AtkinsRéalis

Environmental Statement, Chapter 15 – Noise and Vibration

Manchester City Council

October 2024

FORMER CENTRAL RETAIL PARK – THE PARK

AtkinsRéalis - Sensitive / Sensible

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15. Noise and Vibration

15.1 Executive summary

This chapter of the ES assesses the potential impact with regards to noise and vibration during the construction and operational phases of the Proposed Development. This chapter also summarises baseline conditions determined via a site noise survey.

Impacts due to construction noise and vibration are predicted to be not significant. Construction noise levels may temporarily increase when the plant is operating closer to the nearest sensitive receptors and exceed the significant observed adverse effect level, however; the frequency of the significant observed adverse effect level exceedances is unlikely to exceed the temporal threshold as indicated in the threshold example from BS 5228 for the provision of temporary rehousing or noise insulation. Additional mitigation and enhancement measures have been proposed with view of reducing impacts via Best Practicable Means during construction. Predicted vibration levels during construction are below the threshold level for the onset of potential significant effects on humans and below the threshold for cosmetic damage to structures.

Due to the limited activities undertaken on site the operational phase, operational noise and vibration impacts are predicted to be not significant.

15.2 Introduction

AtkinsRéalis has been commissioned by Manchester City Council (MCC) to undertake an assessment of noise and vibration impacts during the construction and operational phases of the proposed development. This chapter of the ES provides a summary of this assessment and describes the assessment method, the existing baseline conditions, potential impacts, assessment of effects, the mitigation measures required to prevent, reduce, or offset any significant adverse effects, the likely residual effects after these measures have been employed, and the 'Type 2' (inter-project) cumulative effects associated with the Proposed Development in combination with other developments within 250 m of the Site.

Type 1 (intra-project) cumulative effects, which are the combined effects of individual topic impacts on a particular sensitive receptor, are considered in ES (Volume 2) Chapter 20: Cumulative Effects.

15.3 Competent expert evidence

This chapter of the ES has been authored by a suitably qualified Senior Acoustician with over 9 years' experience in the field of acoustics, noise and vibration and has been reviewed by an Associate Acoustician with over 15 years' experience. Both author and reviewer are corporate members of the Institute of Acoustics.

15.4 Relevant legislation and guidance

15.4.1 National Planning Policy Framework 2023 (NPPF)

The NPPF[1] provides Governmental planning policies for England and how they are expected to be applied. It references noise as such:

Section 174(e) states that planning policies and decisions should contribute to and enhance the natural and local environment by *"Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions…"*

Additionally, Section 185 details that:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a. mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

b. identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason".

15.4.2 Planning Practice Guidance 2012 as Amended 2023 (PPG)

PPG[2] further contextualises the NPPF and identifies the different topics which must be considered in planning applications, including noise.

Within paragraph 001 of the noise guidance (Reference ID: 30-001- 20190722), it states:

"Noise needs to be considered when development may create additional noise, or would be sensitive to the prevailing acoustic environment (including any anticipated changes to that environment from activities that are permitted but not yet commenced). When preparing plans, or taking decisions about new development, there may also be opportunities to make improvements to the acoustic environment. Good acoustic design needs to be considered early in the planning process to ensure that the most appropriate and cost-effective solutions are identified from the outset."

Noise Policy Statement for England 2010 (NPSE)

NPSE[3] presents underlying principles of noise management, from existing guidance and legislation. The NPSE sets out the long term vision of Government noise policy to:

"Promote good health and a good quality of life through effective management of noise within the context of Government policy on sustainable development."

And aims to, through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- "*Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life."*

[1] National Planning Policy Framework (publishing.service.gov.uk)
[2] Noise - GOV.UK (www.gov.uk)
[3] Noise Policy Statement for England (publishing.service.gov.uk)

Alongside the pre-existing concepts of No Observed Effect Level (NOEL) and Lowest Observed Adverse Effect Level (LOAEL), from existing WHO Night Noise Guidelines (WHO, 2009) the NPSE adapts and adds to this terminology, introducing Significant Observed Adverse Effect Level (SOAEL).

Control of Pollution Act 1974 (CoPA)

The CoPA[4] provides insight into the control of noise on construction sites, including:

a. the erection, construction, alteration, repair or maintenance of buildings, structures or roads;

b. breaking up, opening or boring under any road or adjacent land in connection with the construction, inspection, maintenance or removal of works;

c. demolition or dredging work; and

d. (whether or not also comprised in paragraph (a), (b) or (c) above) any work of engineering construction."

It states:

"Where it appears to a local authority that works to which this section applies are being, or are going to be, carried out on any premises, the local authority may serve a notice imposing requirements as to the way in which the works are to be carried out and may if it thinks fit publish notice of the requirements in such way as appears to the local authority to be appropriate."

The Noise Insulation Regulations 1975 as Amended 1988 (NIR)

The NIR[5] identify the duty and powers of highway authorities to carry out noise insulation work for the insulation of buildings. Noise caused or expected to be caused by traffic using new highways, altered highways, and by highway work must be considered and accounted for in noise insulation of buildings within the vicinity of the road.

The NIR identifies action to be taken where noise levels from highways are above the specified level which indicates significant impact as such:

"Subject to and in accordance with the provisions of these Regulations, where the use of a highway to which this Regulation applies causes or is expected to cause noise at a level not less than the specified level, the appropriate highway authority shall carry out or make a grant in respect of the cost of carrying out insulation work in or to an eligible building."

BS 5228 1+2:2009 +A1:2014 Code of practice for noise and vibration control on construction and open sites (BS 5228)

BS 5228 Provides recommendations for basic methods of noise and vibration control when carrying out construction activities. This includes sites where works such as demolition and ground treatment works are being carried out, as well as open sites where significant levels of noise may be generated by work activities or operations.

It provides different methodologies for the assessment of noise and vibration, with particular respect to the potential significance of noise effects, as well as guidance for the estimation of potential noise from construction sites.

Calculation procedures are set out in Annex F of the guidance for predicting the likely noise levels from specific construction activities at receptors, taking into account distance, ground absorption, screening, reflections and the percentage on-time of the plant operating at full power. Annexes C and D of the guidance provide generic noise data for various items of plant which can be used for undertaking predictions where no specific information is available.

