

9 NOISE & VIBRATION

9.1 INTRODUCTION

9.1.1 Company

WYG

9.1.2 Author

Emma Aspinall, MGeol (Hons)

Emma has over 2 years' experience undertaking noise assessments including noise surveys and noise modelling using CADNA noise modelling software for various schemes both within and outside the UK.

Graham Davis, BA (Hons), PGdip AMIOA

Graham has over 8 years' experience managing, co-ordinating and directing noise assessments, including noise modelling using CADNA modelling software for aviation, major highways schemes, and industrial noise sources for various schemes both within and outside the UK.

Nigel Mann, BSc (Hons), MSc, MIOA

Nigel has over 20 years' experience managing, co-ordinating and directing noise assessments, including noise modelling using CADNA modelling software for large scale urban design projects, wind farms and transportation noise for various schemes both within and outside the UK.

9.1.3 Chapter Purpose

This chapter of the ES assesses the likely significant effects of the proposed development on the environment in terms of Noise and Vibration. The chapter and its supporting appendices describe the planning policy context, the assessment methodology; the baseline conditions at the application site and surroundings; the likely significant 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 cumulative effects. In summary, the objectives of the chapter are to:

- Assess the impact of noise and vibration from the proposed development during the construction phase;
- Assess the impact of noise and vibration from the completed proposed development during the operational phase; and
- Identify any mitigation measures associated with the construction and operational phase.

9.1.4 Chapter Updates for Revised 2020 Submission

This ES chapter relating to noise and vibration has been reviewed against the following aspects and for each it has been confirmed that there are no amendments required to the content of the chapter:

- Baseline data validity: there have been no relevant changes to the baseline data, and the results of the noise survey presented in Section 5.0 remain valid;

- Legislation/policy revisions: although this version of the ES and the accompanying technical appendix have been updated to reflect the most recent version of the Design Manual for Roads and Bridges, there have been no related updates to legislation/policy that have affected either the methodology or findings of this assessment;

- Amendments to construction methodology: the changes to the proposed construction methodology do not affect the findings of the construction assessment as the proposed items of plants to be used remain the same; and

- Operational traffic data: no relevant changes to operational traffic data as confirmed by Mott MacDonald.

In accordance with the methodology outlined in Chapter 2, a Level 2 update has been undertaken. Due to:

- the relevance and scale of the proposed development amendments (including amendments to the stadium design);
- addition of new cumulative schemes (20F/0217 – proposed hotel at Blackstone Street opposite to Bramley-Moore Dock, 20F/1947 – 210 residential units where Lightbody Street meets Great Howard Street);
- the relocation of the proposed chiller compound to the northwest corner of the stadium; and
- statutory consultee comments;

limited technical assessment has been undertaken to confirm the validity of the previous conclusions.

There were limited statutory consultee comments received in relation to this topic that required a response. Where relevant, clarification responses are detailed within Appendix 9.1 and in Table 9.3 within this chapter.

As a consequence of the above factors, it is considered that the previously reported mitigation measures remain valid and the residual effects previously identified have remained the same.

The sections that have been updated are detailed below:

- Section 9.2.2
- Section 9.2.8
- Figure 9.1
- Section 9.3.1
- Section 9.5.1
- Section 9.5.5
- Section 9.5.6
- Section 9.5.7
- Section 9.5.8
- Section 9.5.9

9.1.5 Appendices

- Appendix 9.1 Noise and Vibration Technical Assessment

9.2 METHODOLOGY

9.2.1 Legislation, Policy and Guidance

Legislation, planning policy and guidance relating to developments and their potential effects on noise and vibration are set out below.

9.2.1.1 Planning Policy

Section 38(6) of the Planning and Compulsory Purchase Act 2004 and Section 70(2) of the Town & Country Planning Act 1990 requires planning applications should be determined in accordance with the statutory development plan, unless material considerations indicate otherwise. The statutory development plan for the City of Liverpool currently comprises the Unitary Development Plan (adopted 2002).

The statutory development plan policies relevant to the application proposal are summarised below. The following policies and guidance are material considerations which also inform the assessment:

- National Planning Policy Framework (February 2019);
- Planning Practice Guidance (continually updated); and
- Liverpool Local Plan (Submission Draft, May 2018);

Liverpool Unitary Development Plan (2002)

Chapter 13 of the UDP (2002) [4] contains the relevant policies with respect to noise:

Pollution – Policy EP11

"1. Planning permission will not be granted for development which has the potential to create unacceptable air, water, noise or other pollution or nuisance.

2. Where existing uses adversely affect the environment through noise, vibration, soot, grit, dust, smoke, fumes, smell, vehicle obstruction or other environmental problems, the City Council will:

- i. seek to reduce the problem on site;*
- ii. refuse planning permission for development which would result in a consolidation or expansion of uses giving rise to environmental problems;*
- iii. impose appropriate conditions on any permission which may be granted and/or obtain legal agreements in relation to such permission, in order to regulate uses;*
- iv. take enforcement action where appropriate; and*
- v. in appropriate circumstances, compulsorily acquire the premises whilst endeavouring to assist in the relocation of the firm, where resources permit.*

NOISE & VIBRATION

3. In the case of new development close to existing uses which are authorised or licensed under pollution control legislation, and which are a potential nuisance to the proposed development, planning permission will not be granted unless the City Council is satisfied that sufficient measures can and will be taken to protect amenity and environmental health.

Paragraph 13.103 also states:

“In determining whether a development is likely to cause unacceptable levels of pollution, the City Council will consider:

- national and international standards and regulations;
- the advice of the pollution and control authorities;
- Government guidance;
- neighbouring land uses; and
- the cumulative effect that may result i.e. where emissions, noise, discharge or nuisance from the development would combine with those already existing to reach unacceptable levels.”

Economic Development outside the Regeneration Areas – Policy E5

1. Outside the Economic Regeneration Areas, the City Council will encourage the development of a range of employment generating activities, subject to the following specific criteria:
- ...ii. the nature of any industrial processes and operations involved, particularly with regard to potential generation of environmental pollutants, noise, visual intrusion, traffic and parking/access arrangements.”

New Development in Conservation Areas – Policy HD11

- “1. Planning permission will not be granted for:
- ...v. development that does not generate levels of traffic, parking, noise or environmental problems which would be detrimental to the character or appearance of the area.”

National Planning Policy Framework (2019)

The National Planning Policy Framework (NPPF) [1] sets out the Government’s planning policies for England and how these should be applied. In relation to noise and vibration, the NPPF specifies in Sections 170, 180, 182 and 183 that planning policies and decisions should aim to:

“170. Planning policies and decisions should contribute to and enhance the natural and local environment by:

- e) 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

such as air and water quality, taking into account relevant information such as river basin management plans.”

A further two short statements are presented at paragraph 180, which state:

“180. 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:

“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

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

Furthermore, paragraphs 182 and 183 state:

“182. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.

183. The focus of planning policies and decisions should be on whether proposed development is an acceptable use of land, rather than the control of processes or emissions (where these are subject to separate pollution control regimes). Planning decisions should assume that these regimes will operate effectively. Equally, where a planning decision has been made on a particular development, the planning issues should not be revisited through the permitting regimes operated by pollution control authorities.”

Planning Practice Guidance (2019)

The Planning Practice Guidance [3] web-based resource was launched by the Ministry for Housing, Communities and Local Government on 6 March 2014 and most recently updated in July 2019, to support the National Planning Policy Framework and make it more accessible. With respect to noise, the national Planning Practice Guidance (PPG) provides the following summary of the effects of noise exposure: For the purpose of this assessment the relating target noise level criteria are found in the noise technical report.

With respect to Government policy for noise, the national Planning Practice Guidance (PPG: Noise) provides a summary table of the effects of noise exposure that gives more definition to the terms used in the Noise Policy Statement for England (and NPPF). A summary of this table is shown in Table 9.1 below. These definitions help to confirm the change in noise levels in the magnitude of impact tables (Table 9.7 and Table 9.8).

Table 9.1
Summary of Noise Exposure Hierarchy

PERCEPTION	EXAMPLES OF OUTCOME
Not present	No Observed Effect Level
	No Effect
Present and not intrusive	No Observed Adverse Effect Level
	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.
Present and intrusive	Lowest Observed Adverse Effect Level (LOAEL)
	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.
Present and disruptive	Significant Observed Adverse Effect Level (SOAEL)
	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.

Liverpool City Council Local Plan 2013-2033

The Liverpool City Council (LCC) Local Plan 2013-2033 (Submission Version, May 2018)[5] also contains the following relevant policies with respect to noise.

Draft Policy STP2 (Sustainable Growth Principles and Managing Environmental Impacts):

9 NOISE & VIBRATION

"New development should seek to avoid negative impacts on the environment through adoption of best practice. Where a negative effect is identified this should be mitigated by appropriate measures. To ensure the sustainable growth of the City, new development should:

...i. Deliver high quality contextual design which helps to reinforce the distinct character and identity of the various parts of the City; and results in the efficient use of resources generally including materials, water and energy; reduces carbon emissions and thus contributes to achieving zero carbon buildings; promotes opportunities for physical activity; and minimises waste, light and noise pollution;"

Draft Policy HD11 (New development in Conservation Areas): Same as Policy HD11 outlined within the Liverpool UDP above.

