LAND SOUTH OF GLAN USK PRIMARY SCHOOL, HERBERT ROAD NEWPORT

ENVIRONMENTAL STATEMENT

VOLUME 2
CHAPTER 13: NOISE & VIBRATION

13. NOISE AND VIBRATION

INTRODUCTION

13.1 This Chapter, prepared by Waterman Infrastructure and Environment Ltd, presents an assessment of the likely significant noise effects on sensitive receptors (SRs) as a result of the Development.

This Chapter provides a description of the methods used in the assessment. This is followed by a description of the baseline conditions of the Site and surrounding area, and an assessment of the likely significant effects of the Development during the Site preparation and construction works and once the Development is completed and operational. Mitigation measures are identified where appropriate to avoid, reduce or offset any adverse effects identified and / or enhance likely beneficial effects. Taking account of the mitigation measures, the nature and significance of the likely residual effects are described.

Supporting information relating to the noise assessment is contained within the following appendices:

- **Appendix 13.1:** Glossary of Acoustic Terminology
- **Appendix 13.2**: Baseline Noise Monitoring;
- **Appendix 13.3**: Construction Noise Assessment;
- **Appendix 13.4**: Traffic Noise Assessment; and
- **Appendix 13.5**: Consultation.

LEGISLATION, PLANNING POLICY AND GUIDANCE

Control of Pollution Act, 1974

13.2 Part III of the Control of Pollution Act 1974[1] (CoPA) is specifically concerned with pollution. Regarding noise, it covers construction sites; noise in the street; noise abatement zones; codes of practice and Best Practicable Means (BPM).

Environmental Protection Act, 1990, Part III

The Environmental Protection Act 1990[2], amongst many other controls, empowers Local Planning Authorities (LPAs) to issue a Noise Abatement Notice where a noise nuisance can be proven.

National Planning Policy

Planning Guidance Technical Advice Note 11: Noise

13.2.1 Planning Guidance Technical Advice Note 11[3] (TAN 11) is the principal guidance adopted in Wales for assessing the impact of noise on and from proposed developments. For residential development, the guidance is presented in terms of four Noise Exposure Categories (NECs),

ranging from NEC A, where noise need not normally be considered in determining planning applications to NEC D, where planning permission may need to be refused on noise grounds. The criteria relevant to the proposed development are presented in **Table 13.1**.

Table 0-1: TAN 11 Noise Exposure Categories

NEC	$L_{Aeq,T}$ dB (07:00–23:00)	$L_{Aeq,T}$ dB (23:00–07:00)	Advice
A	< 55	< 45	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	55 to 63	45 to 57	Noise should be considered when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	63 to 72	57to 66	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	> 72	> 66	Planning permission should normally be refused.

Note: Sites where individual noise events during the night-time (23:00 to 07:00) regularly exceed 82dB L_{Amax} (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq,\ 8\ hour}$ (except where the $L_{Aeq,\ 8\ hour}$ already puts the Site in NEC D).

Regarding commercial or industrial developments, TAN 11 advises that much of the development which is necessary for the creation of jobs and the construction and improvement of essential infrastructure would generate noise and that, whilst local authorities must ensure that development does not cause an unacceptable degree of disturbance, the planning system should not place unjustifiable obstacles in the way of such development.

Local Planning Policy

Newport Local Development Plan 2011-2026, January 2015

13.2.3 The Newport Local Development Plan (LDP) 2011-2026[4] was adopted in January 2015 and replaces the Unitary Development Plan.

GP2 General Development Principles – General Amenity states "*Development will be permitted where……. there will not be a significant adverse effect on local amenity, including in terms of noise disturbance…….*",

GP7 General Development Principles – Environmental Protection and Public Health states "Development will not be permitted which would cause or result in unacceptable harm to health because of ……. noise pollution…..to environment, local amenity or public health and safety."

Guidance

BS 8233, Guidance on Sound Insulation and Noise Reduction for Buildings, 2014

13.3 When considering the amenity of future users of the Development, it is important to ensure the critical effects of noise on sleep, annoyance and speech interference are guarded against, as appropriate. The most relevant source of guidance is presented within BS 8233:2014[5], which recommends desirable internal noise criteria for a range of spaces appropriate to their function.

Table 13.2 summarises the BS8233 guideline internal and external noise level criteria for unoccupied spaces relevant to this Development.

Table 0-2: Summary of Recommended Environmental Noise Levels

Typical Situation	Noise Levels, dB $L_{Aeq,T}$	
	Day-time	Night-time
Living Room	35	-
Dining Room	40	-
Bedrooms	35	30

Notes: * For regular events only, excluding infrequent & irregular sources interpreted as no more than 10-15 times a night.

World Health Organisation, Guidelines for Community Noise, 1999

13.3.1 The WHO[6] document gives guidance on desirable levels of noise structured per specific environments and appropriate critical effects. One of the tenets of the WHO guidelines is the protection of the most vulnerable and sensitive of the population, with the WHO guideline values for environmental noise set at the level of the lowest adverse health effect below which the occurrence rates of "effects" can be assumed to be negligible.

13.3.2 This document states that, in dwellings, the critical effects of noise are on sleep disturbance, annoyance and speech interference. To avoid sleep disturbance, indoor guideline values for bedrooms are 30 dB $L_{Aeq,T}$ for continuous noise and 45 dB L_{AFmax} for single sound events. It is identified within the document that 10-15 occurrences per night of the limiting maximum noise level may be considered acceptable. To enable casual conversation indoors during daytime, the sound level of interfering noise should not exceed 35 dB $L_{Aeq,T}$.

13.3.3 With regards to outdoor living areas the WHO document states that "*To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55 dB $L_{Aeq,T}$ on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor level should not exceed 50 dB $L_{Aeq,T}$. Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development*." Such a limiting criterion should be treated as an aspirational design goal for the proposed Development.

British Standard 5228:2009 + A1:2014 - Code of Practice for Noise and Vibration Control on Construction and Open Sites

13.3.4 British Standards (BS) 5228-1[7] and BS 5228-2[8] provides guidance on the assessment of noise and vibration impacts respectively during the redevelopment of a site, including procedures for estimating noise levels from construction activities and vibration attributable to vibratory rolling and piling activities.

The guidance does not define acceptable limits. However, it does provide potential methods for assessing the significance of noise impacts, which should be defined on a site-specific basis. BS 5228 also provides guidance on minimising potential impacts using mitigation and the adoption of Best Practicable Means (BPM).