BS 5228 Part 1 Annex E sets out the need for a pragmatic approach to be taken when assessing the noise effects of a construction project. It goes on to describe example methods for identifying the likely significance of noise levels from construction activities based on a combination of fixed noise thresholds and noise change criteria.

Design Manual for Road and Bridges Revision 2 2020 (DMRB) LA 111 'Noise and Vibration'

DMRB LA 111[6] outlines the methodology for the assessment, reporting and management of environmental effects of road construction, demolition and alteration projects, specifically in terms of noise and vibration.

The document provides detailed methodologies for identifying, noise sensitive receptors, study areas, baseline noise and vibration and determining significance of effects.

BS 4142:2014 +A1:2019 Methods for rating and assessing industrial and commercial sound (BS 4142)

BS 4142 provides a method for rating industrial and commercial sound, and a method for assessing resulting impacts upon people. The method is applicable to fixed plant installations, sound from industrial and manufacturing processes and other associated activities.

The assessment method defined in the standard could be used for the following:

- Investigating complaints.
- Assessing sound from proposed, new, modified or additional sound source(s) of an industrial and/or commercial nature.
- Assessing sound at proposed new dwellings or premises used for residential purposes.

The determination of noise amounting to a nuisance is beyond the scope of BS 4142.

BS 4142 provides guidance on determining the rating levels for the relevant sound sources, as well as the ambient, background and residual sound levels at outdoor locations. The procedure contained in BS 4142 determines the significance of sound based on the margin by which the rating level of a specific sound source exceeds the background sound level and the context in which the sound occurs/will occur. The standard states that:

"The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact."

Manchester City Council Planning and Noise Technical Guidance 2022

Manchester City Council Planning and Noise Technical Guidance refers to BS 4142 for the assessment of noise from fixed plant / equipment and states that:

'Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (LA90) level at the nearest noise sensitive location'.

BS ISO 12913-1:2014, Acoustics – Soundscape, Part 1: Definition and conceptual framework

The concept of 'soundscape' is concerned with the overall quality of the noise environment. BS ISO *12913 "aims to enable a broad international consensus on the definition of a 'soundscape' to provide a foundation for communication across disciplines and professions with an interest in soundscape".* All sounds in a location are relevant since they affect the character and perception of noise. Some sounds can be viewed as more acceptable

[4] Control of Pollution Act 1974 (legislation.gov.uk)
[5] The Noise Insulation Regulations 1975 (legislation.gov.uk)
[6] LA 111 - Noise and vibration (standardsforhighways.co.uk)

than others and this subjectivity gives rise to the concepts of 'positive' and 'negative' sounds. Research shows that there are a number of acoustical and non-acoustical factors which could affect the perception of a soundscape.

15.5 Assessment method

15.5.1 Establishing the baseline

A baseline noise survey was undertaken on 22nd and 23rd June 2023 to understand the existing noise climate during both the day and night time periods at locations representative of the nearest NSRs.

Attended measurements were undertaken at four different locations at the Site which can be seen in Figure 15-4. The attended 15-minute noise measurements were conducted using a field calibrated Class 1 integrated sound level meter positioned at each location. The sound level meter was placed at a height of approximately 1.5 m above the local ground level and in a free-field position. Notes were taken on the meteorological conditions, which were considered appropriate for obtaining baseline noise data. Noise measurements were undertaken following the guidance set out within *BS 7445:2003 – Description and measurement of environmental noise Part 1, Description and measurement of environmental noise, Guide to quantities and procedures*.

Whilst the future anticipated baseline of the Site includes the completed construction of the Phase 1 development adjacent to the west and partial earthworks complete within the Site, the baseline survey carried out is perceived as appropriate in order to understand the impacts of the construction and operation of the Proposed Development on noise levels.

15.5.2 Construction

Study areas

The study areas for noise and vibration are defined in accordance with the Design Manual for Roads and Bridges (DMRB) LA 111[7] and BS 5228[8]. Construction noise predictions are considered to be accurate to a distance of 300 m, beyond which atmospheric conditions can play a significant effect. Regarding vibration, the DMRB LA 111 states that "*a study area of 100 m from the closest construction activity with the potential to generate vibration is normally sufficient to encompass vibration sensitive receptors*".

Construction Noise

The future anticipated baseline for the Site includes partial earthworks carried out within the central corridor of the Site by the Phase 1 Development. Therefore the construction noise is limited to the minor remaining site clearance works and level works within Cotton Field Park and within the dog-leg of the Site along Great Ancoats Street. Additionally, no ground breaking activities are proposed as the existing concrete will be retained underneath any earthworks that are required to build up the necessary levels of the Site. This assessment only considers the noise generating activities limited to this development.

The LOAEL for construction noise assessments has been determined using baseline noise levels. The baseline noise level has been identified based on the existing noise survey data. The LOAEL represents the lowest noise level at which the detectable onset of an adverse effect can occur. The SOAEL represents the noise level that, if exceeded, has the potential to result in a significant effect, depending on duration and context.

SOAEL values are identified using the ABC method outlined in Table 15-1. All baseline levels rounded to the nearest 5dB $L_{Aeq,T}$ are below 65 dB $L_{Aeq,T}$ and therefore the SOAEL threshold is set as 65 dB $L_{Aeq,T}$ as per the ABC method. Noise limits for residential receptors are set based on baseline noise levels, as per the ABC Method detailed in Annex E.3.2 of BS 5228, and which is reproduced below in Table 15-1.

Table 15-1 – Example method 1 – The ABC method

Assessment category and threshold value period	Threshold value, in decibels (dB) ($L_{Aeq, T}$)		
	Category A	Category B	Category C
Night-time (23.00−07.00)	45	50	55
Evenings and weekends D)	55	60	65
Daytime (07.00−19.00) and Saturdays (07.00−13.00)	65	70	75
NOTE 1 A potential significant effect is indicated if the $L_{Aeq, T}$ noise level arising from the Scheme exceeds the threshold level for the category appropriate to the ambient noise level.			
NOTE 2 If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total $L_{Aeq, T}$ noise level for the period increases by more than 3 dB due to site noise.			
NOTE 3 Applied to residential receptors only.			
A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.			
B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.			
C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.			
D) 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.			

In this ES, the ABC method is used to assess the impacts of the construction activities on residential receptors. Using this method, the impact of an activity has potential to be significant if the noise levels from the construction activities are shown to exceed the relevant threshold value.