Policy SP4 (Food and Drink Uses and Hot Food Take-aways):

"5. Proposals for all food and drink uses including hot food take-aways both within and outside designated centres should demonstrate that:

(a) There would be no adverse impact on residential amenity in terms of noise, customer activity, vibrations, odours, traffic disturbance and litter;

(d) Appropriate fume extraction systems and/ or noise insulation are provided;"

Policy R1 Air, Light and Noise Pollution:

"1. Development proposals which are likely to have a pollution impact should demonstrate that:

a. Appropriate measures are incorporated to avoid pollution to air, water and soil;

b. The impact of noise, vibration and lighting will not be significant;

c. The proposal will not undermine the achievement of Air Quality Management Area (AQMA) objectives; and

d. It will not lead to a significant decline in air quality

2. Where existing uses adversely affect the environment through noise, vibration, dust, smoke, fumes, smell, vehicle obstruction or other environmental problems the City Council will:

a. Refuse planning permission for proposals which would result in a consolidation or expansion of uses giving rise to environmental problems.

b. Impose appropriate conditions on any permission which may be granted and/or obtain legal agreements in relation to such a permission in order to regulate uses.

3. New development proposals close to existing uses which are authorised or licenced under pollution control legislation, and which are a potential nuisance to the proposed development, will not be permitted unless the City Council is satisfied that sufficient measures will be taken by the developer to protect amenity and environmental health.

4. Where appropriate Major developments should incorporate measures to reduce and minimise air pollution."

Noise Policy Statement for England (2010)

The Noise Policy Statement for England (NPSE)[2] was published on 15 March 2010. It sets out the long-term vision of government noise policy, to "promote good health and a good quality of life through the management of noise within the context of Government policy on sustainable development".

The aims of the NPSE are:

"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."

Since the publication of the NPSE, this document and the accompanying Explanatory Note forms the basis for noise consideration within the National Planning Policy Framework (NPPF) and the national Planning Practice Guidance (PPG). The content of these documents is explained in more detail in the Noise Technical Report. This includes further reference to the following concepts introduced within the NPSE:

- NOEL – No Observed Effect level

This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.

- LOAEL – Lowest Observable Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

- SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

However, specific noise measures such as limits or thresholds are not presented and it states that:

"It is not possible to have a single objective based measure that defines 'significant effect levels' that is applicable to all sources of noise in all situations." As such, there remains the requirement to establish relevant criteria based on currently available guidance documents and standards such as the WHO Guidelines and DMRB.

9.2.1.2 Other Relevant Guidance

Other relevant guidance has been used to enable the assessment of the proposed development in terms of the LOAEL and the SOAEL. This guidance includes but is not limited to:

- World Health Organisation (WHO), 'Guidelines for Community Noise 1999' [6];
- Design Manual for Roads and Bridges (DMRB) [7];
- BS 8233:2014 Guidance on sound insulation and noise reduction for buildings – Code of practice [8];
- BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound [9];
- IEMA (Institute for Environmental Management and Assessment) 'Guidelines for Environmental Noise Impact Assessment October 2014' [10];
- Noise Council: Code of Practice on Environmental Noise Control at Concerts [NCCPENCC] [11]
- BS 5228-1:2009+A1:2014 'Code of Practice for noise and vibration control on construction and open sites' [12] and
- ISO 9613-2: 1996 Acoustics – Attenuation of sound during propagation outdoors – Part 2: General Method of Calculation [13].

9.2.2 Consultees and Scoping

Consultation regarding noise and vibration has been undertaken through the EIA scoping process, which is documented below.

9.2.2.1 Scoping Consultation

The noise and vibration assessment methodology within the EIA scoping report was submitted to LCC and relevant parties (including the Marine Management Organisation (MMO)) on 15 May 2017. The formal scoping opinion was received on 8 November 2017; a summary of comments relating to noise and vibration is provided in Table 9.2 below.

Table 9.2

Summary of Responses Relating to Noise and Vibration

CONSULTEE	SCOPING OPINION COMMENTS	FURTHER INFORMATION
Environment Agency	During the construction phase noise and vibration (e.g. through piling) may be a potentially significant impact to fish by direct killing or having an influence on migratory fish species located within the Mersey such as Atlantic salmon.	Noise and vibration associated with the construction phase has been qualitatively assessed with regards to marine life and mitigation measures identified with respect to the construction phase of the development.

NOISE & VIBRATION

CONSULTEE	SCOPING OPINION COMMENTS	FURTHER INFORMATION
Merseyside Environmental Advisory Service	Air quality, noise and lighting assessments are proposed to inform the EIA. These assessments should consider impacts upon statutory designated nature conservation sites.	Baseline noise monitoring and assessment locations were selected to represent nearby statutory conservation sites and used to inform the accompany ecology assessments.

9.2.2.2 Planning Application Consultation

Comments were received by Liverpool City Council (LCC) dated 13 May 2020 regarding the initial noise and vibration assessment. A summary of comments is provided in Table 9.2 below.

Table 9.3
Summary of Consultation Responses Relating to Noise and Vibration

CONSULTEE	CONSULTATION COMMENTS	FURTHER INFORMATION
Liverpool City Council	<p>A standard condition regarding noise from fixed building services plant which shall not exceed background levels.</p> <p>Agreement with the findings of the noise assessment regarding the Liverpool Waters scheme in that impacts associated with the proposed development will be addressed by an up-to-date noise assessment for the scheme, in-line with the outline planning consent.</p> <p>Provision of a curfew of 23:00 for up to six non-football events and no later than 23:30 for up to two non-team sporting events.</p>	<p>The proposed conditions provided by LCC are considered to be appropriate regarding noise associated with the proposed development.</p> <p>To clarify, the assessment for non-football events accounts for up to four events.</p>

9.2.3 Consideration of Climate Change

The climate change scenarios set out in Chapter 2 EIA Methodology of this ES have been reviewed and considered in the context of noise and vibration. It is considered unlikely that the climate change scenarios identified will affect or be affected by noise and vibration associated with the proposed development. Therefore, climate change has not been considered further within this ES Chapter.

9.2.4 Consideration of Human Health

The impact on human health from noise and vibration forms an integral part of the relevant British Standards used within this assessment and is detailed within the relevant policy and guidance above. As such, the consideration of the potential impacts of noise and vibration from the

proposed development on human health are inherent within this assessment.

9.2.5 Consideration of Risk of Major Accidents and/or Disasters

The major accidents and/or disasters identified within Chapter 2 EIA Methodology of this ES have been reviewed and are not considered to be relevant in terms of noise and vibration. As such, this topic has not been further considered within this ES Chapter.

9.2.6 Alternatives

A comprehensive alternative sites assessment has been undertaken and is addressed within Chapter 5 Alternatives and Design Evolution. An alternative future baseline scenario has been included within the assessment for comparison purposes as stated in Chapter 2 EIA Methodology.

In regard to the traffic data that have informed this assessment, the baseline conditions that have been considered include an alternate future baseline scenario as follows:

- a 2019 existing baseline conditions;
- a 2023 base (no development) – future baseline with cumulative development and Liverpool Waters (LPA ref. 10O/2424 – latest non-material amendment being ref. 19NM/1121); and
- 2028 base (no development) – future baseline with cumulative development and Liverpool Waters.

Further details on the traffic data that has formed the basis of the noise assessment may be found in Chapter 7 Transport and the traffic data used in the assessment of the non-match day/non-event day scenarios is included at Appendix 7.2, ES Volume III.

9.2.7 Assessment Scenarios

To determine the effects of the proposed development, a number of different assessment scenarios have been tested. These are as follows:

- Construction phase – noise associated with construction works across the site.
- Operational phase (stadium noise – Scenario 1) – noise associated with matchday operations prior to kick-off: crowd footfall in and around the stadium, noise associated with the proposed fan zone, noise associated with food and drink vans, parking movements within the surface car park adjacent to the sea wall and to the west of the proposed water channel and use of the PA/VA system
- Operational phase (stadium noise – Scenario 2) – noise associated with matchday operations during match: crowd noise including contributions from fans cheering and chanting, a goal being scored and celebratory music and full use of the PA/VA system in and around the stadium.

- Operational phase (road traffic) – both opening year and future year scenarios have been assessed as below, inclusive of matchday traffic to represent worst-case traffic flows:
 - 2023 “Do Minimum (DM)” – without development opening year
 - 2023 “Do Something (DS)” – with development opening year (The Proposed Development (non-matchday, with a conference taking place at the site) + Liverpool Waters + Cumulative Development)
 - 2028 “Do Minimum (DM)” – without development future year (DM)
 - 2028 “Do Something (DS)” – with development future year (The Proposed Development (non-matchday, with a conference taking place at the site) + Liverpool Waters + Cumulative Development)
- Operational phase (concert) – it is anticipated that there will be up to four non-football events per year. Noise associated with a non-football event has been assessed, in this case, worst case music noise levels from a concert event.

Further information on the assumptions that have been made in the preparation of the non-matchday, with conference taking place at the site, transport data is provided in the Transportation chapter (Chapter 7, ES Volume II).

9.2.7.1 Construction Vibration

Vibration associated with construction has been assessed qualitatively within the noise technical report within Appendix 9.1, ES Volume III. CFA piling is proposed to reduce vibration from piling works. Further measures to reduce construction vibration will be included within the CEMP in due course. With these measures in place, significant impacts on sensitive receptors from construction vibration are not anticipated. On this basis, an assessment of construction vibration has been scoped out of this ES chapter.

