19.0 Noise and Vibration

Introduction

19.1 This chapter presents the assessment of likely significant noise and vibration effects resulting from the proposed development.

19.2 The assessment has been undertaken based on appropriate information on the proposed development provided by the applicant and its project team. RPS is a member of the Association of Noise Consultants (ANC), the representative body for acoustics consultancies, having demonstrated the necessary professional and technical competence. The assessment has been undertaken with integrity, objectivity and honesty in accordance with the Code of Conduct of the Institute of Acoustics (IOA) and ethically, professionally and lawfully in accordance with the Code of Ethics of the ANC.

Competency Statement

19.3 The technical content of this assessment has been provided by RPS personnel, all of whom are corporate (MIOA) or non-corporate, associate members (AMIOA) of the IOA, the UK's professional body for those working in acoustics, noise and vibration. This chapter has been peer reviewed within the RPS team to ensure that it is technically robust and meets the requirements of the company's Quality Management System.

19.4 This Chapter has been prepared by Emily Forster BSc (Hons); Diploma in Acoustics and Noise Control; Associate Member of Institute of Acoustics (IOA) and reviewed by Pam Lowery MEng MSc MIOA PIEMA. Emily has over seven years' experience undertaking noise and vibration assessments for a variety of developments within the residential, commercial, industrial, waste, mineral and renewable sections, covering both construction and operation. Emily is involved with all aspects of the assessment including noise surveys, data analysis, modelling and calculations, and reporting. Emily have prepared several noise assessments as technical reports or as Chapters for inclusion with Environmental Impact Assessments. Pam has over 23 years' experience in environmental acoustics. She has provided both technical and policy support in the construction and operational assessments of major road, rail and energy projects for both public and private sector clients in the UK and Ireland. Pam is experienced in data analysis and modelling, as well as preparing submission documents for and participating in the examination of proposed projects. She has also worked with UK government departments in developing noise policies and procedures, including the development of environmental noise assessment procedures.

Legislation, Guidance and Policy

Introduction

19.5 This section details the legislation, guidance and policy applicable to this assessment of noise and vibration from the Proposed development.

Legislative and Policy Framework

Control of Pollution Act (CoPA)

19.6 Part III of the Control of Pollution Act 1974 (CoPA)[1] is specifically concerned with pollution. With regard to noise, it covers: construction sites; noise in the street; noise abatement zones; codes of practice; and best practicable means (BPM).

19.7 Section 60, Part III of the CoPA provides a Local Authority the power to serve a notice imposing requirements for the way in which construction works are to be carried out in their jurisdiction. This notice can specify the following:

- The plant or machinery permitted for use
- The hours during which construction work may be undertaken
- Limits for the emission levels of noise and vibration due to the works at any time or spatial position on site
- Any other change in circumstance.

19.8 The CoPA provides the local authority, in whose area work is going to be undertaken, or is being undertaken, with the power to serve a notice imposing requirements as to the way in which construction works are to be carried out. This notice can specify the plant or machinery that is or is not to be used, the hours during which the construction work can be carried out, the level of noise and vibration that can be emitted from the premises in question or at any specified point on these premises or that can be emitted during specified hours.

19.9 Section 61 of the CoPA refers to prior consent for work on construction sites. It provides a mechanism through which a contractor can apply to the relevant local authority for consent to undertake construction works in advance. If consent is given, and the stated method and hours of work are complied with, then the local authority cannot take action under Section 60.

19.10 Section 71, Part III of the CoPA refers to the preparation and approval of codes of practice for minimising noise. The Control of Noise (Code of Practice for Construction and Open Sites) (Scotland) Order 2002 approved various parts of British Standard (BS) 5228:1997 for the purpose of giving guidance on appropriate methods for minimising noise and vibration from construction and open sites in exercise of the powers conferred on the Secretary of State by sections 71(1)(b), (2) and (3) of the CoPA

19.11 It is acknowledged within Appendix 1 of the 'Assessment of noise: technical advice note' (TAN) that BS 5228:1997 is outdated and the newest versions of BS 5228 are to be used, this being BS 5228-1:2009+A1:2014[2] and BS 5228-2:2009+A1:2014[3] .