In accordance with BS 5228 Part 1, other project specific factors, such as the duration of the impact needs to be considered when determining if there is a significant effect. It is common practice to determine a significant effect where noise levels thresholds in Table 15-1 are exceeded for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any 6 consecutive months.

In addition to BS 5228 Part 1 Example method 1, further example thresholds are provided to determine the eligibility for noise insulation and temporary rehousing which are provided in Table E.2 of the Standard and reproduced below in Table 15-2.

[7] Design Manual for Road and Bridges Revision 2 2020 LA 111 'Noise and Vibration'

[8] BS 5228 1+2:2009 +A1:2014 Code of practice for noise and vibration control on construction and open sites

Table 15-2 – Examples of time periods, averaging times and noise levels associated with the determination of eligibility for noise insulation

Day	Time (hours)	Averaging period, T	Noise insulation trigger level, dB $L_{Aeq,T}$
Mondays to Fridays	0700 – 0800	1 hour	70
	0800 – 1800	10 hours	75
	1800 – 1900	1 hour	70
	1900 – 2200	1 hour	65
	2200 – 0700	1 hour	55
Saturdays	0700 – 0800	1 hour	70
	0800 – 1300	5 hours	75
	1300 – 1400	1 hour	70
	1400 – 2200	1 hour	65
	2200 – 0700	1 hour	55
Sundays and Public Holidays	0700 – 2100	1 hour	65
	2100 – 0700	1 hour	55
A) All noise levels are predicted or measured at a point 1m in front of the most exposed of any windows and doors in any façade of any eligible dwelling			

Noise insulation, or the reasonable costs thereof, may be offered where the noise insulation tiggers presented in Table 15-2 are exceeded, or where construction noise levels exceed the pre-construction ambient noise levels by 5 dB or more (whichever is the higher) for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any 6 consecutive months.

Temporary rehousing, or the reasonable costs thereof, may be offered where the noise tiggers presented in Table 15-2 are exceeded by 10 dB or more, or where construction noise levels exceed the pre-construction ambient noise levels by 10 dB or more (whichever is the higher) for a period for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any 6 consecutive months.

The magnitude of impact due to construction traffic will be determined in accordance with DMRB LA 111 as reproduced in Table 15-3. The magnitude of impact is determined with reference to the Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL).

Table 15-3 – Magnitude of impact and construction noise descriptions

Magnitude of impact	Construction noise level ($L_{Aeq,T}$)	Change in construction traffic noise level ($L_{A10,18h}$)
Major	Greater than or equal to the SOAEL +5 dB	Greater than or equal to 5 dB
Moderate	Greater than or equal to the SOAEL and below the SOAEL +5 dB	Greater than or equal to 3 dB and less than 5 dB
Minor	Greater than or equal to the LOAEL and below the SOAEL dB	Greater than or equal to 1 dB and less than 3 dB
Negligible	Below the LOAEL	Less than 1 dB

A significant effect is determined for construction traffic noise where "a major or moderate magnitude of impact will occur for a duration exceeding:

- either 10 or more days or nights in any 15 consecutive days or nights; or
- a total number of days exceeding 40 in any six consecutive months.

The construction traffic noise levels are proposed to be determined using the method given in the 'Calculation of Road Traffic Noise', 1988 (CRTN).

For the construction traffic, the assessment methodology is to determine whether temporary traffic flow or composition (%HGV) increases would result in road traffic noise changes that could result in a potential significant effect. According to the DMRB LA 111, road traffic noise changes that are of negligible impact are unlikely to alter behaviour or responses to noise and as such, will not give rise to a likely significant effect.

Construction Vibration

BS 5228 gives guidance on vibration levels that could be used to assess the likely impacts of construction activities on the environment and people. It also provides empirical formulae for predicting likely vibration levels from activities such as vibratory and hammer driven piling.

Annex B of BS 5228-2 gives guidance on vibration levels in Peak Particle Velocity (PPV) and associated effects in terms of human and structural response. Tables providing these guideline values are reproduced in Table 15-4 and Table 15-5.

Table 15-4 – Guidance on effects of vibration levels

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

Based on the guidance provided in Table 15-4, the threshold level for the onset of potential significant effects on humans at surrounding residential properties is typically taken to be 1.0 mm/s PPV.

Table 15-5 – Transient vibration guide values for cosmetic damage

Type of Building	Peak Component Particle Velocity in Frequency Range of Predominant Pulse	
	4 Hz to 15 Hz	15Hz and above
Reinforced or framed structures	50mm/s at 4Hz and above	50mm/s at 4Hz and above
Industrial and heavy commercial buildings		
Unreinforced or light framed structures	15 mm/s at 4Hz increasing to 20 mm/s at 15Hz	20 mm/s at 15Hz increasing to 50 mm/s at 40Hz and above
Residential or light commercial buildings		

Minor damage is possible at vibration magnitudes which are greater than twice those given in Table 15-5, and major damage to a building structure can occur at values greater than four times the tabulated values.

The guideline values presented in Table 15-5 relate predominantly to transient vibration which does not give rise to resonant responses in structures, and to low-rise buildings. Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values might need to be reduced by up to 50%.

In addition to the guideline values in Table 15-5, BS 5228 Part 2 notes that the probability of damage tends towards zero at 12.5mm/s PPV.

Construction plant and programme

The proposed assumed plant and associated noise data, as per BS 5228, are outlined in Table 15-6. One of each plant type listed in Table 15-6 is assumed:

Table 15-6 – Assumed construction plant noise data

Plant Type	Construction Stage	BS 5228 Reference	Sound Pressure Level at 10m	% On-time
Telehandler	All	C.2.35	71	50
Forklift	All	C.4.59	78	25
Dumper	All	C.4.4	76	50
HGV (8 wheels)	All	C.11.10	77	25
Road Sweeper	All	C.4.90	76	25
Bowser and pump	Hard & Soft Engineering	C.5.40	68	100
Vibratory Compactor	Hard Engineering	C.5.29	82	25
Cultivator	Earthworks	C.4.75	79	25
Tracked Excavator	Earthworks	C.4.17	71	50
Bulldozer	Earthworks	C.2.1	75	50
Roller	Earthworks	C.5.20	75	50

It is assumed all plant will be used for standard 10-hour days, Monday to Friday, with no night working. The assumed works programme is summarised in Table 15-7:

Table 15-7 – Assumed construction programme

Phase	Sub-phase	Timescale
1 – Site Establishment	N/A	Two months
2 – Construction Execution	Earthworks	Six weeks
	Hard engineering	Four months
	Soft engineering	Four months
3 – Commissioning and handover	N/A	Two weeks

15.5.3 Operational noise

Operational road traffic noise

For the operational traffic assessment, the approach proposed is to identify the maximum number of additional heavy vehicles which would result in noise increases of negligible impact, when compared with a Do Minimum Opening Year (DMOY) scenario noise levels (i.e. what the noise levels would be like in 2030 if the Proposed Development were not to be built). According to the DMRB LA 111, road traffic noise changes that are of negligible impact are unlikely to alter behaviour or responses to noise and as such, will not give rise to a likely significant effect.