9.2.7.2 Ecological Receptors

The significance of the effects of noise and vibration upon ecological receptors has been assessed within the Terrestrial Ecology and Aquatic Ecology chapters (ES chapters 12 and 13). The technical assessment that has informed these assessments is provided in Appendix 9.1. For the purposes of the assessment, ecological receptors are represented at 50m intervals from the site boundary in a northerly, westerly and southerly direction.

9.2.7.3 Cumulative Effects – Operational Phase

With respect to the consideration of cumulative effects, the operational traffic assessment includes contributions from the surrounding cumulative schemes within the traffic flows and the adjacent Liverpool Waters scheme (LPA ref. 10O/2424 – latest non-material amendment being 19NM/1121) has been considered throughout this assessment. Due to the short-term duration and nature of sporting and entertainment events that are unlikely

9 NOISE & VIBRATION

to occur simultaneously with other nearby events of a similar type or scale, other operational phase inter-project cumulative effects are not expected have a significant impact on sensitive receptors in relation to noise. This is due to the distance from the closest sensitive receptors considered within this assessment, the localised nature of noise sources (such as plant and or vehicle movements) in the wider area and the character of noise associated with operations at the proposed development.

9.2.7.4 Cumulative Effects – Construction Phase

The approved construction phasing parameters plan for the Liverpool Waters consented scheme indicates that the Central Docks area is proposed to be constructed between 2020-2036; Clarence Docks Area is proposed to be constructed between 2031-2036; and Northern Docks (Bramley-Moore Dock and Nelson Dock) is proposed to be constructed between 2036-2041. On this basis, construction of the Liverpool Waters scheme is not likely to coincide with construction of the current proposals.

In the unlikely event that the construction phasing of Liverpool Waters is amended and construction of the two schemes does coincide, it is considered that the cumulative effects of this would not be significant. This is due to the fact the closest receptor to the proposed development (R11), is 16m away from construction activities and falls within the negligible impact magnitude; even if the level of construction noise were to double (assuming that all activities were occurring simultaneously at an equivalent distance, a worst-case 3 dB increase in noise levels would be expected). Due to the fact this receptor is approximately 200m away from the Liverpool Waters site boundary and is to progress in distinct phases, construction activities would not cause a significant impact when assessed cumulatively. The closest existing receptor to the Liverpool Waters scheme is R06, which is approximately 42m away from the Liverpool Waters site boundary and 214m from the proposed development site and is it a distance where cumulative construction effects would be dominated by the closest activities and therefore is not expected to be significant.

Furthermore, it is identified within the Liverpool Waters ES that mitigation will be included in the form of a suitable Construction and Environmental Management Plan (CEMP), as is this case for the proposed development; the adoption of best practice measures detailed within the respective CEMPs will further reduce the potential for significant effects related to cumulative construction noise. The other consented cumulative schemes are located a greater distance from the application site and sensitive receptors and would all also be subject to a CEMP which would reduce the potential for construction noise effects. On this basis, significant cumulative construction noise effects are not anticipated and they have not been considered further in this ES chapter.

9.2.8 Assessment of Baseline Conditions & Receptor Sensitivity

Baseline conditions were determined through an on-site noise survey (undertaken between Friday 20 April 2018 to Tuesday 1 May 2018). During this time, measurements were undertaken at eleven locations and

one unattended location. Full details of the noise monitoring survey are presented in Section 5.0 of the Noise and Vibration Technical Report (Appendix 9.1).

As previously stated, for the purposes of the traffic assessment associated with the proposed development, two future baselines have been assessed, the 2023 opening year and the 2028 future year. The future baseline noise has been predicted using traffic flow data outlined in Chapter 7 Transport of this ES.

For the traffic assessment, the future baseline scenarios used are inclusive of cumulative developments within the study area. Therefore, the results presented can be considered a cumulative worst-case assessment of effects.

The study area used for this assessment is detailed within SK01 of the Noise and Vibration Technical Report (Appendix 9.1).

A number of existing and proposed key receptors have been selected to enable an assessment to be undertaken for the potential noise and vibration effects of the construction and operation phases of the proposed development, these are identified in Table 9.4 and Table 9.5 and shown in Figure 9.1.

Table 9.4

Existing and Proposed Sensitive Receptor Locations (Construction and Operational Noise)

REF.	DESCRIPTION	HEIGHT (M)
R01	76 Boundary Street	1.5
R02	2 St. Albans Court	1.5
R03	30 Snowdon Lane	1.5
R04	31 Houlgrave Road	1.5
R05	52 Colin Drive	1.5
R06	Titanic Hotel, Stanley Dock, Regent Road	8.0
R07	27 Egremont Promenade	1.5
R08	40 Egremont Promenade	1.5
R09	Mariners' Park Care Home, Royden Avenue	1.5
R10	62 Radnor Drive	1.5
R11	62 Regent Road	1.5
PR1	Proposed Liverpool Waters Development	19.0
PR2	Proposed Liverpool Waters Development	19.0
PR3	Proposed Liverpool Waters Development	4.0
PR4	Proposed Liverpool Waters Development	4.0
PR5	Proposed Liverpool Waters Development	14.0
PR6	Proposed Liverpool Waters Development	14.0
PR7	Proposed Liverpool Waters Development	10.0

REF.	DESCRIPTION	HEIGHT (M)
PR8	Proposed Liverpool Waters Development	16.0
PR9	Proposed Stanley Dock Apartments	4.0
PR10	Proposed Hotel – Blackstone Street / Regent Road	4.0
PR11	Proposed Lightbody Street Development	10.0

Table 9.5

Existing Sensitive Receptor Locations (Traffic Noise Assessment)

REF.	DESCRIPTION	HEIGHT (M)
TR01	92 Boundary Street	4.0
TR02	76 Boundary Street	4.0
TR03	2 St. Albans Court	4.0
TR04	30 Snowdon Lane	4.0
TR05	31 Houlgrave Road	4.0
TR06	52 Colin Drive	4.0
TR07	5 O'Reilly Court	4.0
TR08	10 Jack McBain Court	4.0
TR09	Titanic Hotel, Stanley Dock, Regent Road	4.0
TR10	62 Regent Road	4.0

Table 9.6 sets out the scale of sensitivity that has been applied to receptors identified and considered within this assessment.

Table 9.6

Methodology for Assessing Sensitivity of Noise and Vibration

SENSITIVITY	EXAMPLE OF RECEPTOR
High	Residential properties (permanent tenants) and schools and hospitals CPRE rated tranquillity (Zones 8-10)
Medium	Transient residential receptors such as users of hotels CPRE rated tranquillity (Zones 4-7)
Low	Commercial premises CPRE rated tranquillity (Zones 1-3)

9.2.9 Assessment of Magnitude

The assessment was undertaken based on the description of development contained in Chapter 3 Application Site & Proposed Development and Chapter 5 Construction Methodology of this volume of the ES. Guidance with regard to assessing the magnitude of noise effect is available within the Guidelines for Environmental Noise Impact Assessment, published by IEMA in 2014 [14]. The guidance indicates broad parameters with respect to categorising the significance of the basic noise change. For the purpose of this ES, the categories outlined in Table 9.7 through to Table 9.11 form the basis of the impact magnitude for the assessment, along with the

NOISE & VIBRATION

relevant fixed limit noise level criteria for the construction and operational phases.

Table 9.7
Methodology for Assessing the Magnitude of Impact (Construction Noise)

MAGNITUDE	NOISE LEVEL CRITERIA
Negligible (NOAEL)	In urban areas noise levels exceed 55 dB
Minor (LOAEL)	In urban areas noise levels exceed 65 dB
Moderate (SOAEL)	In urban areas noise levels exceed 75 dB
Major (UOAEL)	In urban areas noise levels exceed 85 dB

Table 9.8
Methodology for Assessing the Magnitude of Impact (Operation - Traffic)

MAGNITUDE	NOISE LEVEL CRITERIA
Negligible (NOAEL)	L _{A10,18hour} change in noise is: < 1 dB (Short Term)
	L _{A10,18hour} change in noise is: < 3 dB (Long-Term)
Minor (LOAEL)	L _{A10,18hour} change in noise is: < 3 dB (Short Term)
	L _{A10,18hour} change in noise is: < 5 dB (Long-Term)
Moderate (SOAEL)	L _{A10,18hour} change in noise is: < 5 dB (Short Term)
	L _{A10,18hour} change in noise is: < 10 dB (Long-Term)
Major (UOAEL)	L _{A10,18hour} change in noise is: > 5 dB (Short Term)
	L _{A10,18hour} change in noise is: > 10 dB (Long-Term)

Table 9.9
Methodology for Assessing the Magnitude of Impact (Operation – Stadium; Change in Noise Level)

MAGNITUDE	NOISE LEVEL CRITERIA
Negligible (NOAEL)	Up to 3.0 dB Change or a Reduction in Noise Levels
Minor (LOAEL)	Up to 4.9 dB Increase in Noise Levels at a receptor of some sensitivity
Moderate (SOAEL)	Up to 4.9 dB Increase in Noise Levels at a receptor of high sensitivity
Major (UOAEL)	Greater than 5.0 dB Increase in Noise Levels

Table 9.10
Methodology for Assessing the Magnitude of Impact (Operation – Stadium; Noise Intrusion)

MAGNITUDE	NOISE LEVEL CRITERIA
Negligible (NOAEL)	Noise levels less than:
	Bedrooms (night-time) – 30 dB L _{Aeq,8hours} / 45 dB L _{Amax}
	Living Rooms (daytime) – 35 dB L _{Aeq,16hours}
Minor	Noise levels exceed:

MAGNITUDE	NOISE LEVEL CRITERIA
(LOAEL)	Bedrooms (night-time) – 30 dB L _{Aeq,8hours} / 45 dB L _{Amax}
	Living Rooms (daytime) – 35 dB L _{Aeq,16hours}
Moderate (SOAEL)	Noise levels exceed:
(SOAEL)	Bedrooms (night-time)– 35 L _{Aeq,8hours} / 45 dB L _{Amax}
	Living Rooms (daytime)– 45 L _{Aeq,16hours}
Major (UOAEL)	Noise levels exceed:
	Bedrooms (night-time) – 51 L _{Aeq,8hours} / 67 dB L _{Amax}
	Living Rooms (daytime) – 57 dB L _{Aeq,16hours}

Table 9.11
Methodology for Assessing the Magnitude of Impact (Operation – Stadium; Concert Noise)

MAGNITUDE	NOISE LEVEL CRITERIA
Negligible (NOAEL)	MNL of less than 15 dB above background noise levels over a 15 minute period (4 – 12 events per year)
Minor (LOAEL)	MNL of 15 dB above background noise levels over a 15 minute period (4 – 12 events per year)
Moderate (SOAEL)	MNL in excess of 65 dB over a 15 minute period (4 – 12 events per year)
Major (UOAEL)	MNL in excess of 75 dB over a 15 minute period (4 – 12 events per year)

The assessment of significance within this chapter is determined by combining the magnitude of impact with the sensitivity of the receptor.

9.2.10 Assessment of Significance

The assessment of significance within this chapter is determined by combining the magnitude of impact with the sensitivity of the receptor. Table 9.12 shows how the interaction of magnitude and sensitivity can be combined to determine the significance of an environmental effect.

If a significance of effect is negative then the resulting effect is described as being adverse, if a significance of effect is positive the resulting effect is classed as being beneficial.

Table 9.12
Significance of Effects Matrix

MAGNITUDE OF EFFECT	SENSITIVITY OF RECEPTOR			
	High	Medium	Low	Negligible
Major	Major	Major-Moderate	Moderate	Minor

MAGNITUDE OF EFFECT	SENSITIVITY OF RECEPTOR			
	High	Medium	Low	Negligible
Moderate	Major-Moderate	Moderate	Minor	Negligible
Minor	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Negligible	Negligible	Negligible

For the purposed of this EIA, the threshold between significant and not significant in EIA terms is defined as follows:

- A construction phase effect identified as being of major-moderate significance or greater is considered to be significant. This equates to noise levels at identified sensitive receptors of greater than 75dB(A) as a result of construction work; and
- An operational effect associated with the traffic noise assessment identified in the long-term or short-term as being of major-moderate significance or greater is considered significant. This equates to a change of noise levels of ≥3dB in the short-term or ≥5dB in the long term as a result of the proposed development.

9.2.11 Relevant Associated Development

An external waiting (corral) area is proposed on land owned by Merseytravel adjoining Sandhills rail station to manage pedestrian access to the station (north and south bound rail services) in the post-match period. However, based on the distance of Sandhills Station to the BMD site and nearby noise sensitive receptors, it is not expected for there to be any additional effects as a result of this scheme. Given the small scale of additional works, the construction impacts associated with this associated development would not be materially worse than those of the proposed development.

9.2.12 Assumptions/Limitations

In undertaking the noise and vibration assessment of the application site and wider surrounding area, there are a number of limitations and constraints affecting the outputs from this work. These include:

- Construction noise levels are based on typical fixed and mobile plant noise levels presented within BS5228-1:2009+A1:2014 and as detailed within Chapter 4 of this ES. The assessment is considered worst-case with construction operations located at the shortest distance to the noise sensitive receptor and operating simultaneously. In this respect, a medium to high degree of confidence is assigned to the predicted significance of the construction effects.
- The surrounding Liverpool Waters scheme has been included as a sensitive receptor within the construction assessment, even though the exact details regarding the timing and construction of this scheme are unknown at this stage (aside from that stated in the original Liverpool Waters planning application in relation to phasing). As such, for the purposes of the assessment, and to ensure a robust assessment, the

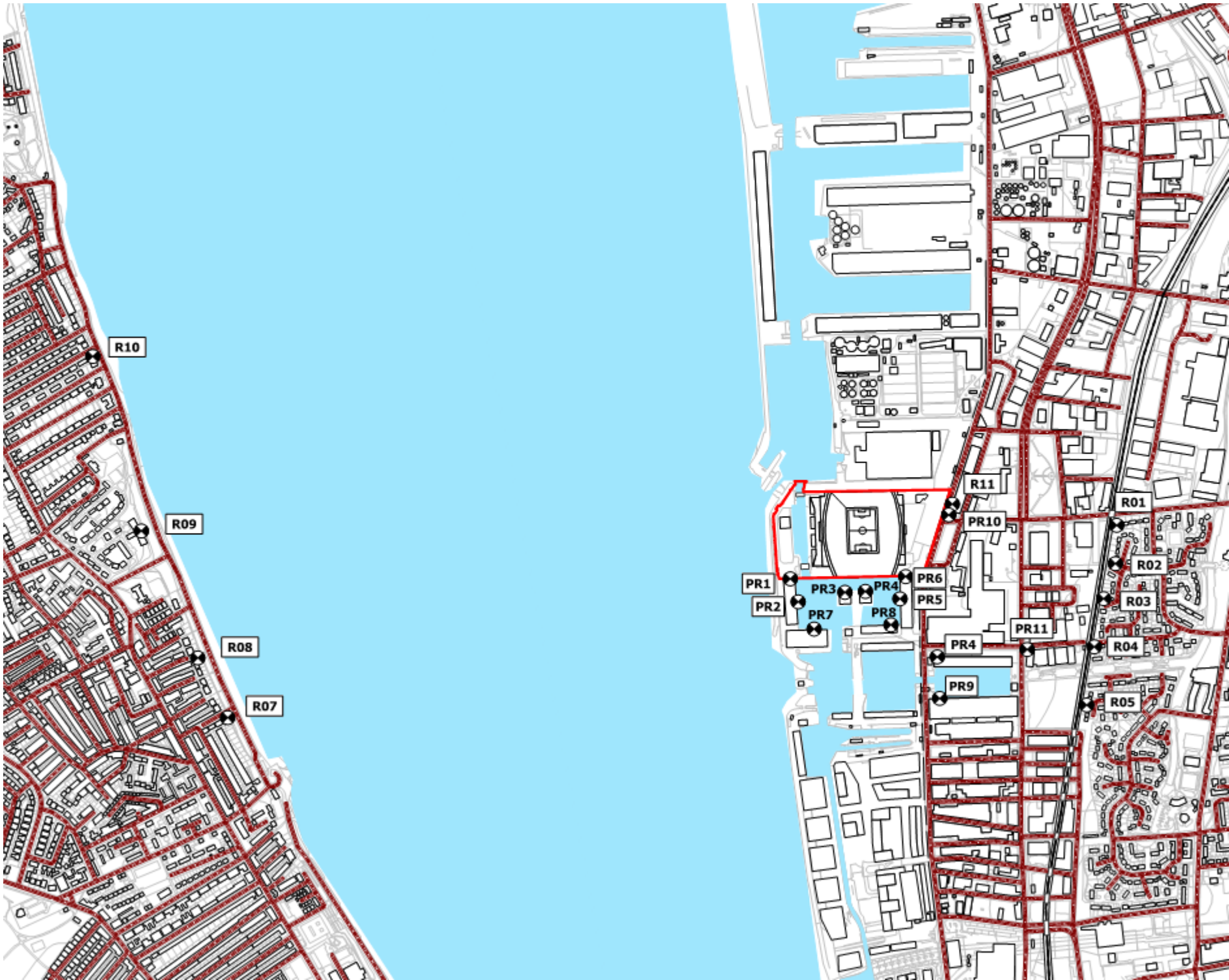
9 NOISE & VIBRATION

Liverpool Waters scheme is considered to have been built-out to its maximum extent to the south of the application site.

- The results of the traffic noise assessment are based on traffic flows provided by Mott MacDonald.
- There is currently no fixed internal layout associated with the Liverpool Waters development (LPA ref. 19NM/1121 – latest variation of the original outline ref. 10O/2424). The approved parameters plan has been used to identify the receptors at the outline building facades. It should however be noted that as the approved scheme parameter blocks for the east and west quay of Nelson Dock straddle the application site boundary with Bramley-Moore Dock then a robust position has been adopted whereby the scheme block is reduced back to the application redline boundary between Nelson and Bramley-Moore Dock.