[1] The Stationery Office Limited. Control of Pollution Act, Chapter 40, Part III. 1974
[2] British Standards Institution. British Standard 5228-1:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites - Part 1: Noise
[3] British Standards Institution. British Standard 5228-1:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites - Part 2: Vibration

19.12 Section 72 of the CoPA refers to Best Practicable Means (BPM), which is defined as:

"In that expression, 'practicable' means reasonably practicable, having regards among other things to local conditions and circumstances, to the current state of technical knowledge and to the financial implications'. Whilst 'Means' includes 'the design, installation, maintenance and manner and periods of operation of plant and machinery, and the design, construction and maintenance of buildings and acoustic structure."

The Environmental Noise (Scotland) Regulations

19.13 The Environmental Noise (Scotland) Regulations 2006[4] transpose and implement Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise. This directive is also known as The Environmental Noise Directive (END).

19.14 The regulations came into force on 5th October 2006 and apply to environmental noise to which humans are exposed, in particular in built up areas, public parks or other quiet areas in an agglomeration, near schools, hospitals, and other noise sensitive buildings and areas. The regulations apply to noise from road, railway and airport sources, as well as industrial noise.

19.15 The regulations do not apply to noise that is caused by the person exposed to the noise, noise from domestic activities, noise created by neighbours, noise at workplaces, or noise inside means of transport or due to military activities in military areas.

Environmental Protection Act 1990, Part III (EPA)

19.16 The Environmental Protection Act 1990 (EPA)[5] deals with statutory nuisance, including noise.

19.17 Section 79 of the EPA, 'Statutory nuisances and inspections therefor', places a duty on local authorities to regularly inspect their areas to detect whether a statutory nuisance exists. This section also considers and defines the concept of BPM which originates from Section 72, Part III of the CoPA.

19.18 Where the local authority is satisfied that a statutory nuisance does exist, or is likely to occur or recur, it must serve an abatement notice. Section 80, Part III of the EPA, 'Summary proceedings for statutory nuisances', provides local authorities with the power to serve an abatement notice requiring the abatement of the nuisance or prohibiting or restricting its occurrence or recurrence; and/or carrying out such works or other action necessary to abate the nuisance.

19.19 Section 82 of the EPA, 'Summary proceedings by persons aggrieved by statutory nuisances', allows a Magistrates' court to act on a complaint made by any person on the grounds that he is aggrieved by a statutory nuisance, such as noise.

[4] Scottish Statutory Instruments. No. 465. Environmental Protection. The Environmental Noise (Scotland) Regulations 2006
[5] The Stationery Office Limited. Environmental Protection Act, Chapter 43, Part III. 1990

19.20 The procedures for appeals against abatement notices are detailed in the Statutory Nuisance (Appeals) Regulations 1995.

National Planning Policy Context

National Planning Framework 4 (NPF4)

19.21 Overarching planning policies for Scotland are contained within the 'National Planning Framework 4' (NPF4)[6]. The emphasis of the Framework is to allow development to proceed where it can be demonstrated to be sustainable. In relation to noise, Policy 23 of the Framework is applicable to noise and the Proposed development. It states:

"[…] e) Development proposals that are likely to raise unacceptable noise issues will not be supported. The agent of change principle applies to noise sensitive development. A Noise Impact Assessment may be required where the nature of the proposal or its location suggests that significant effects are likely. […]"

Planning Advice Note PAN 1/2011 Planning and Noise

19.22 Planning Advice Note PAN 1/2011 Planning and Noise[7] provides advice on the role of the planning system in helping to prevent and limit the adverse effects of noise. Information and advice on noise impact assessment methods is provided in the associated Assessment of noise: technical advice note (TAN)[8]

19.23 The PAN promotes the principles of good acoustic design and a sensitive approach to the location of new development. It promotes the appropriate location of new potentially noisy development, and a pragmatic approach to the location of new development within the vicinity of existing noise generating uses, to ensure that quality of life is not unreasonably affected and that new development continues to support sustainable economic growth.