Table 15-8 – Operational noise criteria

Magnitude of impact	Criteria level
Major	Above SOAEL
Moderate	Above or equal LOAEL and below SOAEL
Minor	Above or equal to 5 dB below typical Background Noise Level (L_{A90}) and below LOAEL
Negligible	> 5 dB below typical Background Noise Level (L_{A90})

Reference is made to DMRB LA 111 (Tables 3.16 and 3.17) to identify the magnitude of impact on receptors. This is reproduced in Table 15-8 above.

15.6 Baseline conditions

15.6.1 Noise and vibration sensitive receptors

A review of the local area surrounding the Site has been undertaken to understand the existing usages and where there are NSRs in proximity to the Site. Figure 15-1 shows the existing building usages in the vicinity of the Site and indicates the key NSRs considered in the assessment. At present the Site is vacant, with structures already having been removed. Figure 15-1 shows the area is typically urban in its usage, with a mix of commercial and residential properties surrounding the Site. To the north of the Site lies Co-op Academy New Islington, and to the east is Ancoats Primary Care Centre.

Key NSRs identified around the Site are identified in Table 15-9, with corresponding NSR identity numbers shown in the figure above.

Table 15-9 – Key Noise Sensitive Receptors

NSR ID	Location	Distance to Site (m)	Type of NSR
1	Cotton Field Park	Adjacent	Community
2	Great Ancoats Street, Manchester M4 6DE and proposed 20 storey building to create a 154 bedroom hotel adjacent to Laystall Street / Great Ancoats Street.	30	Office / Hotel
3	Old Mill Street, Manchester M4 6NA	33	Residential
4	Laystall Street, Manchester M1 2JP	57	Residential
5	Co-op Academy New Islington School, Hugh Oldham Way, Manchester M4 6EY	64	Educational
6	New Islington Marina, Old Mill Street, Manchester M4 6EA	79	Residential
7	New Islington Medical Practice, Ancoats Primary Care Centre, Old Mill Street, Manchester M4 6EE	80	Medical
8	Keepers Quay, Manchester M4 6LG	106	Residential
9	Cotton Field Wharf, Manchester M4 6FQ	116	Residential

15.6.2 Defra strategic noise mapping review

The Site is located in a metropolitan area and as such external ambient noise levels are considered to be high. Defra strategic road noise mapping data (dB $L_{Aeq,16hr}$),[9],[10] for the Site is shown in Figure 15-2. The Defra noise mapping indicates that road traffic noise from road Great Ancoats Street (A665) is the main strategic noise source influencing the noise climate at the Site, with noise levels of <75 dB $L_{Aeq,16hr}$ close to the road that decrease to <70 dB $L_{Aeq,16hr}$ at 20m from the centre of the road. Other local roads may contribute but are not included within the Defra strategic noise map database.

Noise Important Areas (NIA) are areas where the top 1% of the population affected by the highest road/rail noise levels are located, according to the strategic noise mapping undertaken by Defra under the terms of the Environmental Noise (England) Regulations 2006, as amended. Road NIA 10962 is located within the Site, along Great Ancoats Street and is shown in

[9] https://www.gov.uk/government/publications/strategic-noise-mapping-2019

[10] http://www.extrium.co.uk/noiseviewer.html

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385200
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398400
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AtkinsRéalis

- Site Boundary
- Phase 1
- Phase 2
- Key Noise Receptors

Noise Sensitive Receptors

- Accommodation
- Education
- Leisure
- Medical
- Office
- Residential

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Client
Manchester City Council

Project
Former Central Retail Park: The Park

Title
Receptor Categories

Sheet Size	Original Scale	Designed / Drawn	Checked	Authorised
A3	1:2,000	BT Date 30/07/24	RS Date 30/07/24	LR Date 30/07/24

Drawing Number
Figure 15-1

Rev
02

384800 385000 385200 385400

398600 398400 398200

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Cotton St
Blossom St
Gun St
Henry St
Jersey St
Murray St
Redhill St
Keepers Quay
Lockyard La
Weybridge Rd
Pickford St
Great Ancoats Street
A665
Port St
New Islington Free School
Tariff St
Ancoats
Ducie St
Pigeon St
Peak St
Store St
Millbank St
Jutland St
Old Mill St
Vesta St
Pollard Street
A662

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- Site Boundary
- Phase 1
- Phase 2

Strategic Road Noise Mapping: LAeq, 16hr

- 55.0-59.9 dB
- 60.0-64.9 dB
- 65.0-69.9 dB
- 70.0-74.9 dB
- >=75.0 dB

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Project
Former Central Retail Park: The Park

Title
Department for Environment, Food & Rural Affairs Road Noise Mapping (dB LAeq,16hr)

Sheet Size	Original Scale	Designed / Drawn	Checked	Authorised
A3	1:2,000	BT Date 30/07/24	RS Date 30/07/24	LR Date 30/07/24

Drawing Number
Figure 15-2

Rev
03



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- Site Boundary
- Phase 1
- Phase 2
- Noise Important Areas

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Client
Manchester City Council

Project
Former Central Retail Park: The Park

Title
Department for Environment, Food & Rural Affairs Noise Important Areas 10962

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Drawing Number
Figure 15-3

Rev
02

15.6.3 Baseline noise survey

During the measurement periods of the baseline noise survey, various sources of noise were identified and recorded, including road traffic, construction activities, and commercial operations.

The primary noise sources noted at Location 1 during the daytime were road traffic noise from Great Ancoats Street, nearby construction work noise, and some contribution from pedestrians on the tow path to the north of the Site. The dominant noise sources during the night-time were road noise from Great Ancoats Street and to a lesser extent, noise from plant associated with the retail building south-west of the monitoring position.

