9 Noise and Vibration

9.1 Introduction

9.1.1 This chapter of the ES considers the effects of noise and vibration associated with the construction and operation of the proposed development on the surrounding environment. The proposed development has the potential to affect noise or vibration sensitive receptors.

9.1.2 The scope of this assessment includes a quantitative study, based on the construction methodology and operation of the proposed development.

9.1.3 Impacts from the following have been assessed:

- noise and vibration from construction activities for the proposed development at residential receptors;
- off-site noise from construction road traffic on neighbouring roads;
- operational noise from the building services plant at the proposed development;
- operational noise from road and rail traffic associated with the proposed development.

9.1.4 For construction, there are a number of existing and proposed access routes onto the proposed development north of the railway line which could be utilised for construction activities. To provide flexibility, two access arrangements have been assessed.

- All construction traffic movements north of the railway line utilise the existing access north of the gas reduction station access via Heol Las on the eastern boundary of the proposed development.
- All construction traffic movements north of the railway line utilise the proposed secondary access at the Cypress Drive/Sandbrook Road roundabout on the western boundary of the proposed development.

9.1.5 During operation, the noise associated with building services plant has the potential to impact surrounding residential receptors. The use of the proposed development will result in additional road traffic being generated on the local highway network. This has the potential to result in changes to existing levels of noise at nearby sensitive receptors from road traffic.

9.1.6 The construction of a new railway station on the mainline, Cardiff Parkway, is included within the proposed development. There will not be an increase in the

number of services using the line; however consideration has been given in this assessment to the potential impact from trains stopping at the station.

9.1.7 Activities associated with the operation of this development do not generate appreciable levels of vibration, and as such have not been further assessed.

9.1.8 The methodology used for the assessment is defined in this chapter. The baseline conditions currently existing at the proposed development and surrounding area are described. As part of the assessment, mitigation measures are proposed where appropriate, and the likely residual effects identified after any such measures have been adopted.

9.2 Review of proposed development

9.2.1 A complete description of the proposed development is provided in section 3 of the introduction. In relation to noise and vibration assessment specifically, the following has the potential to result in impacts:

- New business park; and
- New transport hub facility incorporating a new railway station.

9.3 Legislation, policy context and guidance

Legislation

9.3.1 The Environmental Protection Act 1990 sets out the duty of the Local Authority to take steps to abate any noise impact, including that from a construction site, deemed to be causing a statutory nuisance. Noise is outlined in Part III of the Act in relation to noise as a nuisance or that is prejudicial to health.

9.3.2 The Control of Pollution Act 1974 is the key legislation which is used to consider and control pollution in the form of noise and vibration from construction activities. It outlines the principles of using Best Practicable Means and gives the Local Authority control. This may include specific controls to restrict certain activities identified as causing particular problems. Conditions regarding hours of operation will generally be specified and noise and vibration limits at certain locations may be applied in some cases. All requirements must adhere to established guidance and be consistent with best practicable means to control noise only as far as is necessary to prevent undue disturbance.

9.3.3 The Environmental Noise (Wales) Regulations 2006 (as amended 2009) provide the mechanism for enacting the requirements of Directive 2002/49/EC of the European Parliament (the Environmental Noise Directive) in Welsh law.

Policy context

9.3.4 Planning Policy Wales Edition 10 describes the planning development policies of the Welsh Government. The document aims to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales.

9.3.5 With regard to the assessment of noise associated with development, paragraph 6.7.4 provides guidance on noise generation near protected areas:

> *"The planning system should maximise its contribution to achieving the well-being goals, and in particular a healthier Wales, by aiming to reduce average population exposure to air and noise pollution alongside action to tackle high pollution hotspots. In doing so, it should consider the long-term effects of current and predicted levels of air and noise pollution on individuals, society and the environment and identify and pursue any opportunities to reduce, or at least, minimise population exposure to air and noise pollution, and improve soundscapes, where it is practical and feasible to do so. ".*

9.3.6 Technical Advice Note 11 (TAN 11) 1997, provides technical guidance on noise generating development including transportation projects. In relation to noise generating developments it states:

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

9.3.7 The Well-being of Future Generations (Wales) Act 2015 has a number of well-being goals to achieve through implementing sustainable development. Changes in noise levels can have an impact on the health of habitat and humans, as such the goals to create 'a resilient Wales' and 'a healthier Wales' are applicable.

Local Planning Policy – Cardiff Council and Newport City Council

9.3.8 The Cardiff Council Local Development Plan (CLDP) 2006-2026 Policies relevant to noise include Policy EN13 states that "*development will not be permitted where it would cause or permit unacceptable harm to health, local amenity, the character and quality of the countryside, or interests of nature conservation, landscape or built heritage importance because of air, noise, light pollution or the presence of unacceptable levels of land contamination*".