19.24 It advises that Environmental Health Officers (EHOs) and/or professional acousticians should be involved at an early stage in development proposals which are likely to have significant adverse noise impacts or be affected by existing noisy developments.

Assessment of Noise: Technical Advice Note

19.25 The TAN[8] provides guidance to assist in the technical evaluation of noise assessment. It has been prepared as a guide for noise professionals, both in the public and private sector, in the preparation and evaluation of noise impact assessments. It aims to assist in assessing the significance of impact.

[6] Scottish Government: National Planning Framework 4. February 2023
[7] Scottish Government. Planning Advice Note PAN 1/2011 Planning and Noise. March 2011
[8] Scottish Government. Assessment of noise: technical advice note (TAN). March 2011

19.26 The TAN advises on the principles of a noise impact assessment, including defining the significance of impact, an appropriate noise impact assessment methodology, and suitable mitigation to limit people's exposure to noise through design.

Local Policy and Guidance

Dumfries and Galloway Council Local Development Plan 2 (LDP2)

19.27 The Dumfries and Galloway Council Local Development Plan 2[9] provides the planning framework, guiding the future use and development of land in towns, villages and the rural area. In regard to noise and a development of this nature, Policies OP1 is applicable. Policy OP1 states:

"Policy OP1: Development Considerations

Development will be assessed against the following considerations where relevant to the scale, nature and location of the proposal:

a) General Amenity

Development proposals should be compatible with the character and amenity of the area and should not conflict with nearby land uses. The following issues which may result from the development will be a material consideration in the assessment of proposals:

- *noise and vibration;*
- *odour and fumes;*
- *potential loss of privacy, sunlight and daylight on nearby properties;*
- *emissions including dust, smoke, soot, ash, dirt or grit or any other environmental pollution to water, air, or soil; and*
- *light pollution. […]"*

British Standard 5228 'Code of practice for noise and vibration control on construction and open sites', Parts 1 and 2, 2009 as amended 2014

19.28 British Standard (BS) 5228[10] is a two-part standard which comprises:

- BS 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'[11] and

[9] Dumfries and Galloway Council Local Development Plan 2. October 2019
[10] British Standards Institution. British Standard 5228:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites Parts 1 and 2
[11] British Standards Institution. British Standard 5228-1:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites Part 2: Vibration.

- BS 5228-2:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration'[12]

19.29 The Standard provides guidance, information and procedures on the control of noise and vibration from demolition and construction sites.

19.30 There are no set standards for the definition of the significance of construction noise effects. However, for noise, example criteria are provided in BS 5228 1:2009+A1:2014 Annex E and for vibration, example criteria are provided in BS 5228-2:2009+A1:2014 Annex B. The assessment of whether changes in noise levels due to construction activity constitute significant effects will be dependent on the absolute levels of ambient and construction noise, as well as the magnitude, duration, time of occurrence and frequency of the noise change.

19.31 BS 5228-1:2009+A1:2014 provides basic information and recommendations for methods of noise control relating to construction and open sites where work activities/operations generate significant noise levels, including:

- community relations;
- noise and persons on site;
- neighbourhood nuisance;
- project supervision, and
- control of noise.

19.32 The annexes including information on legislative background, noise sources, remedies and their effectiveness (mitigation options); current and historic noise level data on site equipment and site activities; significance of noise effects; calculation procedures estimating noise emissions from sites and noise level monitoring; types of piling; and air overpressure.

19.33 BS 5228-2:2009+A1:2014 provides basic information and recommendations for methods of vibration control relating to construction and open sites where work activities/operations generate significant vibration levels. It includes sections on community relations, vibration and persons on site, neighbourhood nuisance, project supervision and control of vibration and measurement.