The primary noise sources noted at Location 2 during the daytime were distant road noise from Great Ancoats Street, distant construction works, and school playground noise. The dominant noise source during the night-time was road traffic along Great Ancoats Street.

The primary noise sources noted on site at Location 3 during the daytime were distant construction works and distant school playground noise. Some smaller noise contributions were noted from people using the Site, predominantly skateboarders. The dominant noise source during the night-time was road traffic noise from Great Ancoats Street.

The primary noise sources noted at Location 4 during the daytime were pedestrians and road traffic from Great Ancoats Street, and to a lesser extent, construction noise near Great Ancoats Street. The dominant noise source during the night-time was traffic noise from Great Ancoats Street

A summary of the baseline noise survey results is provided in Table 15-10. A glossary of noise indicators is provided in Section 15.12.

Table 15-10 – Noise survey results

Location		L_{Aeq}, dB	L_{Amax}, dB	L_{A10}, dB	L_{A90}, dB
1	Day 07:00 – 22:00	61	89	64	53
	Night 22:00 – 07:00	60	76	63	46
2	Day 07:00 – 22:00	52	68	54	48
	Night 22:00 – 07:00	45	77	47	39
3	Day 07:00 – 22:00	55	77	56	49
	Night 22:00 – 07:00	45	67	47	39
4	Day 07:00 – 22:00	58	81	60	53
	Night 22:00 – 07:00	52	76	54	43

The noise survey results reflect the subjective observation that the dominant noise source on the Site was Great Ancoats Street, due to the higher noise levels at the southern extent of the site nearer to Great Ancoats Street.

384800 385000 385200 385400

398600 398400 398200

N

New Islington Free School

Blossom St Cotton St Jersey St Murray St Redhill St Keepers Quay Lockyard La Weybridge Rd

Great Ancoats Street A665 Pickford St Redhill St Port St

Tariff St Ancoats Pigeon St Peak St Ducie St Store St Millbank St Old Mill St Vesta St Pollard Street A662

1 2 3 4

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- Site Boundary
- Phase 1
- Phase 2
- Survey Locations

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Client
Manchester City Council

Project
Former Central Retail Park: The Park

Title
Noise Measurement Locations

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Drawing Number
Figure 15-4

Rev
03

15.7 Potential impacts

15.7.1 Construction noise

Noise levels have been predicted at the NSRs in accordance with BS 5228 Part 1 as shown in Table 15-11. Predictions consider a reasonable worst-case scenario and assume an average distance between the noise sources and receptors (i.e. centre of the site) with all plant in use throughout the day for the duration / on-times shown in Table 15-6, considering hard ground. It is assumed that NSRs could have a full line-of-sight to the works and therefore no screening corrections have been applied.

Table 15-11 – Predicted construction noise levels

NSR	Predicted Façade Noise Level, dB $L_{Aeq,T}$		
	Earthworks	Hard Engineering	Soft Engineering
1	64	64	62
2	63	63	61
3	60	60	58
4	61	61	59
5	62	62	60
6	60	60	58
7	62	62	60
8	59	59	57
9	59	58	56

As a contractor has not yet been appointed, information regarding HGV traffic for deliveries and waste collection during construction is not known, however, the existing road network holds significant numbers of vehicles and generates high noise levels. A temporary but relatively small temporary increase in HGV traffic may occur, however the increase will be below threshold (i.e. 20% increase of HGV road traffic) which would result in a 1dB increase of road traffic noise, therefore there will be no impacts due to construction road traffic noise.

15.7.2 Construction vibration

Construction vibration levels have been predicted in accordance with BS 5228 Part 2. The calculation considers vibration generating works only, namely the use of a vibratory compactor during steady state operation, as shown in Table 15-2.

Table 15-12 – Predicted construction vibration levels, vibration compactor

Receptor	Distance from Site	50% probability that vibration levels will exceed: (mm/s)	33% probability that vibration levels will exceed: (mm/s)	5% probability that vibration levels will exceed: (mm/s)
1	Adjacent	N/A *	N/A *	N/A *
2	30	0.15	0.29	0.56
3	33	0.13	0.25	0.49
4	57	0.06	0.11	0.22
5	64	0.05	0.10	0.19
6	79	0.04	0.07	0.14
7	80	0.04	0.07	0.13
8	106	0.02	0.05	0.09
9	116	0.02	0.04	0.08

* Outdoor / community receptor, vibration criteria not applicable.

15.7.3 Operational noise and vibration

The park will be used for recreational activities by the public and will likely include activities such as walking, meetings between friends/families, relaxing and children playing. During the operational phase, operational noise will be limited to basic park maintenance such as waste removal (emptying of bins), grass cutting and hedge cutting. No fixed plant equipment is proposed as part of the development. Such operations will emit negligible levels of vibration.

Whilst park maintenance will emit some noise, the noise will be temporary in nature and not occur regularly. Furthermore, the operational noise sources are already a part of the noise climate due to the maintenance of the adjacent park, Cotton Field.

The park will not include additional parking facilities, therefore additional road traffic associated with users of the park is will not occur. Vehicular noise will be associated with waste collections from the Proposed Development, however, this will likely be a single vehicle and no more than once per day.

Operational noise will likely be less than background noise levels and will not be exceed LOAEL at NSRs. Effects of operational noise have not been assessed further.

There are no vibration sources that could cause impacts from the Proposed Development during operation. Effects of operational vibration have not been assessed further.