9.3.9 It further advises in paragraph 5.188 that "*special consideration is required where noise-generating development is proposed in or near special areas such as urban quiet areas, which are tranquil urban green spaces designated by the Welsh Government under the Environmental Noise Directive*". Cardiff contains 6 quiet areas and 6 candidate quiet areas identified in the CLDP, none of which would be

impacted by noise or vibration from the proposed development, as they are sufficiently far from the development.

9.3.10 The policy identifies that the Welsh government has a duty under the Environmental Noise Directive to produce strategic noise maps for agglomerations, major roads and major railways. The proposed development is not within or near to a Noise Action Planning Priority area, which have been identified as part of this process.

9.3.11 Policy R8 (Food and Drink Uses) is also applicable to the proposed A1 and A3 business uses, however the policy proposes to control potential noise and disturbance through controlling the specific A3 use and restricting opening hours, rather than through mitigation to be provided by the development.

9.3.12 The Newport City Council Local Development Plan (NLDP) 2011-2026 Adopted Plan (2015) refers to policy R13 which is specifically in relation to the development of new, large scale out-of-centre retail sites, however no specific mention of noise is made in this policy. Policy SP14 relates to transport proposal such as the proposed Cardiff Parkway Station. This states that transport proposals will be supported where they result in other environmental improvements including noise reduction.

Relevant guidance

British Standard BS5228-1&2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1 Noise and Part 2 Vibration

9.3.13 This provides practical guidance on the control of construction site noise and vibration. This includes quantitative noise and vibration prediction methods based on the construction method. BS5228-1&2:2009+A1:2014 also provides quantitative criteria for the assessment of construction noise and vibration effects.

9.3.14 For noise generating developments, including industrial and commercial sources, local planning authorities must ensure this does not cause an unacceptable degree of disturbance. It will also be relevant to bear in mind that if subsequent intensification or change of use results in greater intrusion, consideration should be given to the use of appropriate conditions.

British Standards BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

9.3.15 The likelihood of complaints about noise from industrial and commercial activities can be assessed, where BS 4142:2014+A1:2019 is appropriate, using guidance in BS 4142:2014+A1:2019. Tonal or impulsive characteristics of the noise are likely to increase the scope for complaints and this is taken into account by the ‘rating level’ defined in BS 4142:2014+A1:2019. Since background noise levels vary throughout a 24-hour period it will usually be necessary to assess the

acceptability of noise levels for separate periods (e.g. day and night) chosen to suit the hours of operation of the proposed development. In addition, general guidance on acceptable noise levels within buildings can be found in BS 8233: 2014 (see below).

British Standard BS 8233:2014 Guidance on sound insulation and noise reduction for buildings

9.3.16 This provides guidance on noise control in and around buildings. For many common situations, this guide suggests criteria, such as suitable sleeping/resting conditions, and proposes noise levels that normally satisfy these criteria for most people. Technically it is applicable to new build developments or building refurbishments, but it also serves as useful guidance in determining acceptable levels of noise.

Design Manual for Roads and Bridges – LA 111 Noise and vibration (revision 1 Feb 2020)

9.3.17 An approach to assessing noise and vibration effects from roads is described in Design Manual for Roads and Bridges (DMRB) relating to environmental assessment.

World Health Organization (WHO) Guidelines for Community Noise 1999 and Environmental Noise Guidelines for the European Region 2018

9.3.18 This provides guidance on acceptable levels of noise in a variety of scenarios and arising from sources such as road, rail and air traffic, industries, construction and public work, and the neighbourhood.

Night Noise Guidelines for Europe

9.3.19 These guidelines recommend that the population should not be exposed to night noise levels greater than 40dB of $L_{night,outside}$, with an interim target of 55dB, during the part of the night when most people are in bed.

9.4 Scoping and consultation

Scoping

9.4.1 The methodology set out in the scoping assessment has largely been followed in this report. Where there are exceptions, these are in response to comments from the Local Authority, or in response to the information available. Full responses received from the Local Authority are available in Appendix A1.

9.4.2 Following receipt of the scoping document, Cardiff Council (CC) has responded requesting that additional baseline noise monitoring include weekend periods. This was identified in correspondence from Gillian Jones in memorandum ref GJ3-3496/18 dated 17 July 2018.

9.4.3 CC have also requested in their response to that a Construction Environmental Management Plan (CEMP) be either prepared or conditioned. A draft CEMP will

be submitted as part of this application. This was outlined in an email received from Tim Walter 29 August 2018, based on comments from Gwyn Mapp (See Appendix A1).

9.4.4 The response from Tim Walter of CC has also included a request in their response to the scoping report that consideration is given to the impact of noise from the proposed new railway station. To address this comment, a high-level assessment of the likely impact from noise from train movements at the station has been included in this report.

9.4.5 CC has also identified that the hours of working during the construction period will need to reflect the permitted hours of work. This information is clarified in the assessment.