British Standard 4142:2014 - Methods for Rating and Assessing Industrial and Commercial Sound

13.3.5 BS 4142[9] is used in the assessment of sound of an industrial and/or commercial nature. The standard provides an objective method for rating the likelihood of adverse impacts on nearby SRs, having regard to the context in which a sound occurs. BS 4142 states:

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

British Standard 6472:2008 – Guide to Evaluation of Human Exposure to Vibration in Buildings

13.3.6 BS 6472:2008[10] provides guidance on the measurement and assessment of vibration within buildings that may cause adverse disturbance to human occupants. BS 6472 also introduces the concept of Vibration Dose Values (VDVs) for intermittent vibration assessment and reference curves for continuous vibration assessment. **Table 13.3** presents the VDVs at which adverse comments are probable and unlikely for residential Developments during the day and night time periods.

Table 0-3: Effects of Vibration on Human Response

Land use	Low probability of adverse comment VDV ($m/s^{1.75}$)	Adverse comment possible VDV ($m/s^{1.75}$)	Adverse comment probable VDV ($m/s^{1.75}$)
Residential buildings 16-hour day (07:00 to 23:00)	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8-hour night (23:00 to 07:00)	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

Calculation of Road Traffic Noise, 1988

13.3.7 The Calculation of Road Traffic Noise (CRTN)[11] describes procedures for predicting and measuring noise from road traffic noise in terms of the L_{A10} (*the noise level exceeded for 10% of the time*) and is suitable for environmental assessments of development proposals where road traffic noise may have a significant effect.

Institute of Environmental Assessment and Management - Guidance Note 1 Guidelines for the Environmental Assessment of Road Traffic, 1993

13.3.8 Guidance on effect assessment of traffic noise is provided within the Institute of Environmental Management and Assessment (IEMA) Guidance Note No.1 Guidelines for the Environmental Assessment of Road Traffic[12]. The guidance note recommends assessment where traffic flows will increase (as a result of development) by more than 30% (*or the number of Heavy Good Vehicles (HGVs) will increase by more than 30%),* and where specifically sensitive areas experience traffic flow increases of 10% or more. The guidance note indicates that projected changes in traffic of less than 10% create no discernible environmental effect.

DMRB Volume 11, Section 3, Part 7 Noise and Vibration, 2011

13.3.9 The Design Manual for Roads and Bridges (DMRB)[13] provides guidance on the assessment of the impacts that road projects may have on levels of noise and vibration. The latest revision provides updated advice on calculating night-time noise levels, determining the extent of the study area and selecting appropriate traffic speed data. DMRB states that where appropriate the standard may be applied to existing roads.

Within the introduction section it states that "the standard must be used forthwith on all road projects for the assessment of noise and vibration impacts associated with construction, improvements, operation and maintenance associated with motorways and trunk roads.

ASSESSMENT METHODOLOGY AND SIGNIFICANCE CRITERIA

13.4 The assessment of likely significant noise effects has involved the following staged process:

- identifying potentially sensitive existing and future receptors within the area surrounding the Site;
- establishing the baseline noise conditions currently existing at the Site and at existing receptors surrounding the Site using appropriate noise surveys;
- assessing likely noise levels generated during the Site preparation and construction works associated with the Development;
- establishing design criteria for plant and services associated with the Development;
- assessing likely noise levels from the completed and operational Development;
- formulating proposals for mitigation (*where appropriate*); and
- assessing the likely significance of any residual noise effects.

Baseline Noise Monitoring

13.5 Long-term noise monitoring was undertaken at one key location on the periphery of the Site over a 24-hour period from Tuesday 9th May to Wednesday 10th May 2017, covering both the day and night-time periods. Additional concurrent short-term noise measurements were also undertaken at key locations on the Site, to robustly verify the existing noise climate and

calibrate the subsequent Cadna-A noise model, whilst also providing a good representation of the noise environment experienced at neighbouring and future SRs.

Baseline Vibration Monitoring

13.5.1 Short term vibration monitoring was undertaken at a key location of the Site on Friday 22nd February 2013, covering a representative sample of trains passing on the mainline inter-city railway lines to the north of the Site.

Site Preparation and Construction Assessment Methodology

Construction Works Noise

13.6 The generic construction sequence of works which are considered to be the most likely to give rise to significant noise effects can be divided into three specific activities:

- Enabling Works;
- Building Construction; and
- Landscaping and External Infrastructure Works.

13.6.1 To assess the likely significant effects of noise from construction works on existing SRs surrounding the Site, the '*ABC Method'* provided in BS 5228-1:2009+A1:2014 was used. This method defines category threshold values which are determined by the time of day and existing monitored ambient noise levels. Noise likely to be generated by construction activities, (known as the '*total noise level*') was then compared with the '*threshold value'*. If the total noise level exceeds the 'threshold value', a significant effect is deemed likely to occur.

13.6.2 Noise threshold levels were established for the existing SRs based upon the monitored noise levels. Noise levels associated with the Site preparation and construction works were then predicted and assessed against the threshold levels. Calculations were carried out in accordance with the methodology prescribed within BS 5228. Calculations representing a worst-case scenario over a one-hour period with plant operating at the closest point to the nearest SR and in the absence of mitigation are presented to provide the "*greatest*" environmental effect that might reasonably be expected. In practice, noise levels would tend to be lower owing to greater separation distances, screening effects and periods of plant inactivity.

Full details of the predictions and assumptions of the assessment of likely noise associated with the construction works are contained within **Appendix 13.3**.

Construction Traffic Noise

13.6.3 Assessment of noise level changes arising from construction traffic was undertaken using the calculation methodology detailed within the CRTN.

Construction Works Vibration

13.6.4 Levels of vibration generated during the Site preparation and construction phase require consideration to determine the potential for construction vibration to give rise to disturbance to humans and cause damage to buildings.

13.6.5 There are currently no British Standards that provide a methodology for predicting levels of vibration from construction activities other than BS 5228-2:2009, which relates to percussive, or vibratory, rolling and piling only. However, as stated in BS 5228-2:2009 and as generally accepted, the threshold of vibration perception for humans is typically in the peak particle velocity (PPV) range 0.14 mm/s to 0.3 mm/s at frequencies between 8 Hz and 80 Hz in residential environments. Based on historical field measurements undertaken by Waterman and having regard to information contained within BS 5228-2:2009, **Table 13.4** details the distance at which certain activities are likely to give rise to '*just perceptible*' levels of vibration.

Table 0-4: Assessing Construction Vibration Effects upon Human Response

Construction activity	Distance from activity when vibration may just be perceptible (*metres*)[1]
Heavy vehicles	5 - 10
Excavation	10 - 15
Concreting	15 - 20
Earth moving	20 - 30
Rotary bored piling	20 - 30

Notes: [1] Distances for perceptibility are dependent upon several factors and may be greater than indicated. The principal factors are dependent on the radial distance between source and receiver, source energy per blow or per cycle, ground conditions, underlying geology and upon the foundations construction of the building itself.