15.8 Assessment of effects

Table 15-13 Construction phase impact assessment

Receptor	Impact	Mitigation	Residual impact	Residual effect	Significance
132-134 Great Ancoats Street, Mancester M4 6DE	Noise from construction activities	Best practice noise and vibration measures	Negligible	Construction noise levels calculated as 58 - 60 dB LAeq,T which is below the SOAEL and therefore not significant. Construction noise levels may temporarily increase when the plant is operating closer to the nearest sensitive receptors and exceed the significant observed adverse effect level, however; the frequency of the significant observed adverse effect level exceedances is unlikely to exceed the temporal threshold as indicated in the threshold example from BS 5228 for the provision of temporary rehousing or noise insulation	Negligible adverse effect Duration criteria not met Not significant
	Noise generated from construction traffic	Best practice noise and vibration measures	Negligible	The frequency of deliveries to the site is not known at this stage, however it is likely that a temporary but relatively small increase in HGV traffic may occur. As Great Ancoats Street is part of the wider Manchester Ring Road and which provides access to the city centre and therefore holds significant numbers of vehicles, significant impacts due to construction traffic are unlikely.	Negligible adverse effect Not significant
	Vibration from construction activities	Best practice noise and vibration measures	Negligible	Construction vibration levels are predicted to be 0.13 - 0.49mm/s and therefore below the threshold level for onset of potential significant effects on humans. The predicted vibration levels are further below the threshold for cosmetic damage to buildings, therefore; impacts due to construction vibration are predicted to be not significant.	Negligible adverse effect Duration criteria not met Not significant
Co-op Academy New Islington, 10 Hugh Oldham Way, Manchester M4 6EY	Noise from construction activities	Best practice noise and vibration measures	Negligible	Construction noise levels calculated as 61 - 63 dB LAeq,T which is below the SOAEL and therefore not significant. Construction noise levels may temporarily increase when the plant is operating closer to the nearest sensitive receptors and exceed the significant observed adverse effect level, however; the frequency of the significant observed adverse effect level exceedances is unlikely to exceed the temporal threshold as indicated in the threshold example from BS 5228 for the provision of temporary rehousing or noise insulation	Negligible adverse effect Duration criteria not met Not significant
	Noise generated from construction traffic	Best practice noise and vibration measures	Negligible	The frequency of deliveries to the site is not known at this stage, however it is likely that a temporary but relatively small increase in HGV traffic may occur. As Great Ancoats Street is part of the wider Manchester Ring Road and which provides access to the city centre and therefore holds significant numbers of vehicles, significant impacts due to construction traffic are unlikely.	Negligible adverse effect Not significant
	Vibration from construction activities	Best practice noise and vibration measures	Negligible	Construction vibration levels are predicted to be 0.15 - 0.56mm/s and therefore below the threshold level for onset of potential significant effects on humans. The predicted vibration levels are further below the threshold for cosmetic damage to buildings, therefore; impacts due to construction vibration are predicted to be not significant.	Negligible adverse effect Duration criteria not met Not significant
Cotton Field Park	Noise from construction activities	Best practice noise and vibration measures	Negligible	Construction noise levels calculated as 62 - 64 dB LAeq,T which is below the SOAEL and therefore not significant. Construction noise levels may temporarily increase when the plant is operating closer to the nearest sensitive receptors and exceed the significant observed adverse effect level, however; the frequency of the significant observed adverse effect level exceedances is unlikely to exceed the temporal threshold as indicated in the threshold example from BS 5228 for the provision of temporary rehousing or noise insulation	Negligible adverse effect Duration criteria not met Not significant

Receptor	Impact	Mitigation	Residual impact	Residual effect	Significance
	Noise generated from construction traffic	Best practice noise and vibration measures	Negligible	The frequency of deliveries to the site is not known at this stage, however it is likely that a temporary but relatively small increase in HGV traffic may occur. As Great Ancoats Street is part of the wider Manchester Ring Road and which provides access to the city centre and therefore holds significant numbers of vehicles, significant impacts due to construction traffic are unlikely.	Negligible adverse effect Not significant
	Vibration from construction activities	Best practice noise and vibration measures	Negligible	Cotton Park is an outdoor / community receptor, vibration criteria not applicable	Negligible adverse effect Duration criteria not met Not significant
Cotton Field Wharf, 4 New Union Street, Manchester M4 6FQ	Noise from construction activities	Best practice noise and vibration measures	Negligible	Construction noise levels calculated as 57 - 59 dB LAeq,T which is below the SOAEL and therefore not significant. Construction noise levels may temporarily increase when the plant is operating closer to the nearest sensitive receptors and exceed the significant observed adverse effect level, however; the frequency of the significant observed adverse effect level exceedances is unlikely to exceed the temporal threshold as indicated in the threshold example from BS 5228 for the provision of temporary rehousing or noise insulation	Negligible adverse effect Duration criteria not met Not significant
	Noise generated from construction traffic	Best practice noise and vibration measures	Negligible	The frequency of deliveries to the site is not known at this stage, however it is likely that a temporary but relatively small increase in HGV traffic may occur. As Great Ancoats Street is part of the wider Manchester Ring Road and which provides access to the city centre and therefore holds significant numbers of vehicles, significant impacts due to construction traffic are unlikely.	Negligible adverse effect Not significant
	Vibration from construction activities	Best practice noise and vibration measures	Negligible	Construction vibration levels are predicted to be 0.02 - 0.09mm/s and therefore below the threshold level for onset of potential significant effects on humans. The predicted vibration levels are further below the threshold for cosmetic damage to buildings, therefore; impacts due to construction vibration are predicted to be not significant.	Negligible adverse effect Duration criteria not met Not significant
	Noise from construction activities	Best practice noise and vibration measures	Negligible	Construction noise levels calculated as 60 - 62 dB LAeq,T which is below the SOAEL and therefore not significant. Construction noise levels may temporarily increase when the plant is operating closer to the nearest sensitive receptors and exceed the significant observed adverse effect level, however; the frequency of the significant observed adverse effect level exceedances is unlikely to exceed the temporal threshold as indicated in the threshold example from BS 5228 for the provision of temporary rehousing or noise insulation	Negligible adverse effect Duration criteria not met Not significant
Keepers Quay, Manchester M4 6LG	Noise generated from construction traffic	Best practice noise and vibration measures	Negligible	The frequency of deliveries to the site is not known at this stage, however it is likely that a temporary but relatively small increase in HGV traffic may occur. As Great Ancoats Street is part of the wider Manchester Ring Road and which provides access to the city centre and therefore holds significant numbers of vehicles, significant impacts due to construction traffic are unlikely.	Negligible adverse effect Not significant
	Vibration from construction activities	Best practice noise and vibration measures	Negligible	Construction vibration levels are predicted to be 0.04 - 0.13mm/s and therefore below the threshold level for onset of potential significant effects on humans. The predicted vibration levels are further below the threshold for cosmetic damage to buildings, therefore; impacts due to construction vibration are predicted to be not significant.	Negligible adverse effect Duration criteria not met Not significant
Laystall Apartments, Laystall Street, Manchester M1 2JP	Noise from construction activities	Best practice noise and vibration measures	Negligible	Construction noise levels calculated as 60 - 62 dB LAeq,T which is below the SOAEL and therefore not significant. Construction noise levels may temporarily increase when the plant is operating closer to the nearest sensitive receptors and exceed the significant observed adverse effect level, however; the frequency of the significant observed adverse effect level exceedances is unlikely to exceed the temporal threshold as indicated in the threshold example from BS 5228 for the provision of temporary rehousing or noise insulation	Negligible adverse effect Duration criteria not met Not significant