Table 9.1: Response to scoping opinion

Comment from Cardiff Council to scoping	How this is responded to in this document
"It is acknowledged that a traffic and transport assessment and a noise and vibration assessment will be undertaken as part of the EIA. The sections pertaining to these in the above report are 3.2 and 5.3".	No response required - this chapter forms the noise and vibration assessment referred to
"more than 4 monitoring locations may need to be considered near to noise sensitive receptors and that weekend periods should also be included in the assessment in accordance with BS 4142" .	Baseline noise survey now includes longer periods of unattended monitoring at some locations to cover these periods.
"Also that a Construction Environmental Management Plan (CEMP) is prepared and adhered to as part of the application".	An outline CEMP has been produced to cover all construction requirements including N&V requirements. The requirements of the CEMP have been included in this assessment as embedded mitigation, not additional mitigation.
"being a scoping report about the creating of a new railway station I would have expected the noise assessment to mention the impact, positive or negative, from the change in rail noise that will occur as a result of the station coming into operation. There is no mention of railway noise in the noise section of the scoping report. This oversight needs addressing as the railway line in question has been identified as a "Major Railway" by the Welsh Government's Action Planning Process."	The development of the railway station comprises new platforms but no changes to the current track arrangements, and no additional services to the route. An assessment of the impact of rail services stopping at the railway station on the local environment has been made on the basis of these factors.
"Table 6 provides details of the noise thresholds for construction site noise, however the hours of work quoted are longer than are permitted. These hours will need to reflect the permitted hours of work of 08:00 – 18:00 Monday to Friday and 08:00 – 13:00 on Saturdays. There should be no noisy works audible beyond the site boundary outside of these hours unless the works are to be carried out when there is a line closure in place and prior approval has been given by Neighbourhood Services Team 2".	Table 6 of the scoping document is based on the standard BS5228 which includes the longer hours. Shorter hours are included in the assessment and will be included in the outline CEMP. The CEMP also notes in section 4.3.1 that for constructability and safety reasons, occasional work may be required outside of these hours, however this will be by exception, where eg working adjacent to the railway requires activities to be undertaken during a railway possession.

9.5 Methodology

Overview

9.5.1 The assessment approach reflects the requirements of National and Regional policy as described from Section 1.3.4, i.e. Planning Policy Wales Edition 10, TAN 11, Cardiff Council policy and Newport City Council policy.

9.5.2 The assessment of noise effects has compared predicted noise levels during construction to the baseline noise levels. The significance of an effect has been determined based on a number of factors, including:

- change in noise level;
- time of day or week of impact
- sensitivity of receptor; and
- duration of impact.

9.5.3 The significance criteria distinguish between residential properties and non-residential properties. Both residential and non-residential may be considered noise sensitive receptors, however the relative sensitivity is dependent on the receptor use, and the time during the day or week that the potential impact occurs

9.5.4 In the case of vibration from construction activities, the significance of effects has been assessed in terms of the likely exceedance of particular threshold levels associated with disturbance.

9.5.5 During operation, noise from building services equipment supporting the proposed development need to meet identified noise level criteria relative to background noise at surrounding receptors in order to demonstrate that the impact has been minimised. The noise levels relative to these criteria will determine the significance of effects. It is noted that this is an outline application and as such the details of equipment selections and locations will be made at a later date, and so assessment at this stage will be relatively high level.

Methodology for establishing baseline conditions

9.5.6 A study area of 300m around the red line boundary of the proposed development has been considered for potential construction noise impacts and an area of 50m will be considered for potential construction vibration impacts. Given the locality and the types of construction activities proposed, this is considered a sufficient area to assess likely significant effects.

9.5.7 For operational noise from all sources, an assessment has been undertaken at sensitive receptors typically within 300m of the red line boundary of the proposed development, however, where other factors dictate (e.g. there is uninterrupted line of sight to the receptor) this has been extended in these cases to include more distant receptors. This is considered a reasonable approach as the most affected

receptors are typically those nearest to the proposed development, with receptors further away benefitting from screening by the nearest receptors.

9.5.8 Noise and vibration sensitive receptors have been identified within the study area based on usage. All residential receptors within the study area have been included, and of the non-residential usages within the area, schools, outdoor recreation space and offices have been identified as receptors.

9.5.9 For assessment methods which compare to the existing noise levels (i.e. construction noise, operational noise from building services plant sources and rail noise), the noise levels measured in 2019 are considered representative of the existing noise climate. The detailed survey results and methodology are available in the baseline noise survey appendix.

9.5.10 For methods where the significance of an impact is based partly on the change in noise level rather than the absolute level, i.e. construction and operational road traffic, the assessment year for consideration of construction traffic effects is 2023, and the year taken as the first year of operational traffic effects is 2028.

Assessment methodology

Construction

9.5.11 The methodology used for calculating the impact of on-site construction works at the proposed development will be as per the guidance provided in BS 5228-1&2: 2009+A1:2014. Annex F contains a methodology for calculating noise levels based on the plant items. The outline CEMP contains a number of measures to ensure that noise and vibration from construction activities are kept to a minimum. This includes consideration of Best Practicable Means (BPM) as defined in the Control of Pollution Act 1974 (COPA).