It is a widely-held belief that if vibration can be felt, then damage to property is inevitable; however, vibration levels at least an order of magnitude higher than those for human disturbance are required to cause damage to buildings. A limit of 10 mm/s is commonly adopted in-line with the guidance provided in BS 5228-2:2009 when considering the potential for building damage to arise. Whilst mindful of relevant building damage criteria, the vibration assessment concentrates principally upon the potential for human disturbance.

OPERATIONAL DEVELOPMENT ASSESSMENT METHODOLOGY

Residential / External Amenity

13.7 Guidance from TAN 11, BS 8233 and the WHO guidelines were used to assess the suitability of the Site for residential development.

13.7.1 Baseline noise levels, established through survey, were used to calibrate a 3-dimensional Cadna-A noise model of the Site. It is against these established prevailing noise levels that the assessment of the suitability of the Site for residential Development was undertaken.

13.7.2 With regard to vibration, VDV values determined from vibration measurements of a number of representative train events, were compared to the levels at which adverse comment is

likely presented in Table 13.3. The noise and vibration monitoring locations are shown on **Figure 13.1**.

Industrial Uses

13.7.3 There is the potential for noise impacts associated with the operation of the Crawford Industrial Estate upon the completed Development. Noise sources were identified as emanating from the rear of JS Payne Ltd Structural Architectural Steel and Stainless Steel Fabricators.

The potential noise impacts of the JS Payne Site upon the proposed Development shall be assessed in-line with the guidance provided in BS 4142:2014.

Building Services Plant Noise

13.7.4 The significance of sound of an industrial and / or commercial nature depends upon several factors including the margin by which a sound exceeds the background sound level, its absolute level, the time of day and change in the acoustic environment, as well as local attitudes to the source of the sound and the character of the neighbourhood.

13.7.5 BS 4142:2014 provides an assessment and rating method to assess adverse effects from a range of industrial and / or commercial noise sources, including fixed building services plant. The measured or predicted noise level from the source in question, the '*specific noise*' level ($L_{Aeq,T}$), immediately outside the dwellings was compared with the '*background noise*' level ($L_{A90,T}$). Where the sound contains certain acoustic features at the assessment location (*e.g. tones, impulses, intermittency etc.),* then a scaled character correction was added to the specific noise level to obtain the *'rating noise'* level ($L_{Ar,Tr}$). The significance of effect is dependent on the context, having consideration to pertinent factors such as the sensitivity of the receptor, the absolute level of sound to the character and level of the residual sound compared to the character and level of the specific sound.

Based on the noise monitoring data detailed in **Appendix 13.2** and in accordance with advice from Newport City Council (NCC), maximum plant emission levels were set in controlling fixed building services plant to an acceptable level. Noise limits apply at a position 1m from the façade of the nearest SRs and include the total contribution of noise from all plant items associated with the Development that may run during any period.

Road Traffic Noise

13.7.6 The changes in noise levels, attributable to changes in operational road traffic flows and volumes resulting from the Development have been calculated using traffic data provided by the Applicant's transport consultants (Asbri Transport Limited) (refer to **Appendix 13.4**). Traffic flow data has been provided for the 'with' and 'without' Development for the anticipated year of completion (2023), together with baseline traffic data for 2017.

13.7.7 Basic Noise Levels (BNLs) were calculated for the road links covered by the Transport Assessment using the calculation methodology of 'The Calculation of Road Traffic Noise' (CRTN). The calculations use the 18-hour Average Annual Weekday Traffic (AAWT) flow, % Heavy Good Vehicles (HGV) composition and speed limit for each road link. The BNLs were

calculated using the calculation methodology provided in the CRTN. The likely impacts of changes in operational road traffic noise were evaluated by consideration of the estimated changes in $L_{A10,(18\ hour)}$ road traffic noise level on the local highway network.

SIGNIFICANCE CRITERIA

Construction Noise & Vibration

13.8 As outlined above, to assess the significance of effects from construction noise on existing sensitive receptors and future sensitive receptors for areas of the Development built out and occupied, 'The ABC Method' provided in BS5228-1:2009+A1:2014 was used. The vibration assessment has been made against the criteria for human perception as presented in BS5228-2:2009. For noise and vibration generated from the demolition and construction works, the criteria in **Table 13.5** were adopted to provide transparency in the definition of the significance of identified effects. Full details are provided in **Appendix 13.3**.

Table 0-5: Significance Criteria for the Assessment of Construction Noise and Vibration

Significance of Impact	Level Above Threshold Value dB(A)	Level of Vibration	Definition
Insignificant	≤ 0.0	< 0.14mm/s	The impact is not of concern
Adverse Impact of Minor Significance	>0.0 to 4.9	>0.14mm/s to <1mm/s	The impact is undesirable but of limited concern
Adverse Impact of Moderate Significance	5.0 to 9.9	1mm/s to 3mm/s	The impact gives rise to some concern but is likely to be tolerable depending on scale and duration
Adverse Impact of Major Significance	≥10	>3mm/s	The impact gives rise to serious concern and it should be considered unacceptable

With regards to potential damage to underground utilities, provided vibration is ≤7.5mm/s (derived from BS5228-2), the significance of the impact would be insignificant. For all other buildings, the significance of a vibration level of ≤10mm/s is insignificant with regard to building damage.

Construction Traffic

13.8.1 The criteria proposed for the assessment of operational road traffic noise as detailed in **Table 13.5** is also considered appropriate for the assessment of demolition and construction road traffic noise and has accordingly been adopted in this assessment.

OPERATIONAL DEVELOPMENT

Residential Amenity

13.9 The assessment of residential amenity is not an impact of the Development but rather a product of the prevailing noise and vibration environment, although it is recognised that

the noise environment could be changed by the Development. In view of this, it is not appropriate to attach significance criteria to the suitability of the Site for residential uses. Rather, the assessment of residential amenity with regard to noise has been undertaken in line with relevant and credited guidance on noise, notably, TAN 11 NECs (**Table 13.1**), BS8233:2014 (**Table 13.2**) and WHO Guidelines (a widely accepted approach). Vibration has been assessed against the human response criteria of BS6472 (**Table 13.3**).

Industrial Uses

13.9.1 The potential noise impacts of Crawford Industrial Estate, namely that from the JS Payne facility upon the proposed Development shall be assessed in-line with the guidance provided in BS 4142:2014.