British Standard 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

19.34 BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'[13] (BS 4142) describes a method for rating and assessing sound of an industrial and/or commercial nature. The standard is applicable to the determination of the rating level of industrial or commercial sound as well as the ambient, background and residual sound levels for the purposes of investigating complaints, assessing sound from proposed new, modified or additional sources or assessing sound at proposed

[12] British Standards Institution. British Standard 5228-2:2009+A1:2014. Code of practice for noise and vibration control on construction and open sites Part 2: Vibration. 2014
[13] British Standards Institution. British Standard 4142:2014+A1:2019. Methods for rating and assessing industrial and commercial sound

new dwellings. The determination of whether a noise amounts to a nuisance is beyond the scope of the standard, as is rating and assessment of indoor noise levels. The standard compares the "rating level" of the noise (i.e. the specific noise level from the site under investigation adjusted using penalties for acoustic character such as tonality or impulsiveness) with the pre-existing background noise level.

19.35 The specific sound levels should be determined separately in terms of the $L_{Aeq,T}$ index over a period of T = 1 hour during the daytime and T = 15 minutes during the night-time. For the purposes of the standard, daytime is typically between 07:00 and 23:00 hours and night-time is typically between 23:00 and 07:00 hours.

19.36 BS 4142:2014+A1:2019 requires that the background sound levels adopted for the assessment be representative for the period being assessed. The standard recommends that the background sound level should be derived from continuous measurements of normally not less than 15-minute intervals, which can be contiguous or disaggregated. However, the standard states that there is no 'single' background sound level that can be derived from such measurements.

19.37 BS 4142:2014+A1:2019 states that measurement locations should be outdoors, where the microphone is at least 3.5 m from any reflecting surfaces other than the ground and, unless there is a specific reason to use an alternative height, at a height of between 1.2 m and 1.5 m above ground level. However, where it is necessary to make measurements above ground floor level, the measurement position, height and distance from reflecting surfaces should be reported, and ideally measurements should be made at a position 1 m from the façade of the relevant floor if it is not practical to make the measurements at least 3.5 m from the facade.

19.38 With regard to the rating correction, paragraph 9.2 of BS 4142:2014+A1:2019 states:

"Consider the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention."

19.39 The commentary to paragraph 9.2 of BS 4142:2014+A1:2019 suggests the following subjective methods for the determination of the rating penalty for tonal, impulsive and/or intermittent specific sounds:

"Tonality

For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a rating penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.

Impulsivity

A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.

NOTE 2 If characteristics likely to affect perception and response are present in the specific sound, within the same reference period, then the applicable corrections ought normally to be added arithmetically. However, if any single feature is dominant to the exclusion of the others then it might be appropriate to apply a reduced or even zero correction for the minor characteristics.

Intermittency

When the specific sound has identifiable on/off conditions, the specific sound level should be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. … If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

Other sound characteristics

Where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."

19.40 An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level of the specific sound. In the context of the standard, adverse impacts include, but are not limited to, annoyance and sleep disturbance. Typically, the greater this difference, the greater is the magnitude of the impact:

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

19.41 The significance of the effect of the noise should be determined on the basis of the initial estimate of impact significance from the BS 4142 assessment and after having considered the context of the sound. It is necessary to consider all pertinent factors, including: the absolute level of sound; the character and level of the residual sound compared to the character and level of the specific sound; and the sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as: facade insulation treatment; ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and acoustic screening.

Design Manual for Roads and Bridges, LA111 'Noise and Vibration' (Highways England for Transport Scotland)

19.42 The Design Manual for Roads and Bridges (DMRB), LA111 'Noise and Vibration'[14] provides guidance on methods for assessing and reporting the effects of highways noise and vibration from construction, operation and maintenance projects.

19.43 In specific regard to the Proposed development, the guidance provides method for assessing the magnitude of traffic noise impact during construction and operation, using predicted change in traffic noise levels, calculated using methods outlined in Calculation of Road Traffic Noise (CRTN) (Department of Transport, 1988).

Calculation of Road Traffic Noise 1988

19.44 The Calculation of Road Traffic Noise (CRTN)[15] describes the procedures for measuring and calculating noise from road traffic. These procedures are necessary to enable entitlement under The Noise Insulation Regulations to be determined but they also provide guidance appropriate to the calculation of traffic noise for more general applications, for example, environmental appraisal of road schemes, highway design and land use planning. The document can also be used to generate scaling factors for expected increases in road traffic and expected levels of attenuation from barriers.