Receptor	Impact	Mitigation	Residual impact	Residual effect	Significance
	Noise generated from construction traffic	Best practice noise and vibration measures	Negligible	The frequency of deliveries to the site is not known at this stage, however it is likely that a temporary but relatively small increase in HGV traffic may occur. As Great Ancoats Street is part of the wider Manchester Ring Road and which provides access to the city centre and therefore holds significant numbers of vehicles, significant impacts due to construction traffic are unlikely.	Negligible adverse effect Not significant
	Vibration from construction activities	Best practice noise and vibration measures	Negligible	Construction vibration levels are predicted to be 0.05 - 0.19mm/s and therefore below the threshold level for onset of potential significant effects on humans. The predicted vibration levels are further below the threshold for cosmetic damage to buildings, therefore; impacts due to construction vibration are predicted to be not significant.	Negligible adverse effect Duration criteria not met Not significant
New Islington Marina, 9 Old Mill Street, Manchester M4 6EA	Noise from construction activities	Best practice noise and vibration measures	Negligible	Construction noise levels calculated as 56 - 59 dB LAeq,T which is below the SOAEL and therefore not significant. Construction noise levels may temporarily increase when the plant is operating closer to the nearest sensitive receptors and exceed the significant observed adverse effect level, however; the frequency of the significant observed adverse effect level exceedances is unlikely to exceed the temporal threshold as indicated in the threshold example from BS 5228 for the provision of temporary rehousing or noise insulation	Negligible adverse effect Duration criteria not met Not significant
	Noise generated from construction traffic	Best practice noise and vibration measures	Negligible	The frequency of deliveries to the site is not known at this stage, however it is likely that a temporary but relatively small increase in HGV traffic may occur. As Great Ancoats Street is part of the wider Manchester Ring Road and which provides access to the city centre and therefore holds significant numbers of vehicles, significant impacts due to construction traffic are unlikely.	Negligible adverse effect Not significant
	Vibration from construction activities	Best practice noise and vibration measures	Negligible	Construction vibration levels are predicted to be 0.02 - 0.08mm/s and therefore below the threshold level for onset of potential significant effects on humans. The predicted vibration levels are further below the threshold for cosmetic damage to buildings, therefore; impacts due to construction vibration are predicted to be not significant.	Negligible adverse effect Duration criteria not met Not significant
New Islington Medical Practice, Ancoats Primary Care Centre, Old Mill Street, Manchester M4 6EE	Noise from construction activities	Best practice noise and vibration measures	Negligible	Construction noise levels calculated as 58 - 60 dB LAeq,T which is below the SOAEL and therefore not significant. Construction noise levels may temporarily increase when the plant is operating closer to the nearest sensitive receptors and exceed the significant observed adverse effect level, however; the frequency of the significant observed adverse effect level exceedances is unlikely to exceed the temporal threshold as indicated in the threshold example from BS 5228 for the provision of temporary rehousing or noise insulation	Negligible adverse effect Duration criteria not met Not significant
	Noise generated from construction traffic	Best practice noise and vibration measures	Negligible	The frequency of deliveries to the site is not known at this stage, however it is likely that a temporary but relatively small increase in HGV traffic may occur. As Great Ancoats Street is part of the wider Manchester Ring Road and which provides access to the city centre and therefore holds significant numbers of vehicles, significant impacts due to construction traffic are unlikely.	Negligible adverse effect Not significant
	Vibration from construction activities	Best practice noise and vibration measures	Negligible	Construction vibration levels are predicted to be 0.04 - 0.14mm/s and therefore below the threshold level for onset of potential significant effects on humans. The predicted vibration levels are further below the threshold for cosmetic damage to buildings, therefore; impacts due to construction vibration are predicted to be not significant.	Negligible adverse effect Duration criteria not met Not significant
William Sutton Building, Old Mill Street, Manchester M4 6NA	Noise from construction activities	Best practice noise and vibration measures	Negligible	Construction noise levels calculated as 59 - 61 dB LAeq,T which is below the SOAEL and therefore not significant. Construction noise levels may temporarily increase when the plant is operating closer to the nearest sensitive receptors and exceed the significant observed adverse effect level, however; the frequency of the significant observed adverse effect level exceedances is unlikely to exceed the temporal threshold as indicated in the threshold example from BS 5228 for the provision of temporary rehousing or noise insulation	Negligible adverse effect Duration criteria not met Not significant

Receptor	Impact	Mitigation	Residual impact	Residual effect	Significance
	Noise generated from construction traffic	Best practice noise and vibration measures	Negligible	The frequency of deliveries to the site is not known at this stage, however it is likely that a temporary but relatively small increase in HGV traffic may occur. As Great Ancoats Street is part of the wider Manchester Ring Road and which provides access to the city centre and therefore holds significant numbers of vehicles, significant impacts due to construction traffic are unlikely.	Negligible adverse effect Not significant
	Vibration from construction activities	Best practice noise and vibration measures	Negligible	Construction vibration levels are predicted to be 0.06 - 0.22mm/s and therefore below the threshold level for onset of potential significant effects on humans. The predicted vibration levels are further below the threshold for cosmetic damage to buildings, therefore; impacts due to construction vibration are predicted to be not significant.	Negligible adverse effect Duration criteria not met Not significant

15.9 Additional mitigation and enhancement measures

Elevated construction noise levels at times during construction may still have the potential to cause some disturbance, therefore measures should be implemented to reduce construction noise as far as reasonably practicable. Additional mitigation and enhancement measures and the resultant residual effects will refer to construction noise. Whilst best practice, the following mitigation measures have been considered and referenced in the above impact assessment to offset any potential impacts.