Fixed Plant and Building Services Noise

13.9.2 The guidance provided in BS4142: 2014 together with the requirements of Newport City Council has been used to determine the upper noise limits for items of fixed plant which may be introduced as part of the Development. Noise from any fixed plant or building services (as defined in BS4142) should be 10dB below the prevailing background noise level at the sensitive receptors, with a minimum value of 35dB $L_{Ar,Tr}$.

Road Traffic Noise

13.9.3 The Design Manual for Roads and Bridges, Volume 11 Section 3, Part 7 'Traffic Noise and Vibration' (DMRB) provides significance criteria for changes in operational road traffic noise levels which are reproduced in **Table 13.6** and were used in this assessment. DMRB state that "a change in road traffic noise of 1 dB $L_{A10,18h}$ in the short term (*e.g. when a project is opened*) is the smallest that is considered perceptible" or a 3 dB $L_{A10,18h}$ change in the long term (*typically 15 years after project opening*). Notwithstanding this, it is generally accepted by acoustic practitioners that subjectively an increase of 3dB in environmental noise is just noticeable, whereas an increase of 10dB, a tenfold increase in intensity is judged by most people as a doubling of loudness.

Table 0-6: Significance Criteria for Road Traffic Noise Assessment

Significance	Short-Term Noise Level Change dB(A)	Long-Term Noise Level Change dB(A)
Insignificant	0 to 0.9	0 to 2.9
Adverse Impact of Minor Significance	1.0 to 2.9	3.0 to 4.9
Adverse Impact of Moderate Significance	3.0 to 4.9	5.0 to 9.9
Adverse Impact of Major Significance	≥ 5	≥10

Where there are reductions in road traffic noise of the same magnitude as presented in **Table 13.6** then the significance is beneficial.

LIMITATIONS AND ASSUMPTIONS

Construction Works Noise

13.10 The BS 5228 calculation methods allow accurate noise levels to be determined for various construction activities. However, the value of any such predictions is necessarily limited by the number of assumptions that were made regarding the number and type of plant to be utilised, their location and detailed operating arrangements. Some of this information would be clarified as the detailed design progresses and later when resources are mobilised, but other information (*such as exactly where the plant operates and for how long*) would remain uncertain, even after works have commenced.

Consequently, the available information is considered sufficient to perform a generic construction phase noise assessment, focussing on key activities operating at the Site boundary, with the aim of identifying whether a significant, albeit temporary, noise effect is likely to arise at the nearest SRs.

Building Services Plant Noise

13.10.1 At this stage in the design of the Development, the number, location, specific type and configuration of fixed plant connected with the Development are not defined. Consequently, it is not possible to undertake predictions to determine whether appropriate standards might be met, so instead appropriate plant noise emission limits have been set.

BASELINE CONDITIONS

Sensitive Receptors

13.11 Existing potentially noise SRs which may be affected by the Development are shown in **Table 13.7** and illustrated in **Figure 13.1**.

Table 0-7: Existing Sensitive Receptors

Sensitive Receptor Figure 13.1	Type of Receptor	Address / Name	Approximate Distance from Site Boundary
SR A	Existing Residential	Charnwood Road / Filey Road	30 m East
SR B	Existing Residential	Orchard Street / Margaret Avenue	30 m East
SR C	Existing Residential	Glan Usk Primary School	15 m North

Where several SRs are located close to each other, the nearest SR is given to represent the immediate area. It should be noted that any SRs that lie further away from those listed above are not included and will not be part of the assessment moving forward.

Baseline Noise Monitoring

13.11.1 The noise monitoring locations are shown on **Figure 13.1** and described below in **Table 13.8**. A summary of the measured daytime (07:00 to 19:00), evening (19:00 to 23:00) and

night-time (23:00 to 07:00) noise levels at these locations are presented in **Table 13.9**, with full results displayed graphically in time-history format in **Appendix 13.1**.

Table 0-8: Noise Monitoring Locations

Monitoring Location (*Figure 10.1*)	**Description**	**Observations and Predominant Noise Sources**
LT1	Free-field measurement at the eastern Site boundary fronting the railway lines. Microphone located 1.5 m AGL.	Noise climate dominated by constant distant vehicular traffic on M4 motorway to the south of the site. Although intermittent in comparison, noise from distant rail pass-by (*approximately one passage/fright every 10-minute*) was audible.
ST1	Free-field measurement at the north-western boundary of the Site overlooking the River Usk. Microphone located 1.2 m AGL.	Noise climate dominated by constant vehicular traffic on M4 motorway. Contributory noise from children playing during lunch break at Glan Usk Primary School, influencing the noise climate to a degree.
ST2	Free-field measurement at the south-eastern boundary of the Site overlooking the River Usk Microphone located 1.2 m AGL.	
ST3	Free-field measurement at the southern boundary of the Site adjoining Glan Usk Primary School. Microphone located 1.2 m AGL.	

Table 0-9: Summary of Baseline Noise Measurements (free-field)

Monitoring Location (*Figure 10.1*)	Period	Duration	$L_{Aeq,T}$ dB	$L_{A10,T}$ dB	$L_{A90,T}$ dB		$L_{AFmax,5min}$ dB	
			Ave[1]	Ave[2]	Range	Ave[2]	Range	90th %tile[3]
LT1	Day	12hr	67	65	44 - 60	50	57 - 96	84
	Evening	4hr	56	50	36 - 46	39	42 - 82	77
	Night	8hr	48	45	33 - 56	39	41 - 77	66
ST1	Day	30mins	60	61	45 - 57	53	62 - 76	72
ST2	Day	30mins	59	62	48 - 56	52	63 - 83	75
ST3	Day	30mins	54	56	49 - 51	50	58 - 63	62

Notes: [1] Logarithmic average over the daytime / evening / night-time survey periods; [2] Arithmetic average over the daytime / evening / night-time survey periods. [3] The 90th percentile L_{AFmax} value is presented for the long-term noise monitoring results and is considered to fairly represent typical L_{AFmax} levels being experienced, within the spirit of WHO and BS 8233 guidance. All figures rounded to nearest whole decibel.

The Site is situated in an urban location adjoining the strategic rail network and approximately 460 metres to the south of the M4. Transportation noise is the dominant prevailing noise source with localised contribution from Crawford Industrial Estate to the south of the Site.

Baseline Vibration Monitoring

13.11.2 On 22nd February 2013, a subjective assessment of vibration was conducted across the Site to determine existing tactile vibration from train passes on the mainline to the north of the Site for a representative sample of train events.

The subjective assessment of vibration during the survey (*including at the closest passing point of the rail head to the site boundary*) did not reveal any perceptible levels of vibration along the eastern boundary during both passenger and freight train passes.