19.45 The index adopted by CRTN to assess traffic noise is $L_{A10,18h}$. This value is determined by taking the highest 10% of noise readings in each of the 18 one-hour periods between 06:00 and 00:00, and then calculating the arithmetic mean.

IEMA Guidelines for Environmental Noise Impact Assessment

19.46 The Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Impact Assessment[16] address the key principles of noise impact assessment and are applicable to all development where noise effects are likely to occur. The guidelines provide specific support on how noise impact assessment fits within the EIA process, covering scope of a noise assessment, issues to be considered at baseline, prediction of changes in noise levels as a result of the proposals, and definition and evaluation of the significance of the effect of changes in noise levels.

[14] Highways England for Transport Scotland. Design Manual for Roads and Bridges. LA 111 Noise and vibration. 2020
[15] Department of Transport. Calculation of Road Traffic Noise. HMSO. 1988
[16] IEMA. Guidelines for Environmental Impact Assessment. November 2014

Methodology Used For Assessment

Introduction

19.47 This section of the Chapter details the consultation undertaken, study areas, assessment methodology used, and significance criteria.

Consultation

19.48 A scoping report was submitted to Marine Scotland regarding the proposed development on 29th June 2021[17]. The scoping report outlined the methodology to be adopted as part of the noise and vibration assessment. In February 2023 Marine Scotland responded in agreement to the proposed methodology, as stated in paragraph 5.12.1 of the Scoping Opinion[17].

19.49 Consultation was undertaken with the Environmental Health team at Dumfries and Galloway Council (DGC) to discuss the proposed methodology. William Jackson, Environmental Health Officer, confirmed acceptance of the methodology on 28th January 2025. A copy of this consultation is provided as **Appendix 19.1** (**Volume 2**).

Study Area

19.50 Potentially sensitive receptors within the study area have been determined through a site visit and desktop review of Google Maps and OS OpenMap Local[18]. TAN defines residential dwellings, schools, hospitals, offices, restaurants, theatres, places of worship, sports grounds, factories and night clubs as potentially sensitive receptors. Further details regarding these types of receptors are described in Table 19-7.

Construction excluding traffic

19.51 The study area for the assessment of construction phase noise and vibration has been defined with reference to the guidance in DMRB LA111 and focuses on the closest Noise and Vibration Sensitive Receptors (NVSRs) to the works. Note 1 of paragraph 3.5 of DMRB LA111 states the following regarding construction noise sensitive receptors:

'A study area of 300 m from the closest construction activity is normally sufficient to encompass noise sensitive receptors.'

19.52 Similarly, Note 1 of paragraph 3.29 of DMRB LA111 states the following regarding construction vibration sensitive receptors:

'A study area of 100 m from the closest construction activity with the potential to generate vibration is normally sufficient to encompass vibration sensitive receptors.'

[17] https://marine.gov.scot/node/23515
[18] Ordnance Survey OpenMap Local

19.53 The NVSRs selected are based on their sensitivity in line with TAN, and proximity to the works. The NVSRs are representative of the impact at their location, but also that of neighbouring properties. By selecting the closest NVSRs, the predicted impacts are typical of the worst affected receptors. Receptors further away will experience an impact lesser to that reported within this assessment.

Construction traffic

19.54 In regard to construction traffic, a study area of 50m from any existing roads that are predicted to be subject to an increase in traffic noise level of at least 1.0 dB as a result of the construction of the Scheme, has been adopted, as required by DMRB LA111.

Operation excluding traffic

19.55 The study area for the assessment of operational noise (excluding traffic) focuses on the same NVSRs as selected for the construction phase. By selecting the closest NVSRs, the predicted impacts are typical of the worst affected receptors. Receptors further away will experience an impact lesser to that reported within this assessment.

19.56 Operation of industrial and commercial plant associated with the Proposed development is unlikely to generate high levels of vibration and therefore unlikely to result in significant effects at nearby receptors. Operational vibration is therefore scoped out.