NOISE & VIBRATION

Figure 9.1
Receptor Locations



NOISE & VIBRATION

9.3 BASELINE CONDITIONS

9.3.1 Existing Baseline – Construction and Operational Noise

KEY RECEPTORS	DESCRIPTION	SENSITIVITY	TYPICAL AMBIENT L _{AEQ} NOISE LEVELS	FURTHER INFORMATION
R01/TR02	76 Boundary Street – Two-storey residential property located adjacent to the railway line	High	61.5	Full details of the noise baseline monitoring and existing baseline levels are detailed within Section 5.0 of Appendix 9.1
R02/TR03	2 St. Albans Court – Two-storey residential property located adjacent to the railway line	High	61.5	
R03/TR04	30 Snowdon Lane – Two-storey residential property located adjacent to the railway line	High	48.1	
R04/TR05	31 Houlgrave Road – Two-storey residential property located adjacent to the railway line	High	48.1	
R05/TR06	52 Colin Drive – Two-storey residential property located adjacent to the railway line	High	48.1	
R06/TR09	Titanic Hotel, Stanley Dock, Regent Road – Multi-storey hotel which sits on Stanley Dock, the closest existing sensitive receptor to the proposed development	Medium	69.0	
R07	27 Egremont Promenade – Three-storey residential property located along the southwest margin of the River Mersey	High	51.2	
R08	40 Egremont Promenade – Three-storey residential property located along the southwest margin of the River Mersey	High	51.2	
R09	Mariners’ Park Care Home, Royden Avenue – Two-storey care home facility located along the southwest margin of the River Mersey	High	51.2	
R10	62 Radnor Drive – Two-storey residential property located along the southwest margin of the River Mersey	High	46.8	
R11	62 Regent Road – Three storey residential property located adjacent to the site boundary	High	67.2	
PR1-PR8	Liverpool Waters Scheme – comprising office space, residential space, hotel, conference facilities, retailing, financial and professional services, cafes, restaurants, drinking establishments, non-residential institutions, assembly and leisure, public open spaces. Comprises buildings between 8-174m high.	High	47.4	
PR9	Proposed Stanley Dock Apartments – Conversion to create 538 apartments, penthouse apartments, public exhibition space, offices and basement car parking.	High	69.0	
PR10	Proposed Hotel, Regent Road / Blackstone Street– Demolition and re-development of site to provide 9 storey hotel with multi-storey car park, associated access and servicing.	Medium	67.2	
PR11	Proposed Lightbody Street Development – Erection of 210 residential units at junction of Lightbody Street and Great Howard Street	High	55.7	
TR01	92 Boundary Street – Two-storey residential property located east of the railway line	High	61.5	
TR07	5 O’Reilly Court – Two-storey residential property located adjacent to the railway line	High	48.1	
TR08	10 Jack McBain Court – Two-storey residential property located adjacent to the railway line	High	48.1	

9.3.2 Future Baseline

It is considered that the future baseline at identified receptors will be broadly similar to the existing baseline given their locality to the local road network. An assessment has been undertaken for the change in road traffic noise during the 2023 opening year and the 2028 future assessment year at identified sensitive receptors identified in Table 9.4. Further to this, the Liverpool Waters development is the closest proposed site which will change the future baseline at the closest existing sensitive receptors assessed within this chapter. Based upon the Noise and Vibration ES chapter for the approved Liverpool Waters Development (LPA ref. 10O/2424 – latest variation is 19NM/1121), the residual impact of noise and vibration during both the construction and operational phase on surrounding sensitive receptors is determined to be not significant. Therefore, the future baseline is unlikely to change as a result of the Liverpool Waters development.

9.4 POTENTIAL SIGNIFICANT IMPACTS

PHASE	DESCRIPTION	ADVERSE/BENEFICIAL
Construction	Potential noise impacts associated with dock infill, demolition and other construction works on sensitive receptors surrounding the application site during the construction phase	Adverse
Operation – Traffic (Short-Term)	Potential noise impacts associated with increased vehicle movements – this is inclusive of non-matchday traffic which is inclusive of a conference taking place on site, as well as surrounding cumulative developments to represent a worst-case scenario	Adverse
Operation – Traffic (Long-term)	Potential effects from noise associated with increased vehicle movements – this is inclusive of event traffic as well as surrounding cumulative developments to represent a worst-case scenario	Adverse

NOISE & VIBRATION

PHASE	DESCRIPTION	ADVERSE/BENEFICIAL
Operation – Stadium (Scenario 1)	Potential effects from noise associated with matchday operations prior to kick-off: crowd footfall in and around the stadium, noise associated with the proposed fan zone in the east plaza facing Regent Road, noise associated with food and drink vans, parking movements within the west stand (MSCP integral to the west stand – located above pedestrian circulation space at ground floor level) and adjacent to the sea wall (surface car park with PV canopy above) and use of the PA/VA system	Adverse
Operation – Stadium (Scenario 2)	Potential effects from noise associated with matchday operations during match: crowd noise including contributions from fans cheering and chanting, a goal being scored and celebratory music and full use of the PA/VA system in and around the stadium.	Adverse
Operation – Stadium (Concert)	Potential effects from noise associated with non-football events, such as music noise levels from concerts at the proposed stadium	Adverse

9.5 ASSESSMENT PRE-MITIGATION (INCLUDING DESIGN INTERVENTIONS)

9.5.1 Proposed Development Scenario - Construction

PHASE	RECEPTOR(S) AFFECTED	NOISE LEVEL DB(A)	IMPACT	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
Construction	R01	33.0	The noise level at this receptor does not exceed the minor impact magnitude threshold of 65 dB(A) defined in Table 9.7.	Negligible	Minor Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	R02	36.7	The noise level at this receptor does not exceed the minor impact magnitude threshold of 65 dB(A) defined in Table 9.7.	Negligible	Minor Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	R03	32.5	The noise level at this receptor does not exceed the minor impact magnitude threshold of 65 dB(A) defined in Table 9.7.	Negligible	Minor Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	R04	31.4	The noise level at this receptor does not exceed the minor impact magnitude threshold of 65 dB(A) defined in Table 9.7.	Negligible	Minor Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	R05	32.7	The noise level at this receptor does not exceed the minor impact magnitude threshold of 65 dB(A) defined in Table 9.7.	Negligible	Minor Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	R06	44.8	The noise level at this receptor does not exceed the minor impact magnitude threshold of 65 dB(A) defined in Table 9.7.	Negligible	Negligible Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	R07	41.7	The noise level at this receptor does not exceed the minor impact magnitude threshold of 65 dB(A) defined in Table 9.7.	Negligible	Minor Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	R08	41.5	The noise level at this receptor does not exceed the minor impact magnitude threshold of 65 dB(A) defined in Table 9.7.	Negligible	Minor Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	R09	40.6	The noise level at this receptor does not exceed the minor impact magnitude threshold of 65 dB(A) defined in Table 9.7.	Negligible	Minor Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	R10	38.9	The noise level at this receptor does not exceed the minor impact magnitude threshold of 65 dB(A) defined in Table 9.7.	Negligible	Minor Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	R11	63.5	The noise level at this receptor does not exceed the minor impact magnitude threshold of 65 dB(A) defined in Table 9.7.	Negligible	Minor Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	PR1	71.9	The noise level at this receptor does not exceed the moderate impact magnitude threshold of 75 dB(A) defined in Table 9.7.	Minor	Moderate Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	PR2	62.6	The noise level at this receptor does not exceed the minor impact magnitude threshold of 65 dB(A) defined in Table 9.7.	Negligible	Minor Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	PR3	63.7	The noise level at this receptor does not exceed the minor impact magnitude threshold of 65 dB(A) defined in Table 9.7.	Negligible	Minor Adverse	Yes	Section 6.1 of Appendix 9.1

NOISE & VIBRATION

PHASE	RECEPTOR(S) AFFECTED	NOISE LEVEL DB(A)	IMPACT	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
Construction	PR4	63.8	The noise level at this receptor does not exceed the minor impact magnitude threshold of 65 dB(A) defined in Table 9.7.	Negligible	Minor Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	PR5	61.7	The noise level at this receptor does not exceed the minor impact magnitude threshold of 65 dB(A) defined in Table 9.7.	Negligible	Minor Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	PR6	70.7	The noise level at this receptor does not exceed the moderate impact magnitude threshold of 75 dB(A) defined in Table 9.7.	Minor	Moderate Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	PR7	62.2	The noise level at this receptor does not exceed the minor impact magnitude threshold of 65 dB(A) defined in Table 9.7.	Negligible	Minor Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	PR8	59.9	The noise level at this receptor does not exceed the minor impact magnitude threshold of 65 dB(A) defined in Table 9.7.	Negligible	Minor Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	PR9	43.0	The noise level at this receptor does not exceed the minor impact magnitude threshold of 65 dB(A) defined in Table 9.7.	Negligible	Minor Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	PR10	66.5	The noise level at this receptor does not exceed the moderate impact magnitude threshold of 75 dB(A) defined in Table 9.7.	Minor	Minor Adverse	Yes	Section 6.1 of Appendix 9.1
Construction	PR11	49.5	The noise level at this receptor does not exceed the minor impact magnitude threshold of 65 dB(A) defined in Table 9.7.	Negligible	Minor Adverse	Yes	Section 6.1 of Appendix 9.1

9.5.2 Proposed Development Scenario – Operation (Traffic Short-term 2023) Including Liverpool Waters + Cumulative Schemes

PHASE	RECEPTOR AFFECTED	TRAFFIC NOISE WITHOUT DEVELOPMENT 2023 (L _{A10,18HR} DB(A))	TRAFFIC NOISE WITH DEVELOPMENT 2023 (L _{A10,18HR} DB(A))	DIFFERENCE	IMPACT	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
Operation – Traffic Non-Matchday with a Conference Event	TR01	61.5	61.9	0.4	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 1 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation – Traffic Non-Matchday with a Conference Event	TR02	50.4	50.8	0.4	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 1 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation – Traffic Non-Matchday with a Conference Event	TR03	42.4	43.0	0.6	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 1 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation – Traffic Non-Matchday with a Conference Event	TR04	40.0	40.7	0.7	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 1 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation – Traffic Non-Matchday with a Conference Event	TR05	40.7	41.3	0.6	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 1 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation – Traffic Non-Matchday with a Conference Event	TR06	42.4	43.0	0.6	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 1 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation – Traffic Non-Matchday with a Conference Event	TR07	43.4	44.0	0.6	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 1 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation – Traffic Non-Matchday with a Conference Event	TR08	43.6	44.2	0.6	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 1 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1