Additionally, vibration measurements were undertaken for a residential development approximately 400m south of the site that also lies adjacent to the rail line located on Turner Street (planning application number 11/0843). This site has been granted planning permission and is understood to be complete. The vibration measurements were undertaken at approximately 30m from the rail head and are detailed in **Table 13.10**.

Table 0-10: Vibration Measurements and Corresponding Semantic Rating

Monitoring Location		Maximum Vibration Dose Value (m/s1.75)					
		x-axis		y-axis		z-axis	
		$VDVd,_{16hr}$ day	$VDVd,_{8hr}$ night	$VDVd,_{16hr}$ day	$VDVd,_{8hr}$ night	$VDVb,_{16hr}$ day	$VDVb,_{8hr}$ night
1	Measurement	0.020	0.018	0.030	0.026	0.033	0.029
	Semantic	Adverse Comment Not Expected	Adverse Comment Not Expected	Adverse Comment Not Expected	Adverse Comment Not Expected	Adverse Comment Not Expected	Adverse Comment Not Expected

The vibration survey indicates levels that are well below those that would result in a low probability of adverse comment and are significantly under the minimum NCC criteria of 0.26m/s-$^{1.75}$. Given the similarities of the Turner Street site to the proposed development on Herbert Road, these measurements are deemed representative of the development.

LIKELY SIGNIFICANT EFFECTS

Site Preparation and Construction

Construction Works Noise

13.12 The calculated '*worst-case*' construction noise predictions in terms of dB $L_{Aeq,1hr}$ for the principal construction works at the nearest affected SRs are presented in **Table 13.11**, together with the associated level of significance. Full details of the construction noise assessment are provided within **Appendix 13.2**.

The highest noise levels tend to originate from plant associated with earthmoving works, and/or construction of the superstructure. During the fit-out, construction noise would be significantly lower. In practice, construction noise levels would tend to be lower owing to greater separation distances and screening effects. Noise would also tend to reduce over a 12-hour working day owing to periods of inactivity.

Table 0-11: Summary of Predicted Construction Noise Levels and Level of Significance

Receptor	Assessment Parameter	Development Stage			
		Enabling Works	Rotary Bored Pilling	Concreting	Building Construction
SR A	**Predicted Noise Level**	70	75	76	75
	Significance	**Short-term, local, adverse** and of **minor significance**	**Short-term, local, adverse** and of **moderate significance**	**Short-term, local, adverse** and of **moderate significance**	**Short-term, local, adverse** and of **moderate significance**
SR B	**Predicted Noise Level**	70	75	76	75
	Significance	**Short-term, local, adverse** and of **minor significance**	**Short-term, local, adverse** and of **moderate significance**	**Short-term, local, adverse** and of **moderate significance**	**Short-term, local, adverse** and of **moderate significance**
SR C	**Predicted Noise Level**	76	81	82	81
	Significance	**Short-term, local, adverse** and of **substantial significance**	**Short-term, local, adverse** and of **substantial significance**	**Short-term, local, adverse** and of **substantial significance**	**Short-term, local, adverse** and of **substantial significance**

It should be noted that the daytime construction threshold noise level at SRs A and B adjacent to the railway line is 70dB $L_{Aeq,T}$ based on the measured prevailing daytime noise level. At Usk Primary School the daytime construction threshold limit is 65dB $L_{Aeq,T}$.

The worst-case predicted noise levels presented in **Appendix 13.2** and summarised in **Table 13.11** indicate that **short-term adverse effects** of **minor** to **substantial significance** are predicted at existing SRs A, B and C at varying stages of the Site preparation and construction works. Given that adverse effects have been predicted during the construction works, mitigation measures would be required. Recommended mitigation measures are discussed later in this Chapter.

Construction Traffic Noise

13.12.1 In addition to construction plant operating on the Site, there would be some movement of materials to and from the Site by road. A Construction Traffic Management Plan would be agreed to minimise the temporary and intermittent adverse effects that construction traffic can cause. Peak levels of noise or vibration arising from construction vehicles should not be any greater than can presently arise from existing heavy duty vehicle movements on the existing roads, and would be less than those from the main construction works on the Site, such as piling operations. As such, it is considered that the potential noise effects of construction traffic associated with the proposed Development would be **insignificant**.

Construction Works Vibration

13.12.2 Vibration effects during piling phases would have the potential to arise at premises adjacent to the Development (Glan Usk Primary School) where vibrating generating activities would be carried out within approximately 25m of the receptors identified in **Table 13.7**. However, given the temporary and local nature of these activities it is considered that they would have at worst moderate adverse effects. Given that moderate adverse effects have been predicted mitigation measures would be required. Potential mitigation measures are discussed in the relevant section below.

OPERATIONAL DEVELOPMENT

Residential Amenity – TAN 11

13.13 Noise monitoring results confirm the east of the Site to be exposed to the highest levels of noise during the daytime, evening and night-time periods where it extends closest to the rail route (*monitoring position LT1*). Average ambient ($L_{Aeq,T}$) noise levels of 67, 56 and 48 dB and maximum noise levels of 84, 77 and 66 dB $L_{AFmax,90thpercentile}$ were recorded during the daytime, evening and night-time periods respectively. The noise levels at the short-term locations fell predominantly within NEC B.

With reference to the principles of TAN 11 (**Table 13.1**), the development Site is predominantly in NEC B, with a strip of land approximately 10m in depth adjacent to the railway line in NEC C. This indicates that the Site is predominantly suitable for residential development, with the provision of mitigation, i.e. set-back of facades from the railway line and the use of sufficient façade glazing.

Residential Amenity – Noise (Internal)

13.13.1 A three-dimensional Cadna-A noise model has been produced to predict the levels of noise incident upon the façades of the proposed residential buildings. **Figure 13.2** presents the predicted daytime façade noise levels and **Figure 13.3** presents the predicted night-time façade noise levels. It should be noted that the baseline noise model, without Development, was calibrated using the baseline noise monitoring data as presented in **Appendix 13.2** of the Environmental Statement.

The Site has an existing consent for 251 units. Of these, 20 apartments are being implemented as part of phase 1 together with noise attenuation works along the railway line and boundary with the Crawford Industrial Estate in the form of a 1.8 m acoustic fence. This acoustic fence has been incorporated into the Development noise model.

As previously discussed, the target criteria for all residential dwellings during the daytime is 35dB $L_{Aeq,T}$ and night-time period is 30dB $L_{Aeq,T}$. During the night time, it is also recommended that the maximum internal noise level does not exceed 45dB L_{AFmax}. The assessment results are presented in **Table 13.12** for the worst affected facades within the Development. L_{AFmax} values were calculated based on the differential between the monitored night-time noise level and the night-time L_{AFmax} value, and applied to the predicted noise levels from the CADNA/A noise model.