9.5.12 For construction vehicles offsite, the numbers of traffic movements have been compared to the situation without the vehicle movements using Department of Transport Memorandum Calculation of Road Traffic Noise (CRTN). The relevant parts of this procedure have been used to predict, for a given road at a reference distance, the change in noise level resulting from the change in road traffic between the baseline and the assessment case with construction traffic.

9.5.13 Vibration from construction sources has been considered using the procedure identified in Transport Research Laboratory Report 429 on ground-borne vibration caused by mechanised construction works, which is included in BS 5228: Part 2. This standard provides typical source vibration levels for particular items of plant.

Operation

9.5.14 The assessment of building services noise has been undertaken in line with BS 4142:2014. This methodology takes into account the existing background noise

levels at dwellings and the character of the new noise source in assessing potential significance.

9.5.15 The Department of Transport Memorandum Calculation of Road Traffic Noise (CRTN) presents a procedure for the prediction of road traffic noise. The relevant parts of this procedure have been used to predict, for a given road at a reference distance, the change in noise level resulting from the change in road traffic between the baseline and the assessment case with construction traffic.

9.5.16 Changes in rail traffic on existing lines are commonly assessed based on the principles of the methodology set out within the Calculation of Rail Noise (CRN) to determine the magnitude of the resulting change in rail noise along affected lines. The proposed development will not change the number of rail movements on this line. However, some existing services will now stop at the proposed Cardiff Parkway station. Therefore, the main changes which would affect noise as a result of the proposed development are changes to the speed profile for stopping services, including potential for additional noise as a result of services pulling away from the station.

Significance Criteria

Construction - noise

9.5.17 BS 5228-1:2009+A1:2014, is the recommended guidance relevant to construction noise. It provides a number of example methodologies for the assessment of significant effects from construction noise. Annex E of BS 5228-1 describes the 'ABC' method of assessment, which has been used for this assessment to establish the threshold of potential significant effect at residential receptors.

9.5.18 Using this method, the adverse impact threshold is determined at an existing residential dwelling using the existing ambient noise level, rounded to the nearest 5dB and evaluated in relation to the thresholds set out in Table 9.2 below.

9.5.19 A potential significant effect is indicated where the construction site noise (L_{Aeq}) level exceeds the threshold level for the category appropriate to the ambient noise level. If the ambient noise level exceeds the highest threshold values given in Table 9.2 (i.e. the ambient noise level is higher than the Category C values), then a potential significant effect is deemed to occur if the construction site noise (L_{Aeq}) level for the period is greater than the ambient noise level.

Table 9.2: Potential significant effects at residential dwellings from on-site noise sources (from BS 52288-1:2009+A1:2014)

Period	**Threshold values in decibels (dB), $L_{Aeq,T}$**		
Weekday Daytime (07:00-19:00) Saturdays (07:00-13:00)	65	70	75
Weekday Evenings (19:00-22:00) Saturdays (13:00-22:00) Sundays (07:00-23:00)	55	60	65
Night-time (23:00-07:00)	45	50	55
Category A: threshold value to use when ambient noise levels (rounded to the nearest 5dB) are less than these values			

Category B: threshold value to use when ambient noise levels (rounded to the nearest 5dB) are the same as Category A values
Category C: threshold value to use when ambient noise levels (rounded to the nearest 5dB) are higher than the Category A values

9.5.20 The weekday daytime threshold values in BS5228 consider a 12-hour period, however the hours of construction on at the proposed development will be limited in the CEMP (section 4.3.1) to 08:00 – 18:00 weekdays and 08:00 – 13:00 Saturdays. The assessment period used in this assessment will therefore be 10 hours rather than 12, to avoid underestimating the impact of noise from works. Potential significant effects will only be identified where activities are likely to exceed the threshold values over a minimum period of one month.

9.5.21 It is noted that there are occasional activities which for safety and/or constructability requirements, works will need to be undertaken outside of these hours, such as major concrete operations, deliveries of abnormal loads or activities requiring closure of roads or railways. These will be occasional and as such have not been assessed at this stage as the impact over the duration of one month would be minimal.

9.5.22 For non-residential receptors, screening criteria has been set relevant to the receptor. For offices, the information contained in BS 8233: 2014+A1 2019 has been used to set external criteria. For schools, the screening criterion is based on meeting internal criteria for general classroom areas, as specified in Building Bulletin 93. In arriving at the relevant external screening criterion, it has been assumed that the buildings are naturally ventilated, and that the façade has a sound insulation performance of 15dB.

Table 9.3: Potential significant effects at non-residential dwellings from on-site noise sources

Noise sensitive non-residential receptor	Internal criteria	Source	External screening criterion (daytime)
Offices	40	BS 8233	55
Schools	35	Building Bulletin 93	50
External Amenity Spaces	n/a	BS 8233	55

9.5.23 The calculated construction noise levels presented are ‘worst-case’ insofar as they represent the entirety of a particular construction activity being located at a distance inside the nearest part of the site activity area where the impact to the noise sensitive receptors could be expected for a minimum of one month.