NOISE & VIBRATION

PHASE	RECEPTOR AFFECTED	TRAFFIC NOISE WITHOUT DEVELOPMENT 2023 (L _{A10,18HR} DB(A))	TRAFFIC NOISE WITH DEVELOPMENT 2023 (L _{A10,18HR} DB(A))	DIFFERENCE	IMPACT	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
Operation – Traffic Non-Matchday with a Conference Event	TR09	58.0	59.9	1.9	The noise level difference at this receptor does not exceed the minor impact magnitude change of 3 dB(A) defined in Table 9.8.	Minor	Moderate Adverse	No	Section 6.5 of Appendix 9.1
Operation – Traffic Non-Matchday with a Conference Event	TR10	66.8	68.4	1.6	The noise level difference at this receptor does not exceed the minor impact magnitude change of 3 dB(A) defined in Table 9.8.	Minor	Moderate Adverse	No	Section 6.5 of Appendix 9.1

9.5.3 Proposed Development Scenario – Operation (Traffic Short-term 2028) Including Liverpool Waters + Cumulative Schemes

PHASE	RECEPTOR AFFECTED	TRAFFIC NOISE WITHOUT DEVELOPMENT 2028 (L _{A10,18HR} DB(A))	TRAFFIC NOISE WITH DEVELOPMENT 2028 (L _{A10,18HR} DB(A))	DIFFERENCE	IMPACT	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
Operation – Traffic Non-Matchday with a Conference Event	TR01	61.7	62.1	0.4	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 1 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation – Traffic Non-Matchday with a Conference Event	TR02	50.7	51.1	0.4	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 1 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation – Traffic Non-Matchday with a Conference Event	TR03	42.6	43.3	0.7	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 1 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation – Traffic Non-Matchday with a Conference Event	TR04	40.3	41.0	0.7	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 1 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation – Traffic Non-Matchday with a Conference Event	TR05	40.9	41.6	0.7	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 1 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation – Traffic Non-Matchday with a Conference Event	TR06	42.7	43.4	0.7	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 1 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation – Traffic Non-Matchday with a Conference Event	TR07	43.7	44.4	0.7	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 1 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation – Traffic Non-Matchday with a Conference Event	TR08	43.9	44.5	0.6	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 1 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation – Traffic Non-Matchday with a Conference Event	TR09	58.2	60.4	2.2	The noise level difference at this receptor does not exceed the minor impact magnitude change of 3 dB(A) defined in Table 9.8.	Minor	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation – Traffic Non-Matchday with a Conference Event	TR10	67.1	69.1	2.0	The noise level difference at this receptor does not exceed the minor impact magnitude change of 3 dB(A) defined in Table 9.8.	Minor	Moderate Adverse	No	Section 6.5 of Appendix 9.1

9.5.4 Proposed Development Scenario – Operation (Traffic Long-term 2023/2028) Including Liverpool Waters + Cumulative Schemes

PHASE	RECEPTOR AFFECTED	TRAFFIC NOISE WITHOUT DEVELOPMENT 2023 (L _{A10,18HR} DB(A))	TRAFFIC NOISE WITH DEVELOPMENT 2028 (L _{A10,18HR} DB(A))	DIFFERENCE (L _{A10,18HR} DB(A))	IMPACT	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
Operation – Traffic Non-Matchday with a Conference Event	TR01	61.5	62.1	0.6	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1

NOISE & VIBRATION

PHASE	RECEPTOR AFFECTED	TRAFFIC NOISE WITHOUT DEVELOPMENT 2023 (L _{A10,18HR} DB(A))	TRAFFIC NOISE WITH DEVELOPMENT 2028 (L _{A10,18HR} DB(A))	DIFFERENCE (L _{A10,18HR} DB(A))	IMPACT	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
Operation — Traffic Non-Matchday with a Conference Event	TR02	50.4	51.1	0.7	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation — Traffic Non-Matchday with a Conference Event	TR03	42.4	43.3	0.9	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation — Traffic Non-Matchday with a Conference Event	TR04	40.0	41.0	1.0	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation — Traffic Non-Matchday with a Conference Event	TR05	40.7	41.6	0.9	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation — Traffic Non-Matchday with a Conference Event	TR06	42.4	43.4	1.0	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation — Traffic Non-Matchday with a Conference Event	TR07	43.4	44.4	1.0	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation — Traffic Non-Matchday with a Conference Event	TR08	43.6	44.5	0.9	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1
Operation — Traffic Non-Matchday with a Conference Event	TR09	58.0	60.4	2.4	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.8.	Negligible	Negligible Adverse	No	Section 6.5 of Appendix 9.1
Operation — Traffic Non-Matchday with a Conference Event	TR10	66.8	69.1	2.3	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.8.	Negligible	Minor Adverse	No	Section 6.5 of Appendix 9.1

9.5.5 Proposed Development Scenario – Operation (Stadium Noise Scenario 1 – Change in Noise Level)

PHASE	RECEPTOR(S) AFFECTED	EXISTING L _{AEQ} 16 HOUR (MONITORED)	PROPOSED L _{AEQ} 16 HOUR (MODELLED)	COMBINED L _{AEQ}	CONTRIBUTION FROM PROPOSED SCHEME	IMPACT	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
Operation — Stadium	R01	61.5	42.3	61.6	0.1	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium	R02	61.5	30.4	61.5	0.0	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium	R03	48.1	26.5	48.1	0.0	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium	R04	48.1	23.6	48.1	0.0	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium	R05	48.1	23.9	48.1	0.0	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium	R06	69.0	43.8	69.0	0.0	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Negligible Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium	R07	51.2	29.0	51.2	0.0	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1

NOISE & VIBRATION

PHASE	RECEPTOR(S) AFFECTED	EXISTING L _{AEQ} 16 HOUR (MONITORED)	PROPOSED L _{AEQ} 16 HOUR (MODELLED)	COMBINED L _{AEQ}	CONTRIBUTION FROM PROPOSED SCHEME	IMPACT	MAGNITUDE PRE- MITIGATION	SIGNIFICANCE PRE- MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
Operation – Stadium	R08	51.2	28.9	51.2	0.0	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R09	51.2	28.8	51.2	0.0	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R10	46.8	27.9	46.9	0.1	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R11	67.2	56.8	67.6	0.4	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1

9.5.6 Proposed Development Scenario – Operation (Stadium Noise Scenario 2 – Change in Noise Level)

PHASE	RECEPTOR(S) AFFECTED	EXISTING L _{AEQ} 16 HOUR (MONITORED)	PROPOSED L _{AEQ} 16 HOUR (MODELLED)	COMBINED L _{AEQ}	CONTRIBUTION FROM PROPOSED SCHEME	IMPACT	MAGNITUDE PRE- MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
Operation – Stadium	R01	61.5	41.9	61.5	0.0	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R02	61.5	44.4	61.6	0.1	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R03	48.1	41.4	48.9	0.8	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R04	48.1	40.8	48.8	0.7	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R05	48.1	42.0	49.1	1.0	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R06	69.0	50.8	69.1	0.1	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Negligible Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R07	51.2	42.9	51.8	0.6	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R08	51.2	42.9	51.8	0.6	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R09	51.2	42.3	51.7	0.5	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R10	46.8	41.2	47.9	1.1	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R11	67.2	58.9	67.8	0.6	The noise level difference at this receptor does not exceed the negligible impact magnitude change of 3 dB(A) defined in Table 9.9.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1

NOISE & VIBRATION

9.5.7 Proposed Development Scenario – Operation (Stadium Noise Scenario 1 – Noise Intrusion)

PHASE	RECEPTOR(S) AFFECTED	EXTERNAL L _{AEQ} NOISE LEVEL AT 1M FROM FACADE	INTERNAL L _{AEQ} WITH WINDOWS OPEN	INTERNAL L _{AEQ} WITH WINDOWS CLOSED	IMPACT	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
Operation – Stadium	R01	42.3	27.3	12.3	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R02	30.4	15.4	0.4	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R03	26.5	11.5	0.0	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R04	23.6	8.6	0.0	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R05	23.9	8.9	0.0	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R06	43.8	28.8	13.8	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Negligible Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R07	29.0	14.0	0.0	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R08	28.9	13.9	0.0	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R09	28.8	13.8	0.0	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R10	27.9	12.9	0.0	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R11	56.8	41.8	26.8	The noise level at this receptor does not exceed the moderate impact magnitude threshold of 45 dB(A) during the daytime with windows open as defined in Table 9.10.	Minor	Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR1	57.9	42.9	27.9	The noise level at this receptor does not exceed the moderate impact magnitude threshold of 45 dB(A) during the daytime with windows open as defined in Table 9.10.	Minor	Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR2	49.8	34.8	19.8	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR3	50.3	35.3	20.3	The noise level at this receptor does not exceed the moderate impact magnitude threshold of 45 dB(A) during the daytime with windows open as defined in Table 9.10.	Minor	Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR4	49.8	34.8	19.8	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR5	45.9	30.9	15.9	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR6	58.5	43.5	28.5	The noise level at this receptor does not exceed the moderate impact magnitude threshold of 45 dB(A) during the daytime with windows open as defined in Table 9.10.	Minor	Moderate Adverse	No	Section 6.4 of Appendix 9.1