Table 0-12: Indicative Façade Sound Insulation Performance for Glazing Elements

Elevation	Period	Incident Façade Noise Level (dB)	Target Criteria (dB)	Minimum Sound Insulation of Glazing dB (R_w+C_{tr})	Example Glazing Configuration (*or equal and approved*)
Eastern Façade Aspects	Daytime $L_{Aeq,16hr}$	67[1]	35	≥28	Standard thermal double glazing (*e.g. 4/12/4mm*) + acoustically passive ventilation (*e.g. trickle vents*)
	Night-time $L_{Aeq,8hr}$	48[1]	30		
	Night-time L_{AFmax}	66[1]	45		

Notes: [1] Calculated incident façade noise level.

13.13.2 Calculations indicate that on the eastern façades of the buildings will require a thermal double glazing providing in the region of 28 dB R_w+C_{tr} sound insulation in combination with an acoustically passive ventilation system to satisfactorily control the ingress of external environmental noise within residential room spaces (*with reference to BS 8233:2014 and WHO, 1999*).

All other aspects of the façades oriented to the north, south and west will require a less stringent glazing package to achieve the required design criteria.

During the detailed design phase of the project, a more in-depth assessment will be undertaken and used to identify the detailed zoning of window types and attendant acoustic performance specifications in one octave band detail to ensure appropriate control of the frequency content of sound incident upon the different façades of the Development.

Residential Amenity – Noise (External)

13.13.3 For external amenity spaces, such as gardens, balconies and terraces the guidance (British Standards 8233:2014) when considering noise and planning consideration for the Development, provides the following statement:

"For traditional external areas that are used for amenity space, such as gardens or patios it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited".

13.13.4 Modelling results indicate that the majority of the site would be less than 55 dB, which falls within the criteria outlined in BS8233 and WHO guidelines for external amenity spaces. External spaces directly adjacent to and in closest proximity to the inter-city railway lines, are predicted to experience noise levels in the range of 55 – 60 dB.

Only the facades facing the rail mainlines are affected by elevated noise levels and so in the spirit of BS8233 a compromise between elevated noise levels and making efficient use of land resources to ensure development needs can be met, is warranted.

Industrial Noise – Crawford Industrial Estate

13.13.5 In addition to transportation noise sources consideration has been given to the potential impacts associated with the operation of the Crawford Industrial Estate. Noise measurements undertaken at ST1 were subject to sources emanating from the Crawford Industrial Estate. Noise sources were identified as emanating from the rear of JS Payne Ltd Structural Architectural Steel and Stainless-Steel Fabricators.

Noise sources predominantly included fork lift truck movements in the yard and grinding noises emanating from the building, which was noted to have access doors open during operations, presumably for ventilation purposes.

The potential impacts of the JS Payne facility upon the proposed Development have been assessed in line with the guidance provided in BS 4142:2014. The assessment results are presented as **Table 13.13.**

Table 0-13: BS 4142 Assessment Crawford Industrial Estate

Parameter	Noise Level	
$L_{Aeq,T}$ of source at receptor	57	dB(A)
Background Level ($L_{A90,T}$)	49	dB(A)
Acoustic Feature Correction?	Yes	+3dB(A)
Rating Level	60	dB(A)

Difference to Background $L_{A90,T}$	11	dB(A)

13.13.6 The assessment results presented as **Table 13.12** indicate that in the absence of mitigation there would be the potential for noise levels generated within the JS Payne Site to fall at least 11dB above the background noise levels. However, it is considered that due to the temporary nature of yard noises from JS Payne Ltd, noise levels when averaged over a one hour period would be in the region of 3dB lower. This is given a typical 50% '*on-time*' of yard noises during the day.

13.13.7 Further to the above NCC has requested that consideration be given to potential night-time noise levels associated with the JS Payne operations. The JS Payne site currently operated during the daytime period only which is unlikely to change. However, it is recognised that the use of the site is unrestricted and could potentially operate 24 hours a day.

13.13.8 To assess the potential impacts during the night-time period consideration has been given to predicted internal noise levels within bedrooms. The predicted noise levels have been assessed against the guideline noise level for the prevention of sleep disturbance of 45dB L_{Amax} as set out in the WHO '*Guidelines for Community Noise'*.

13.13.9 Note should be taken here that the WHO document 'Guidelines for Community Noise' quotes the findings of Vallet & Vernet (1991) which is that:

"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10–15 times per night…"

13.13.10 The closest sensitive receptors to the Crawford Industrial Estate would be apartments. The facades of the apartments could be designed to provide a minimum attenuation to noise of 35dB. With these façade design mitigation measures in place a maximum internal noise level of 49dB L_{Amax} has been predicted. A noise level of this magnitude would be in excess of the WHO '*Guidelines for Community Noise'* for night-time L_{Amax} events within bedrooms. It should be noted however that this is only a relevant consideration should bedrooms overlook Crawford Industrial Estate and if night-time operations occur.

Building Services Plant Noise

13.13.11 Any items of fixed plant associated with the operation of the Development would have the potential to generate noise. At this stage in the design, specific details of the plant associated with the Development are not yet known. Consequently, suitable limits to which plant should adhere have been set and are presented below in **Table 13.13**.

Table 0-14: Plant Noise Limits at Nearest Sensitive Receptors

Location	Period	Representative $L_{A90,5min}$	Plant Noise Emission Limit $(L_{Aeq,T})^{1+2}$
All Sensitive Receptors	Daytime (07:00 and 23:00)	50	40
	Night-time (23:00 and 07:00)	39	35

Notes: [1] If there is determined to be tonal or intermittent content emitting from plant then an acoustic feature correction should be applied (*i.e. the plant noise limits shall be reduced by 5dB*). [2] Noise limits apply at a position 1m from the façade of the nearest noise sensitive properties and include the total contribution of noise from all noise generating plant that may run during any period.

13.13.12 In setting the plant noise emission limits regard was given to the results of the baseline noise survey and the noise requirements of NCC seeking to ensure the acoustic acceptability of plant that may be introduced as part of the Development.

13.13.13 Based on the above principles and the likely distance separation between plant and existing SRs, it is recommended that noise from fixed building services plant is designed to a level 10 dB below the existing background noise level at a position 1m from the façade of the nearest SRs (*i.e. Plant* $L_{Aeq,T} = L_{A90,T}$ *-10dB*). This is on the provision that a limiting plant noise level of 35 dB $L_{Aeq,T}$ is set where the prevailing background noise level minus 10 dB are below this value. Such a limiting criterion falls below credited absolute health-based guideline values to prevent harmful effects of noise (*e.g. on rest / sleep with windows open*), whilst ensuring standard abatement measures remain physically and economical viable.