15.9.1 Best practice noise and vibration measures

In developing the control measures, Best Practicable Means (BPM), as defined in Section 72 of the Control of Pollution Act 1974 and Section 79 of the Environmental Protection Act 1990, will be applied during all construction works to minimise noise and vibration at neighbouring residential properties and other sensitive receptors. In doing so, due consideration will be given to the recommendations contained within BS 5228:2009+A1:2014, approved by the Secretary of State as the Code of Practice for noise and vibration control on construction and open sites.

There are many general measures than can reduce noise levels at source, and the following are examples of items that are considered Best Practicable Means:

- All plant and equipment will comply with the noise limit and noise marking requirements prescribed by the "Noise Emission in the Environment by Equipment for Use Outdoors Regulations 2001" and the "Noise Emission in the Environment by Equipment for Use Outdoors (Amendment) Regulations 2005" implementing the EU Directives 2000/14/EC.
- All plant, equipment and noise control measures applied to plant and equipment shall be maintained in good and efficient working order and operated such that noise emissions are minimised as far as reasonably practicable. As far as reasonably practicable, any plant, equipment or items fitted with noise control equipment found to be defective will not be operated until repaired.
- Vehicles and mechanical plant employed for any activity associated with the construction works will, where reasonably practicable, be fitted with effective exhaust silencers and shall be maintained in good working order and operated in a manner such that noise emissions are controlled and limited as far as reasonably practicable.
- Machines in intermittent use will be shut down or throttled down to a minimum during periods between works.
- Static noise emitting equipment operating continuously will be screened or housed within suitable acoustic enclosure, where appropriate.
- Noisy plant or equipment shall be sited as far away as possible from noise sensitive buildings. Wherever practicable, the use of barriers in the form of acoustic enclosures or barriers shall be employed.
- All personnel on site will undergo site specific inductions and briefings, to include section 61 consent requirements where required, and noise and vibration control measures. Where relevant, specific noise control measures will be incorporated into Works Package Plans.
- A programme of community liaison will be carried out, including notification of works and details of the complaints process.
- A programme of site inspections and noise monitoring is recommended to assess whether BPM is being employed in the control noise and vibration, to investigate any noise complaints or incidents and compare actual construction noise levels against those predicted.
- Noise from reversing alarms from delivery and construction vehicles will be controlled and limited as far as possible through the following means:
- Designing the site layout to limit the need for reversing vehicles;
- The use of banksmen for traffic management at site entrance gates and within site footprint;
- Reversing alarms incorporating directional sounders, broadband signals self-adjusting output sounders or flashing warning lights;
- Setting reversing alarms to the minimum output noise level required for health and safety compliance; and
- Where practicable, noisy activities (such as vegetation clearance and access track works near to properties) should be undertaken during normal daytime working hours (0800 to 1800 Monday to Friday and from 0800 to 1300 Saturday).

Neighbourhood liaison should be undertaken with local residents and surrounding businesses that are likely to be affected by the works, informing them of the nature and expected duration of the works and the proposed hours of work. A noticeboard should be displayed in a prominent position near the site detailing named contacts who are able to provide further information and deal with any complaints as appropriate during all working hours.

15.10 Cumulative effects

This planning application has sight of the prospective Phase 2 development adjacent to the east of the Proposed Development as disclosed within the SRF 2023. It is understood that this will comprise a commercial development with opportunities for ancillary ground floors to provide active frontages. The buildings will be of heights between 6-16 storeys and vehicular access will be available via Old Mill Street. It is assumed the Proposed Development will have been constructed prior to the construction of the Phase 2 development and therefore no cumulative effects are anticipated during the construction phases as these will not overlap. In relation to the operational phase of the Proposed Development, this was scoped out of the biodiversity assessment as all impacts were anticipated to be negligible and not significant. Therefore, the Proposed Development is not expected to result in adverse cumulative effects in combination with those of the Phase 2 development during its construction nor its operation.

There are no other anticipated future developments to consider within this assessment of inter-cumulative effects as all applications within the planning portal as the time of assessment are expected to already be constructed prior to the Proposed Development. However, it is advised that should concurrent construction projects occur that regular liaison is carried out between the environment manager/engineer or the site manager ensure mitigation measures remain appropriate.

Intra-cumulative effects of the Proposed Development are considered in Volume 2, Chapter 20 of this ES.

15.11 Summary and conclusions

This chapter of the ES has assessed the potential impact with regards to noise and vibration during the construction and operational phases.

Impacts due to construction noise and vibration are predicted to be not significant. The frequency of any SOAEL exceedances are unlikely to exceed the temporary housing and noise insulation trigger levels. Additional mitigation measures have been proposed with view of reducing impacts via Best Practicable Means during construction. Predicted vibration levels during construction are below the threshold level for onset of potential significant effects on humans.

Due to the limited activities undertaken on site during operation, operational noise and vibration is expected to be less than baseline levels and therefore are expected to be negligible.

There are predicted to be no cumulative effects during construction and operation.

15.12 Glossary and acronyms

Table 15-14 Glossary of terms

Term	Definition
A-weighting, dB(A)	The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq}, L_{A90} etc., according to the parameter being measured. Sound which is transmitted from the source via the surrounding air, as distinct from transmission through the structure which supports the sound source (cf. structure borne sound).
Ambient noise	Totally encompassing sound in a given situation at a given time usually composite of sounds from many sources near and far.
Façade noise level	A façade noise level is the noise level 1m in front of the most exposed window or door in a building façade. The effect of reflection is to produce a slightly higher (typically +2.5 to +3 dB) sound level than it would be if the building was not there.
Free-field	Measurement condition in which no reflective surfaces, other than the ground, lies within 3.5 metres of the microphone position.
Noise level indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out. The most common noise level indices used in environmental acoustics are the following:
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{Amax,T}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{A10,T}$	The noise level exceeded for 10% of the time over the period T. The $L_{A10,18h}$ measured between 06:00h and 24:00h has been shown to have a good correlation with community response to road traffic noise.
$L_{A90,T}$	The noise level that is exceeded for 90% of the measurement time interval, T. L_{A90} can be considered to be the "average minimum" noise level and is often used to describe the background noise level, i.e., the sound pressure level of non-specific noise.
Reference time interval, T_r	The time interval to which an equivalent continuous A-weighted sound pressure level can be referred.
Sound pressure level, L_p	A value equal to 20 times the logarithm to the base 10 of the ratio of the root-mean-square pressure of a sound to a reference pressure, which is normally taken to be 20 µPa. Its unit of measurement is the decibel (dB).

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