Construction - vibration

9.5.24 The threshold of perception of vibration in residential environments is identified at an exposure level of 0.3mm/s peak particle velocity (PPV) in accordance with guidance in BS 5228: Part 2. The standard identifies that complaints are likely where levels of vibration above 1.0mm/s PPV occur at residential properties. It also notes that this level of exposure to vibration may be tolerated if prior warning and explanation of activities has been given to residents. Above a level of 10mm/s

PPV the vibration is likely to be intolerable for any more than a very brief exposure period.

9.5.25 The overall significance of the effect is assessed using professional judgement by considering not only the size of the impact, but also the sensitivity of receptors, the duration of impact and the time of day in which the impact occurs.

Operation

9.5.26 Noise effects from the operation of utilities, building services and other similar commercial / industrial sources has been assessed in accordance with the assessment methods in BS 4142:2014 and include consideration of the following factors:

- The difference between the 'background noise level' the 'rating level' of the new noise at the receiver location;
- The absolute level of noise; and,
- The character of the new noise compared to the character of the existing residual or ambient noise; and
- The sensitivity of the receptor.

9.5.27 For the determination of operational significant effects from building services plant, the local authority has expressed a preference that noise from the operation of utilities, building services and similar sources be controlled to be not greater than 10dB below the existing background noise level. They have also indicated that where the existing background noise levels are very low, reasoned justification as to why a higher level may be permissible will be considered.

9.5.28 For operational road traffic noise, an approach to assessing significance criteria has been developed by reference to Volume 11, Section 3, Part 7: LA 111 Revision 1 (2020) of the Design Manual for Roads and Bridges (DMRB). The DMRB approach to assessing the noise impact is to compare the noise levels for the 'do something' (with the development) scenario against noise levels for the 'do minimum' (without the development) scenario. This procedure will be used in the assessment by examining the changes in levels of road traffic noise that would result from the implementation of the proposed development.

9.5.29 The scale or severity of any road traffic noise change, beneficial or adverse, requires description to indicate the degree of impact where possible. DMRB Guidance on Noise and Vibration Assessment states that a long-term change in traffic noise of less than 1 dB(A) is not generally noticeable and therefore would be considered imperceptible. A change threshold of 3 dB(A) in the long term has commonly been used in traffic noise assessments in the UK to approximate the threshold of significance. The magnitude criteria in Table 9.4 have been developed based upon DMRB, to assess noise effects arising from the operation of the proposed development.

Table 9.4: Summary table of noise impact evaluation criteria for changes in traffic noise in the long term

Change in noise level, dB(A)	Impact category	Initial indicator of significance
>+10	Major adverse	Potentially significant increase
+5 to +10	Moderate adverse	
+3 to +5	Minor adverse	
0 to +3	Negligible	Unlikely to be significant
-3 to 0	Negligible	
-3 to -5	Minor beneficial	Potentially significant decrease
-5 to -10	Moderate beneficial	
<-10	Major beneficial	

9.5.30 The change in noise exposure arising from forecast changes in traffic flow on existing roads will be calculated using the CRTN Basic Noise Level (BNL) at locations 10m from the kerb. This enables a direct comparison to be made of the change in noise level associated with particular sections of road.

9.5.31 Evaluation of the noise from railways is commonly calculated using the methodology from the Calculation of Railway Noise (CRN). There is no established method in CRN for evaluating the disturbance of trains entering and leaving a new railway station on an existing rail corridor. The impact of the future services has been compared to the situation in the absence of the proposed development using the methodology from CRN in addition to comparing the measured noise level from diesel trains on power to the existing ambient to provide a likelihood of new significant effects being caused.

9.6 Limitations and assumptions

Limitations

9.6.1 The information available on the future rail services is based on a number of assumptions, as outlined in the traffic and transport chapter. Potential future changes to the rolling stock are not known at present, and these may result in changes to the noise level from services on the mainline. In order to present a reasonable worst-case scenario, it has been assumed that noise levels from the movements of future rail stock are equivalent to noise levels measured at present for similar services. New rolling stock is likely to be quieter in order to meet the increasingly stringent requirements for new trains, so this is considered to be a conservative approach.

Assumptions

9.6.2 The predicted level of noise from construction depends on the particular items of equipment used. For this outline planning application, a fully detailed schedule of construction equipment is not available. Therefore, a typical schedule (Table 10.7)

has been assumed for a development of this type and scale. This is considered to be a reasonable scenario for the purpose of this assessment.

9.6.3 It has been assumed that all works will be able to be carried out within the standard working hours in CEMP. Occasionally, works may be required to be undertaken during the evening or night-time, e.g. long concrete pours. At this proposed development there are no known constraints (e.g. access to active rail areas) as to why activities would need to be undertaken outside of the standard working hours, other than for short periods. These occasional activities have therefore not been assessed. The management and control of these activities is outlined in the CEMP.