13.13.14 Design to such a criterion would ensure that plant noise would, at worst, contribute 0.4 dB to the noise climate of the area, which would be imperceptible as to not materially affect or inconvenience user's amenity, thereby ensuring the acoustic acceptability of plant that may be introduced as part of the Development.

13.13.15 Based on the above noise emission limits for new building plant being achieved (*and potentially being controlled by a standard planning condition*), noise generated from new building plant would have an **insignificant** effect on surrounding existing SRs.

Road Traffic Noise

13.13.16 The likely change in road traffic noise resulting from operational traffic associated with the Development was determined in accordance with CRTN; the results of which are presented in **Table 13.15**. The 2023 baseline scenario '*without Development'* includes traffic increases due to natural traffic growth and a cumulative scheme. Therefore, the scenario 'with Development' is intended to identify the likely effects solely as a result of the Development. Full details of the road traffic noise assessment are provided within **Appendix 13.4**.

Table 0-15: Differences in the Road Traffic Basic Noise Level (BNL), dB $L_{A10,18hr}$

Road Link	Difference in dB $L_{A10,18hr}$ BNL (Base + Development) - (Base)		
	2023 - Without Development (Base)	2023 - With Development (Base + Development)	Change
Caerleon Rd north	59.8	60.3	0.5
Caerleon Rd south	60.1	60.6	0.6
Turner Street	56.1	57.4	1.3
Tesco	46.1	47.2	1.2
Trostrey street	33.6	34.4	0.8
Clarence Place	62.8	63.2	0.4
East Usk Road	46.7	47.3	0.6
Church Road	59.0	59.7	0.6
Chepstow Road	59.7	60.0	0.3

Corporation Road	51.7	52.2	0.5

13.13.17 For all road links assessed in **Table 13.15**, the difference in operational road traffic noise (considering the 2023 baseline situation both '*with*' and '*without*' Development) is no greater than +0.8 dB except along Turner Street and Tesco's Drive. According to the criteria (see **Table 13.6**) the difference in noise levels are **insignificant**, with Development alone not large enough to cause any discernible impacts. For operational traffic flows on Turner Street and Tesco's Drive, traffic would increase as a result of the Development, equalling to a noise increase of 1.3dB(A) and 1.2dB(A), respectively, which is assessed as of **permanent, local, adverse impact** of **minor significance** on existing sensitive receptors. However, the significance of the impact on noise sensitive receptors on Turner Street due to changes in road traffic associated with the Development is expected to be **insignificant** for the following reasons:

- traffic flows on Turner Street are an order of magnitude less than nearby surrounding road links and constitute a very small percentage of the total traffic in the area and would therefore not make a significant contribution to the overall traffic noise.

MITIGATION MEASURES AND LIKELY RESIDUAL EFFECTS

Site Preparation and Construction

Construction Works Noise

13.14 Measures to control the construction noise and vibration effects would be incorporated into Site-specific Environmental Management Plan (EMP). This EMP would have regard to appropriate legislation, guidance and measures to minimise construction noise, including:

- application of the principle of Best Practical Means (BPM) as defined in Section 72 of the Control of Pollution Act 1974, carrying out all work in such a manner as to reduce any disturbance from noise to a minimum;
- identification and use of low noise techniques. For example, equipment that breaks concrete by munching or similar, rather than by percussion. Where construction plant is known to generate significant levels of noise then it is to be used sparingly and the construction activity closely monitored to minimise noise levels;
- all plant brought on to Site should comply with the relevant EC / UK noise limits applicable to that equipment or should be no noisier than would be expected based on the noise levels quoted in BS 5228-1:2009+A1:2014. Plant should be properly maintained and operated in accordance with manufacturers' recommendations;
- where feasible, all stationary plant should be located so that the noise at all occupied SRs is minimised and, if practicable, every item of static plant when in operation should be sound attenuated using methods based on the guidance and advice given in BS 5228 (*e.g. local screening*);
- items of plant on the Site operating intermittently should be shut down in the intervening periods between use;

- adoption of a noise monitoring regime and the establishment of noise Action Levels in consultation with NCC, above which consideration would be given to the use of alternative techniques and / or other means of controlling noise levels;
- use of hoarding to the required height and density appropriate to the noise sensitivity of the area;
- implementation of a Construction and Logistics Plan (CLP) to pre-plan and manage traffic associated with the works to minimise disturbance to SRs.

13.14.1 Accounting for the implementation of mitigation, as outlined above, **Table 13.16** summarises the mitigated construction noise levels and the associated significance of likely residual effects for the SRs assessed. The likely residual noise levels associated with the construction works are presented in **Appendix 13.2**.

Table 0-16: Summary of Predicted Residual Construction Noise Levels and Level of Significance

Receptor	Assessment Parameter	Development Stage			
		Enabling Works	Rotary Bored Piling	Concreting	Building Construction
SR A	**Predicted Noise Level**	60	65	66	65
	Significance	**Insignificant**	**Insignificant**	**Insignificant**	**Insignificant**
SR B	**Predicted Noise Level**	60	65	66	65
	Significance	**Insignificant**	**Insignificant**	**Insignificant**	**Insignificant**
SR C	**Predicted Noise Level**	66	71	72	71
	Significance	**Short-term, local adverse** and of **minor significance**	**Short-term, local adverse** and of **moderate significance**	**Short-term, local adverse** and of **moderate significance**	**Short-term, local adverse** and of **moderate significance**

13.14.2 Based on the implementation of mitigation measures as detailed above, the likely residual effects from construction noise are assessed as **insignificant at all SRs** apart from SR C, which are assessed as **short-term, local, adverse**, and of **minor to moderate significance**, depending on the construction activity taking place. However, this conclusion is predicated on the basis that all on-site plant activities operate simultaneously – a situation which in practice is seldom (*if ever*) likely to occur. As such, noise from construction is expected to be **insignificant** at all locations.

Construction Traffic Noise

13.14.3 Regarding construction traffic management during the construction works, all traffic logistics would be agreed with NCC. Such measures would be set out within a Traffic Management Plan (TMP) to appropriately pre-plan and manage traffic associated with the

works as far as practically possible to minimise any potential disturbance to local-residents and businesses from noise associated with road-going vehicles, including haulage vehicles.

In application of the principle of BPMs and implementation of a site specific TMP, the likely residual effects from construction traffic is expected to remain **insignificant** at all locations.