NOISE & VIBRATION

PHASE	RECEPTOR(S) AFFECTED	EXTERNAL L _{AEQ} NOISE LEVEL AT 1M FROM FACADE	INTERNAL L _{AEQ} WITH WINDOWS OPEN	INTERNAL L _{AEQ} WITH WINDOWS CLOSED	IMPACT	MAGNITUDE PRE- MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
Operation – Stadium	PR7	45.5	30.5	15.5	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR8	41.3	26.3	11.3	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR9	43.2	33.2	13.2	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR10	57.7	47.7	27.7	The noise level at this receptor does not exceed the major impact magnitude threshold of 57 dB(A) during the daytime with windows open as defined in Table 9.10.	Moderate	Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR11	35.2	25.2	5.2	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1

9.5.8 Proposed Development Scenario – Operation (Stadium Noise Scenario 2 – Noise Intrusion)

PHASE	RECEPTOR(S) AFFECTED	EXTERNAL L _{AEQ} NOISE LEVEL AT 1M FROM FACADE	INTERNAL L _{AEQ} WITH WINDOWS OPEN	INTERNAL L _{AEQ} WITH WINDOWS CLOSED	IMPACT	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
Operation – Stadium	R01	41.9	26.9	11.9	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R02	44.4	29.4	14.4	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R03	41.4	26.4	11.4	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R04	40.8	25.8	10.8	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R05	42.0	27.0	12.0	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R06	50.8	35.8	20.8	The noise level at this receptor does not exceed the moderate impact magnitude threshold of 45 dB(A) during the daytime with windows open as defined in Table 9.10.	Minor	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R07	42.9	27.9	12.9	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R08	42.9	27.9	12.9	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R09	42.3	27.3	12.3	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R10	41.2	26.2	11.2	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	R11	58.9	43.9	28.9	The noise level at this receptor does not exceed the moderate impact magnitude threshold of 45 dB(A) during the daytime with windows open as defined in Table 9.10.	Minor	Moderate Adverse	No	Section 6.4 of Appendix 9.1

NOISE & VIBRATION

PHASE	RECEPTOR(S) AFFECTED	EXTERNAL L _{AEQ} NOISE LEVEL AT 1M FROM FACADE	INTERNAL L _{AEQ} WITH WINDOWS OPEN	INTERNAL L _{AEQ} WITH WINDOWS CLOSED	IMPACT	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
Operation – Stadium	PR1	61.4	46.4	31.4	The noise level at this receptor does not exceed the major impact magnitude threshold of 57 dB(A) during the daytime with windows open as defined in Table 9.10.	Moderate	Major-Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR2	59.3	44.3	29.3	The noise level at this receptor does not exceed the moderate impact magnitude threshold of 45 dB(A) during the daytime with windows open as defined in Table 9.10.	Minor	Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR3	60.3	45.3	30.3	The noise level at this receptor does not exceed the major impact magnitude threshold of 57 dB(A) during the daytime with windows open as defined in Table 9.10.	Moderate	Major-Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR4	60.9	45.9	30.9	The noise level at this receptor does not exceed the major impact magnitude threshold of 57 dB(A) during the daytime with windows open as defined in Table 9.10.	Moderate	Major-Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR5	60.6	45.6	30.6	The noise level at this receptor does not exceed the major impact magnitude threshold of 57 dB(A) during the daytime with windows open as defined in Table 9.10.	Moderate	Major-Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR6	63.6	48.6	33.6	The noise level at this receptor does not exceed the major impact magnitude threshold of 57 dB(A) during the daytime with windows open as defined in Table 9.10.	Moderate	Major-Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR7	57.3	42.3	27.3	The noise level at this receptor does not exceed the moderate impact magnitude threshold of 45 dB(A) during the daytime with windows open as defined in Table 9.10.	Minor	Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR8	59.1	44.1	29.1	The noise level at this receptor does not exceed the moderate impact magnitude threshold of 45 dB(A) during the daytime with windows open as defined in Table 9.10.	Minor	Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR9	49.7	39.7	19.7	The noise level at this receptor does not exceed the negligible impact magnitude threshold of 35 dB(A) during the daytime with windows open as defined in Table 9.10.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR10	59.5	49.5	29.5	The noise level at this receptor does not exceed the major impact magnitude threshold of 57 dB(A) during the daytime with windows open as defined in Table 9.10.	Moderate	Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium	PR11	52.3	42.3	22.3	The noise level at this receptor does not exceed the moderate impact magnitude threshold of 45 dB(A) during the daytime with windows open as defined in Table 9.10.	Minor	Moderate Adverse	No	Section 6.4 of Appendix 9.1

9.5.9 Proposed Development Scenario – Operation (Stadium – Concert)

PHASE	RECEPTOR(S) AFFECTED	MEASURED BACKGROUND LA90		MUSIC NOISE LEVEL		DIFFERENCE		IMPACT	MAGNITUDE PRE-MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
		DAYTIME 07:00-23:00	NIGHT-TIME 23:00-07:00	DAYTIME 07:00-23:00	NIGHT-TIME 23:00-07:00	DAYTIME 07:00-23:00	NIGHT-TIME 23:00-07:00					
Operation – Stadium Concert	R01	48	43	50	50	2	7	The noise level at this receptor does not exceed the minor impact magnitude difference of +15 dB(A) above background noise levels as defined in Table 9.11.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium Concert	R02	48	43	52	52	4	9	The noise level at this receptor does not exceed the minor impact magnitude difference of +15 dB(A) above background noise levels as defined in Table 9.11.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium Concert	R03	42	38	50	50	8	12	The noise level at this receptor does not exceed the minor impact magnitude difference of +15 dB(A) above background noise levels as defined in Table 9.11.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation – Stadium Concert	R04	42	38	49	49	7	11	The noise level at this receptor does not exceed the minor impact magnitude difference of +15 dB(A) above background noise levels as defined in Table 9.11.	Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1

NOISE & VIBRATION

PHASE	RECEPTOR(S) AFFECTED	MEASURED BACKGROUND LA90		MUSIC NOISE LEVEL		DIFFERENCE		IMPACT		MAGNITUDE PRE- MITIGATION	SIGNIFICANCE PRE-MITIGATION	MITIGATION PROPOSED?	FURTHER INFORMATION
		DAYTIME 07:00- 23:00	NIGHT- TIME 23:00- 07:00	DAYTIME 07:00- 23:00	NIGHT- TIME 23:00- 07:00	DAYTIME 07:00- 23:00	NIGHT- TIME 23:00- 07:00						
Operation — Stadium Concert	R05	42	38	50	50	8	12	The noise level at this receptor does not exceed the minor impact magnitude difference of + 15 dB(A) above background noise levels as defined in Table 9.11.		Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium Concert	R06	53	44	58	58	5	14	The noise level at this receptor does not exceed the minor impact magnitude difference of + 15 dB(A) above background noise levels as defined in Table 9.11.		Negligible	Negligible Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium Concert	R07	44	44	53	53	9	9	The noise level at this receptor does not exceed the minor impact magnitude difference of + 15 dB(A) above background noise levels as defined in Table 9.11.		Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium Concert	R08	44	44	53	53	9	9	The noise level at this receptor does not exceed the minor impact magnitude difference of + 15 dB(A) above background noise levels as defined in Table 9.11.		Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium Concert	R09	44	44	52	52	8	8	The noise level at this receptor does not exceed the minor impact magnitude difference of + 15 dB(A) above background noise levels as defined in Table 9.11.		Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium Concert	R10	44	44	51	51	7	7	The noise level at this receptor does not exceed the minor impact magnitude difference of + 15 dB(A) above background noise levels as defined in Table 9.11.		Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium Concert	R11	51	46	58	58	7	12	The noise level at this receptor does not exceed the minor impact magnitude difference of + 15 dB(A) above background noise levels as defined in Table 9.11.		Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium Concert	PR1	50	41	67	67	17	26	The noise level at this receptor does exceed the minor impact magnitude difference of + 15 dB(A) above background noise levels during daytime and night-time hours as defined in Table 9.11.		Moderate	Major-Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium Concert	PR2	50	41	66	66	16	25	The noise level at this receptor does exceed the minor impact magnitude difference of + 15 dB(A) above background noise levels during daytime and night-time hours as defined in Table 9.11.		Moderate	Major-Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium Concert	PR3	50	41	63	63	13	22	The noise level at this receptor does exceed the minor impact magnitude difference of + 15 dB(A) above background noise levels during night-time hours as defined in Table 9.11.		Moderate	Major-Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium Concert	PR4	50	43	63	63	13	20	The noise level at this receptor does exceed the minor impact magnitude difference of + 15 dB(A) above background noise levels during night-time hours as defined in Table 9.11.		Moderate	Major-Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium Concert	PR5	50	43	65	65	15	22	The noise level at this receptor does exceed the minor impact magnitude difference of + 15 dB(A) above background noise levels during night-time hours as defined in Table 9.11.		Moderate	Major-Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium Concert	PR6	50	43	66	66	16	23	The noise level at this receptor does exceed the minor impact magnitude difference of + 15 dB(A) above background noise levels during daytime and night-time hours as defined in Table 9.11.		Moderate	Major-Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium Concert	PR7	50	41	64	64	14	23	The noise level at this receptor does exceed the minor impact magnitude difference of + 15 dB(A) above background noise levels during night-time hours as defined in Table 9.11.		Moderate	Major-Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium Concert	PR8	50	43	66	66	16	23	The noise level at this receptor does exceed the minor impact magnitude difference of + 15 dB(A) above background noise levels during daytime and night-time hours as defined in Table 9.11.		Moderate	Major-Moderate Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium Concert	PR9	53	44	57	57	4	13	The noise level at this receptor does not exceed the minor impact magnitude difference of + 15 dB(A) above background noise levels as defined in Table 9.11.		Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium Concert	PR10	53	44	58	58	7	12	The noise level at this receptor does not exceed the minor impact magnitude difference of + 15 dB(A) above background noise levels as defined in Table 9.11.		Negligible	Negligible Adverse	No	Section 6.4 of Appendix 9.1
Operation — Stadium Concert	PR11	51	48	61	61	10	13	The noise level at this receptor does not exceed the minor impact magnitude difference of + 15 dB(A) above background noise levels as defined in Table 9.11.		Negligible	Minor Adverse	No	Section 6.4 of Appendix 9.1