9.6.4 The traffic assessments are based on future growth predictions, as outlined in Chapter 4 on Traffic and Transport. These assumptions are used consistently through the assessment by a number of topics however they are subject to limitations as outlined in the above chapter. This data is considered to be adequate for the purposes of this assessment.

9.6.5 The future equipment required by the development is not known with any certainty at present. In order to enable future designers to plan and design adequate noise mitigation, criteria for the maximum acceptable noise levels has been given, based on advice from the Local Authority and experience from other similar schemes.

9.7 Baseline Environment

9.7.1 The existing soundscape in the area is rural in nature, with passing road traffic, as well as sounds from natural sources such as trees and animals. Occasional train noise is audible at locations closer to the existing rail line, and some aircraft noise is also present.

9.7.2 The area to the north west of the proposed development is primarily residential, with two schools in the area; Willowbrook School and Meadowlane School. To the south of the railway and east of the proposed development are sparsely located individual residential dwellings and farm and light industrial areas. To the north lies the St Mellons Business Park, and the proposed development generally has a number of less sensitive non-residential receptors surrounding the proposed development.

9.7.3 A background noise survey was undertaken in July 2019 at representative locations adjacent to the proposed development. Measurements were made both north and south of the existing railway line. Details are provided in the baseline noise appendix. Locations of measurements and receptors are shown in Figure 9.1.

Table 9.5: Measured existing noise levels

No.	Description	Daytime noise level, (07:00-19:00)		Night-time noise level (23:00-07:00)	
		ambient dBL_{Aeq}	background, dBL_{A90}	ambient dBL_{Aeq}	background, dBL_{A90}
1	Maes-Y-Crochan	44	34	41	34

2	St Mellons Road	60	35	44	35
3	Heol Las	59	32	52	30
4	Water Avens Close	49	35	42	29
5	Rhosog Fawr Reen	53	33	44	27

9.8 Assumed construction practices

9.8.1 The assessment has been undertaken on the basis that construction noise and vibration mitigation has been included which constitutes Best Practicable Means, as identified in the outline CEMP and defined in the Control of Pollution Act.

9.8.2 These measures include the site management procedures for the proposed development and communication with local residences and businesses. Plant will be selected which minimises the noise impact as necessary, and where required to reduce the noise impact, equipment which has low noise and vibration characteristics will be used.

9.9 Embedded mitigation

9.9.1 Other than measures included in the CEMP, there are no specific embedded mitigation measures which have been included in the assessed design.

9.10 Assessment of effects

Assessment of effects from construction

9.10.1 The programme of development across the proposed development is based on a 10-year programme, commencing in 2021.Based on the daytime ambient noise levels presented in Table 9.5, the relevant ABC criteria for potential significance is provided in Table 9.6.

Table 9.6: Construction potential significance criteria

No.	Description	Daytime ambient noise level, dBL_{A90}	Category	BS5228 ABC method criteria
1	Maes-Y-Crochan	44	A	65
2	St Mellons Road	60	A	65
3	Heol Las	59	A	65
4	Water Avens Close	49	A	65
5	Rhosog Fawr Reen	53	A	65

9.10.2 In order to assess the impact from construction, a list of plant and operating frequencies has been put together based on professional experience and the likely

activities on proposed development. This was taken from a commercial development of similar scale to the proposed development.

Table 9.7: Construction plant list

Item of Plant	BS 5228-1 data reference	Sound Power Level (dB(A)) (from BS 5228)	% on-time (i.e. proportion of day operating)	Number of plant items
Materials handling wheeled loader	C.2.26	107	50	2
Mobile telescopic crane (80t)	C.4.39	105	50	1
Compressor (1t)	C.5.5	93	50	2
Generator	C.4.76	89	50	2
Concrete mixer (26t)	C.4.22	104	50	1
Tracked excavator (22t)	C.2.3	106	50	2
Dumper (23t)	C.4.2	106	50	3
Dozer (20t)	C.2.12	109	50	1
Roller -soil compaction (18t)	C.2.38	101	50	1
Road Building (asphalt paver + tipper lorry)	C.5.30	103	50	1

9.10.3 Using the plant list in Table 9.7 as a reasonable worst case for the construction activities on the site of the proposed development, the noise levels in Table 9.8 are presented for sensitive receptors.

Table 9.8: Construction noise significance

Receptor	Potential significance criteria	Average monthly noise level, dBL_{Aeq}	Significant?
Cypress Road	65	55	Not significant
Clos Padrig	65	47	Not significant
St Mellons Road	65	53	Not significant
Wentloog Avenue	65	41	Not significant
Willowbrook School	50	42	Not significant
Meadowlane School	50	34	Not significant
Hendre Lake Park	55	45	Not significant
St Mellons Business Park	55	52	Not significant

9.10.4 The average monthly noise levels predicted at each of the receptors is below the potential significance criteria. As such noise from construction works is assessed as not significant.