Construction Works Vibration

13.14.4 With regards to the potential effects of construction generated vibration on nearby existing SRs, agreed vibration limits would be set to ensure compliance with national standards and, hence, minimise the risk of complaints or building damage. These limits would be controlled through the implementation of a site-specific EMP. Consequently, residual vibration levels are anticipated to be reduced to a level that is **insignificant**.

OPERATIONAL DEVELOPMENT

Residential / External Amenity

13.15 Based upon measured environmental noise levels ($L_{Aeq,T}$ and L_{AFmax}) affecting the Site and the results of the Cadna-A noise model, preliminary façade sound insulation calculations have been undertaken to determine the performance requirements the glazing in the worst affected façades would be required to satisfactorily control the ingress of external environmental noise within residential room spaces (*with reference to BS 8233:2014 and WHO, 1999*). This study indicates that thermal double glazing providing up to 28 dB R_w+Ctr attenuation (*e.g. 4/12/4mm glazing configuration*) will be required in combination with acoustically passive ventilation system. During the detailed design phase of the project, a more detailed assessment will be undertaken.

13.15.1 Due to the urban location of the Site adjoining the strategic rail network with localised contributions from Crawford Industrial Estate to the south, external amenity areas would, in small parts, be exposed to levels above the 55 dB $L_{Aeq,16hr}$ WHO guideline criterion. Levels are, however, considered acceptable for its given location when accounting for the convenience and desirability of living in the area. Nonetheless, and in line with relevant and credited guidance, the design intent is to achieve the lowest practicable levels in external amenity spaces through careful layout design and local screening on the most noise exposed façades.

13.15.2 Preliminary calculations indicate that the VDVs associated with train movements during both the daytime and night-time periods will be significantly below the '*low probability of adverse comment*' range as defined by BS 6472 within all areas of the Development. Adverse comment should therefore not be expected from the future occupants.

Industrial Noise – Crawford Industrial Estate

13.15.3 As previously discussed there would be the potential for both internal and external guideline noise criteria to be exceeded should the JS Payne site be operational 24-hours per day. To mitigate noise levels associated with the Crawford Industrial Estate a 2.5m high gabion basket retaining wall with 1.8m high acoustic fence above is proposed between the site boundary and the industrial estate.

The proposed acoustic barrier would serve to reduce external noise levels by in the region of 11dB(A). Predicted noise levels with the barrier in place are presented as **Table 13.17**.

Table 0-17: Crawford Industrial Estate BS 4142 Assessment with Mitigation

Parameter	Noise Level	
$L_{Aeq,T}$ of source at receptor	57	dB(A)
Screening Correction (1.8m acoustic barrier)	11	dB(A)
Background Level ($L_{A90,T}$)	49	dB(A)
Acoustic Feature Correction?	Yes	+3dB(A)
Rating Level	49	dB(A)
Difference to Background $L_{A90,T}$	0	dB(A)

13.15.4 The assessment results indicate that with the acoustic barrier in place there would be the potential for noise levels to equal the monitored background noise level.

13.15.5 It is considered that given the temporary nature of yard noises from JS Payne Ltd, and through appropriate use of a physical barrier between Crawford Industrial Estate and the residential areas that there would be **insignificant impacts** arising from noise upon the residential areas of the Development.

13.15.6 With regards to the night-time noise levels the barrier would provide a 7dB reduction at first floor level. As such, allowing for 35dB(A) attenuation in noise through the façade of the residential dwellings a maximum internal noise level of 40dB L_{Amax} would arise within bedrooms. A noise level of this magnitude would fall below the 45dB L_{Amax} criteria above which the WHO states sleep disturbance may arise.

Building Services Plant Noise

13.15.7 Provided the detailed design of fixed building plant achieves the proposed noise limits set out in **Table 13.14**, the likely residual noise effects of building services plant associated with the Development on SRs would remain **insignificant**.

Road Traffic Noise

13.15.8 There are no specific mitigation measures to offset the predicted adverse noise effects along Turner Street as a result of operational traffic generated from the Development. As such, noise generated from operational traffic on Turner Street is likely to have residual **permanent, local, adverse, effect** of **minor significance** on sensitive receptors. However, a Site wide Travel Plan for the Development should be implemented, with the aim of reducing the number of car trips associated with the Development. This has the potential to bring about noise benefits.

SUMMARY

13.16 This report concludes that:

- Noise monitoring results confirm the east of the Site to be exposed to the highest levels of noise during the daytime, evening and night-time periods where it extends closest to the rail route (*monitoring position LT1*). Average ambient ($L_{Aeq,T}$) noise levels of 67, 56 and 48 dB and maximum noise levels of 84, 77 and 66 dB $L_{AFmax,90thpercentile}$ were recorded during the daytime, evening and night-time periods respectively.
- Measured environmental noise levels ($L_{Aeq,T}$ and L_{AFmax}) affecting the Site, preliminary façade sound insulation calculations have been undertaken to determine the performance requirements the glazing in the worst affected façades would be required to satisfactorily control the ingress of external environmental noise within residential room spaces (*with reference to BS 8233:2014 and WHO, 1999*). This study indicates that thermal double glazing providing up to 28 dB R_w+Ctr attenuation (*e.g. 4/12/4mm glazing configuration*) will be required in combination with an acoustically passive ventilation system. During the detailed design phase of the project, a more detailed assessment will be undertaken.
- With respect to construction noise, **short-term adverse effects** of **minor** to **substantial significance** are predicted at existing SRs A, B and C at varying stages of the Site preparation and construction works. However, with careful programming of work and the adoption of BPM, noise from construction is expected to be **insignificant**. With respect to construction traffic noise and vibration there are no anticipated significant effects at any potential SR.
- It is considered that given the temporary nature of yard noises from JS Payne Ltd, and through appropriate use of a physical barrier between Crawford Industrial Estate and the residential areas that there would be **insignificant effects** arising from noise upon the residential areas of the proposed Development.
- With respect to fixed building services plant, appropriate noise emission limits have been specified, based on representative minimum background noise levels and the requirements of NCC. Providing that the limits are met, with careful attention paid to plant selection, installation and noise attenuation as appropriate then disturbance to surrounding SRs would be avoided.
- There are no specific mitigation measures to offset the predicted noise impacts along Turner Street as a result of operational traffic generated from the Development. As such, noise generated from operational traffic on Turner Street is likely to have residual **permanent, local, adverse, effects** of **moderate significance** on sensitive receptors. However, a Site wide Travel Plan for the Development should be implemented, with the aim of reducing the number of car trips associated with the Development. This has the potential to bring about noise benefits.

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