NOISE & VIBRATION

9.6 MITIGATION & ENHANCEMENT MEASURES

PHASE	POSSIBLE EFFECT BEING MITIGATED	MITIGATION MEASURE	HOW SECURED / TRIGGER	MAGNITUDE POST-MITIGATION	ADVERSE/BENEFICIAL	FURTHER INFORMATION
Construction	Noise associated with dock infill, demolition and other construction works on sensitive receptors surrounding the proposed development site during the construction phase.	Best practice noise mitigation, set out in full in Appendix C of Appendix 9.1, to be incorporated into the CEMP. Construction phase vibration monitoring of Grade II listed Bramley Moore Dock walls will be undertaken; baseline monitoring will be undertaken by the contractor immediately prior to the commencement of works on site to identify appropriate thresholds for vibration monitoring to be adopted during construction works. Where practicable, phasing of any percussive piling activities will be scheduled to avoid migration/mating periods of sensitive ecological species as advised by the project ecologist. 2.4m solid hoarding to be erected around the site boundary.	CEMP, secured by planning condition	Minor	Adverse	Appendix C of Appendix 9.1
Operation – Stadium	Potential noise breakout from Building Services Plant and internally-generated noise sources associated with conference/exhibition spaces.	Noise emission limits in relation to breakout from building services plant, conference and exhibition spaces have been specified at 63.6 dB(A) at 1m or 59.3 dB(A) at 3m during the daytime, and 57.4 dB(A) at 1m or 53.8 dB(A) at 3m during the night-time, to achieve levels at least 10 dB below background noise levels.	Secured by planning condition, built into the scheme upon construction	Minor	Adverse	Section 6.3 of Appendix 9.1

9.7 ASSESSMENT POST-MITIGATION

9.7.1 Proposed Development Scenario

PHASE	RECEPTOR	RESIDUAL IMPACT	RESIDUAL EFFECT					
			SIGNIFICANCE	ADV/BEN	ST/MT/LT	D/IND	P/T	R/IRR
Construction	R01-R11, PR1-PR11	Noise associated with dock infill, demolition and other construction works on sensitive receptors surrounding the proposed development site during the construction phase	Minor	ADV	ST	IND	T	R
Operation – Traffic (Short-term)	TR01-TR10	Noise associated with increased vehicle movements	Minor-Moderate	ADV	ST	D	P	R
Operation –Traffic (Long-term)	TR01-TR10	Noise associated with increased vehicle movements	Minor	ADV	LT	D	P	R
Operation –Stadium Scenario 1 Noise Intrusion	R01-R10, PR2, PR4, PR5, PR7-PR9, PR11	Noise associated with matchday operations prior to kick-off: crowd footfall in and around the stadium, noise associated with the proposed fan zone, noise associated with food and drink vans, parking movements within the west stand and adjacent to the sea wall and use of the PA/VA system	Negligible-Minor	ADV	LT	D	P	R
Operation –Stadium Scenario 1 Noise Intrusion	R11, PR1, PR3, PR6, PR10	Noise associated with matchday operations prior to kick-off: crowd footfall in and around the stadium, noise associated with the proposed fan zone, noise associated with food and drink vans, parking movements within the west stand and adjacent to the sea wall and use of the PA/VA system	Major-Moderate	ADV	LT	D	P	R
Operation –Stadium Scenario 2 Noise Intrusion	R01-R10, PR9	Noise associated with matchday operations during match: crowd noise including contributions from fans cheering and chanting, a goal being scored and celebratory music and full use of the PA/VA system in and around the stadium.	Minor	ADV	LT	D	P	R
Operation –Stadium Scenario 2 Noise Intrusion	R11, PR1-PR8, PR10, PR11	Noise associated with matchday operations during match: crowd noise including contributions from fans cheering and chanting, a goal being scored and celebratory music and full use of the PA/VA system in and around the stadium.	Major-Moderate	ADV	LT	D	P	R
Operation –Stadium Scenario 1 Change in Noise Level	R01-R11	Noise associated with matchday operations prior to kick-off: crowd footfall in and around the stadium, noise associated with the proposed fan zone, noise associated with food and drink vans, parking movements within the west stand and adjacent to the sea wall and use of the PA/VA system	Negligible-Minor	ADV	LT	D	P	R
Operation –Stadium Scenario 2 Change in Noise Level	R01-R11	Noise associated with matchday operations during match: crowd noise including contributions from fans cheering and chanting, a goal being scored and celebratory music and full use of the PA/VA system in and around the stadium.	Negligible-Minor	ADV	LT	D	P	R

NOISE & VIBRATION

PHASE	RECEPTOR	RESIDUAL IMPACT	RESIDUAL EFFECT					
			SIGNIFICANCE	ADV/BEN	ST/MT/LT	D/IND	P/T	R/IRR
Operation –Stadium Concert	R01-R11, PR9-PR11	Noise associated with non-football events, such as music noise levels from concerts at the proposed stadium	Minor	ADV	LT	D	P	R
Operation –Stadium Concert	PR1-PR8	Noise associated with non-football events, such as music noise levels from concerts at the proposed stadium	Major-Moderate	ADV	LT	D	P	R
Key: ADV/BEN = Adverse/Beneficial; ST/MT/LT = Short-term/Medium-term/Long-term; D/IND = Direct/Indirect; P/T = Permanent/Temporary; R/IRR = Reversible/Irreversible								

9.7.2 Proposed Development vs Future Baseline

It is considered that the future baseline at identified receptors will be broadly similar to the existing baseline given the proximity of the receptors to the local road network and major thoroughfares, which will remain largely unchanged. An assessment has been undertaken to quantify the change in road traffic noise during the 2023 opening year and the 2028 future assessment year at identified sensitive receptors identified in Table 9.4. Further to this, the Liverpool Waters development is the closest proposed site which may affect the future baseline conditions at the closest existing sensitive receptors assessed within this chapter. The findings of the Noise and Vibration ES chapter produced in support of the Liverpool Waters Development identify that the residual impact of noise and vibration during both the construction and operational phase on surrounding sensitive receptors is determined to be not significant which is reflected in the findings of this ES. Therefore, it is considered that the future baseline is unlikely to change significantly as a result of the proposed development.

9.8 NOISE AND VIBRATION: INTER-DEVELOPMENT CUMULATIVE SCHEME EFFECTS

The traffic flows used within the operational traffic noise assessment include the contributions from surrounding cumulative schemes within the wider area, and Section 9.5 above outlines the findings of this assessment. As set out in the methodology section of this chapter, no other cumulative effects are considered likely and, as such, they have not been considered further.

9.9 BIBLIOGRAPHY

[1] HMSO, National Planning Policy Framework and Technical Guidance, February 2019

[2] DEFRA. (2010) Noise Policy Statement for England.

[3] National Planning Practice Guidance, March 2014, updated in July 2019

[4] Liverpool City Council. (2002) A Plan for Liverpool: Liverpool Unitary Development Plan. [Online]. <http://liverpool.gov.uk/council/strategies-plans-and-policies/environment-and-planning/plan-making-in-liverpool/current-local-plan-documents/unitary-development-plan/>.

[5] Liverpool City Council, *The Draft Liverpool Local Plan - Submission Version.*, May 2018. [Online]. <http://liverpool.gov.uk/council/strategies-plans-and-policies/environment-and-planning/plan-making-in-liverpool/current-local-plan-documents/local-plan/>

[6] World Health Organisation (WHO), "Guidelines for Community Noise," London, file:///P:/Redirection/Downloads/a68672.pdf 1999.

[7] Design Manual for Roads and Bridges, "LA 111 Noise and Vibration," <http://www.standardsforhighways.co.uk/ha/standards/dmrb/LA111/revision/NoiseandVibration/>.pdf.

[8] British Standards Institute, "BS 8233:2014, Guidance on sound insulation and noise reduction for buildings," 2014

[9] British Standards, "BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound," London, http://bailey.persona-pi.com/Public-Inquiries/Hope%20Valley/E-documentsduringinquiry/NR-INQ/NR_INQ_15/NR.INQ.15_App%20L_BS%204142-2014.pdf 2019.

[10] Institute of Environmental Management and Assessment. (2014) Guidelines for Environmental Noise Impact Assessment.

[11] Code of Practice on Environmental Noise Control at Concerts, 1995, The Noise Council,

[12] British Standard, "BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites - Part 1: Noise," London,.

[13] International Standards Organisation. (1996) ISO 9613-2: 1996 Acoustics - Attenuation of sound during propagation outdoors - Part 2: General Method of Calculation.