9.10.5 Traffic flows, including additional heavy vehicles associated with the construction, have been examined to determine if there are any routes where there is the potential for traffic noise changes of 1dB(A) or more. This is according to the flow, speed or composition change criteria.

9.10.6 For the first construction traffic scenario, where access is via Heol Las, results show that there are two areas where traffic will increase such that the increase in noise level will be greater than 1dB. These are Heol Las south of St Mellon's Road, and Fortran Road north. The receptors adjacent to these sections of road are

office and light industrial units which have a low noise sensitivity. The low level of sensitivity of these receptors means that this increase is considered not significant.

9.10.7 For the second scenario, where access is via Cypress Drive, there will be increases in noise level of between 1 and 2dB on the section of Cypress Drive between Sandbrook Road and Fortran Road. It is noted that the existing vehicle numbers on this road are below 1000 movements, which is a route considered 'low flow' in the Calculation of Road Traffic Noise. Given the small increase in noise level on these sections (less than 3dB) this increase is considered not significant.

9.10.8 There are no other traffic changes on the road network associated with this proposed development which meet the relevant criteria. Construction noise impacts as a result of offsite road traffic changes are therefore considered not significant.

9.10.9 Given the distances of the most intensive ground works for buildings within the construction areas from surrounding dwellings, it is not considered that vibration disturbance would occur. Potentially, compaction activities associated with boundary roads and hard standings could give rise to short-term vibration above 1.0mm/s PPV when works are closest to nearby dwellings at Location 3 (southern boundary). BS 5228-2 notes that complaints are likely where levels occur above 1.0mm/s PPV at residential properties but this exposure can be tolerated if prior warning and explanation has been given to residents. The works could potentially be at this closest location only for a few days and vibration exposure would diminish when plant is operating at larger distances.

9.10.10 With appropriate liaison and given the relatively short duration of these exposure levels, this is assessed as not significant.

Assessment of effects from operation

9.10.11 The existing background noise levels around the proposed development are relatively quiet and the measurements at night-time (worst case) in the area are between 27-35dB. For building services plant to meet the preferred control level of a rating level of not greater than 10dB below the existing background noise level at the nearest receptor, this would result in onerously high levels of control required for building services plant.

9.10.12 It is therefore proposed that the hours of operation of individual plant items be reviewed, and that where the existing background noise level is less than 40dBL_{A90}, the noise from all items of plant be restricted to a rating level of 5 dB below background noise level or 30dBL_{Aeq}, whichever is the higher. This approach is often used where rating levels of 5dB below background noise level have been successfully employed on other commercial schemes to reduce the risk

of significant effects. It is anticipated that by restricting the noise levels in this manner that the noise levels from building services will be not significant.

9.10.13 The proposed development results in increased road traffic volumes on all areas of road assessed. Residences adjacent to the sections of road along Cypress Drive between B4487 and the proposed new link road to the development will be subject to an increase in noise level of between 1-3dB. Additionally, for the short section of Cypress Drive between Fortran Road and the new development entrance this results in an increase of approximately 5dB, which is a minor adverse impact. This is the result of a considerable relative increase in predicted traffic flows. This section of road currently experiences low flows of traffic (less than 2000 one-way movements).

9.10.14 This section of road is relatively small and the properties adjacent to Cypress Drive do not have habitable rooms which face the road, however it is assessed that the size of the increase results in a **significant effect** for properties alongside this section of Cyprus Drive between Fortran Road and the new development entrance. This effect is predicted to less than 5 properties.

9.10.15 At all remaining roads, the increase in noise levels due to changes in road traffic from the proposed development is less than 1dB, which is categorised as negligible. The effect of noise from increased road traffic as a result of the proposed development is therefore not significant for any other section. The noise levels predicted from road traffic after the introduction of the proposed development are below the 'specified level' as defined in the Noise Insulation Regulations 1975. This is the minimum noise level, below which properties are not eligible for Noise Insulation in accordance with this scheme.

9.10.16 The nearest residences to the proposed Cardiff Parkway station lie over 400m away from the station on Water Avens Close. Although outside the study area, there is currently no screening to noise from rail operations. The future proposed development does not introduce additional rail services, however some of the services will now stop to service the station.

9.10.17 This change to the services will result in the following changes which may introduce changes to the noise environment:

- A change in speed profile for stopping services, and
- A change to the noise climate as a result of trains braking to enter the station and spending time on increased power to pull away.

9.10.18 According to CRN, the noise level for a decrease in speed will be lower than for the same train travelling at a higher speed, and so the periods where the train is moving but travelling at lower speeds to enter and exit the station will have lower noise levels.

