.4.69. It is considered that with the implementation of the embedded mitigation measures as defined in this Chapter, together with careful planning and sequencing of the works a part of the CEMP process, the likely noise impacts during the construction phase of the works can be managed to achieve acceptable noise levels at the surrounding NSRs.

8.4.70. By achieving appropriate noise levels at the closest offsite receptors, the noise levels beyond the Site boundary are not expected to exceed the threshold criteria.

8.4.71. Construction noise will be subject to a detailed assessment once the contractor's methodology for the works is defined. In addition, noise should be monitored whilst certain activities are being carried out in the locality of sensitive receptors. This will form part of the CEMP.

8.4.72. On this basis, noise associated with construction activities is predicted to constitute a temporary minor adverse residual impact. This impact is therefore not considered to be significant.

Residual Effects During Construction – Vibration

8.4.73. If significant sources of vibration are necessary during construction (e.g. percussive or vibratory piling), this will be subject to a detailed assessment once the contractor's methodology for the works is defined. Competent piling contractors understand the risks and are used to managing these in urban environments.

Residual Effects during Operation

8.4.74. Once the embedded and proposed mitigation measures as set out in this Chapter have been implemented, subject to planning conditions, residual operational effects are expected to be Negligible or Minor.

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