9.10.19 CRN does not specifically model the situation of a train at standstill pulling away from a platform. In this instance, the noise from the train is primarily due to the engine on power as the train initially moves away. Measurements of noise from

diesel train services similar to the rolling stock which will be stopping at the station[1] indicate that the sound pressure level of a diesel train can vary dependent on both the train type and also the individual driver. The noise level from train departing is typically higher for approximately 10-20 seconds as the train accelerates, before the engine noise reduces as the train acceleration reduces. The noise levels assessed are based on the noise level of the engine accelerating.

9.10.20 The future rail timetable includes 11 services which will stop at Cardiff Parkway between 23:00 and 07:00, in addition to several non-stop services. A comparison has therefore been undertaken with the night-time noise levels. As an initial comparison, the predicted noise level from one individual service has been calculated at the nearest residential receptor and compared with the average ambient noise level over the night-time period. This is based on using a range of measured noise levels of diesel locomotives accelerating as source levels.

9.10.21 Comparison of the ambient and the background noise levels suggests that the existing noise climate at all locations is subject to occasional higher noise levels which cause the ambient noise level to be significantly higher than the background noise level. The calculated noise level at the receptor, based on a point source is outlined in Table 9.9.

Table 9.9: Measured existing noise levels

No.	Location of residence	Distance to station, m	Sound pressure level per locomotive acceleration event at 1m from residence, $dBL_{Aeq, 20s}$	Night-time noise level (23:00-07:00)	
				ambient dBL_{Aeq}	background, dBL_{A90}
2	St Mellons Road	560	31-37	44	35
3	Heol Las	820	28-34	52	30
4	Water Avens Close	410	34-40	42	29

9.10.22 Comparison to the ambient noise level demonstrates that the noise level from this source is well below the ambient noise level. Given that the noise climate has existing occasional higher noise levels from existing road and rail sources, noise events from this source would not be prominent above ambient noise levels and therefore it is considered not significant.

[1] Class 142,150,158,170,175 and 802. Occasional Class 67 locomotives pulling

9.11 Mitigation and enhancement

Mitigation of effects from construction

9.11.1 There are no significant effects identified from construction noise or vibration, therefore further mitigation is not required.

Mitigation of effects from operation

9.11.2 There are no significant effects identified from operational noise from building services plant, or rail traffic as a result of the proposed development, therefore further mitigation of these sources is not required.

9.11.3 For noise from road sources, a significant effect has been identified at properties adjacent to the section of Cypress Drive between Fortran Road and the new development entrance. Given the location of the road within the site boundary, size of the increase in noise level and the location of receptors, there are a number of mitigation methods which could be considered either individually or in combination which would reduce the impact of noise such that it was no longer significant. These include:

- Earth bunding, or
- Noise barrier.

9.11.4 Additionally, the assessment is based on a maximum speed in this road section of 30mph, however it is understood from traffic counts on the road that the average speed on this road section has been measured as 37mph. On this basis, reducing actual speeds on this section of road to 20mph will offset the increase in traffic noise due to increased volumes, and lead to a much smaller increase in noise level, such that the increase is no longer significant. Measures which can be included to ensure the speed limit is achieved include:

- Installing speed limit signs in order to reduce speeds,
- Installing traffic lights at the Fortran Road and proposed development junction with Cypress Drive,
- Proposed development access junction to have priority over Cypress Drive (south), reducing road speeds for through-movements on Cypress Drive, and
- Changes to the radius/alignment of Cypress Drive and the proposed development access.

9.11.5 It is therefore proposed that a noise condition be considered, to evaluate impacts by means of noise monitoring, and if necessary, provide mitigation control. This will enable suitable mitigation to be designed which can be demonstrated to control noise levels such that the impact is not significant. This could be comprised of one or more of the options provided above.

9.12 Residual effects

Residual effects from construction

9.12.1 No significant effects have been identified from construction noise or vibration, and as such no residual effects are identified.

Residual effects from operation

9.12.2 No significant effects from the operation of building service plant or rail traffic have been identified as such no residual effects are identified for these sources.

9.12.3 With mitigation as identified above, operational noise from additional road traffic be not significant.

9.13 Assessment summary matrix

Potential Effect	**Receptor (s)**	**Sensitivity of Receptor**	**Magnitude (prior to mitigation)**	**Significance (prior to mitigation)**	**Mitigation**	**Magnitude (following mitigation)**	**Significance (following mitigation)**	**Comments**
Construction noise	Residential and non-residential receptors	High	Negligible	Not significant	n/a	Negligible	Not significant	n/a
Construction vibration	Residential and non-residential receptors	High	Negligible	Not significant	n/a	Negligible	Not significant	n/a
Operational noise – Road traffic	Residential and non-residential receptors	High	Minor	Significant	Additional works, as described in section 1.11	Negligible	Not significant	n/a
Operational noise – rail traffic	Residential and non-residential receptors	High	Negligible	Not significant	n/a	Negligible	Not significant	n/a
Operational noise – Building services plant	Residential and non-residential receptors	High	Negligible	Not significant	n/a	Negligible	Not significant	n/a