Operational traffic

19.57 The study area for the quantitative assessment of operational phase noise impacts has been defined following the guidance set out within DMRB LA 111.

19.58 It defines an operational study area defined as the following but it can be reduced or extended to ensure it is proportionate to the risk of likely significant effects: 1) the area within 600m of new road links or road links physically changed or bypassed by the project; 2) the area within 50m of other road links with potential to experience a short term BNL change of more than 1.0dB(A) as a result of the project.

19.59 Operational vibration is scoped out of the DMRB LA111 methodology as a maintained road surface will be free of irregularities as part of project design and under general maintenance, so operational vibration will not have the potential to lead to significant adverse effects.

Baseline conditions

Receptors

19.60 NVSRs have been determined through a site visit and desktop review of © Google Maps and OS mapping.

Baseline noise survey

19.61 In January 2025, baseline noise levels in the vicinity of the Proposed development were established through short-term attended noise surveys. Survey locations are shown on Figure 19-1.

19.62 Full details regarding the baseline noise surveys undertaken are provided in the section ‘Baseline Conditions’ below.

Figure 19-1: Noise Monitoring and NVSRs Locations (orange markers identify noise and vibration sensitive receptors (NVSRs), blue markers identify monitoring locations (MLs)

Impact Assessment Methodology

Construction Phase (Temporary)

Construction Noise Impact

19.63 Noise generated during construction, and consequently experienced at nearby sensitive receptors, varies depending on the plant used, the activity being undertaken, phasing of works, period of operation, distance to the receptor, and the influence of the intervening ground (ground absorption and barrier effects).

19.64 BS 5228 1:2009+A1:2014 (BS 5228 Part 1) has been used to define the methodology to assess any potential impact relating to construction noise. At the time of assessment, detailed information regarding the types and number of equipment/plant and phasing and duration of works is not available. Therefore, the pre-construction Contractor (Balfour Beatty Civil Engineering Limited (BBCEL)) has made assumptions on the likely equipment/plant and nature of the works, as set out in **Appendix 19.3** (**Volume 2**).

19.65 BS 5228 Part 1 contains a database of noise emissions from various pieces of equipment and plant which has been consulted as part of this assessment. The prediction method, contained within Annex F of the standard, has been used to undertake a quantitative assessment of construction noise at the selected NVSRs. This takes into account on-time of plant, distance to the nearest receptor, influence of reflections and screening, ground absorption, and calculates the equivalent continuous noise level (L_{Aeq}) over the assessment period of concern.

19.66 The stages of the Annex prediction method are as follows:

- Stage 1 – obtain an activity $L_{Aeq,T}$ by use of the values given in Annexes C and D
- Stage 2 – if the distance R, in metres (m) from the point of interest to the geometric centre of the plant or activity other than 10 m, subtract from the $L_{Aeq,T}$ obtained in stage 1 a distance adjustment K_h or K_s, in decibels (dB), obtained either:

1) From the following equations:

Equation 1: $$K_h = 20 \log_{10} \frac{R}{10}$$

Equation 2: $$K_s = (25 \log_{10} \frac{R}{10}) - 2$$

(where R ≥ 25 m)

- Stage 3 – make allowances for reflections and screening
- Stage 4 – repeat stages 1 to 3 for each activity
- Stage 5 – estimate the percentage of the assessment period for which each activity takes place. Then sum the $L_{Aeq,T}$ from each activity to predict the total assessment period $L_{Aeq,T}$

19.67 For those NVSRs which are less than 25 m from the activity, a 10log reduction has been applied, to assume line source propagation, as opposed to point source. The distance reduction assume hard ground attenuation (i.e. use of Equation 1). A + 3 dB correction has been applied to obtain façade levels. At the time of assessment, details on hoarding and exact locations of plant have not been finalised. Therefore, no correction has been applied for screening.

19.68 To quantify the impact, Annex E of BS 5228 Part 1 has been considered. The Annex contains various example criteria of absolute noise limits for construction activities, which have been used to determine the magnitude of any construction noise impacts within this assessment. The criteria do not represent mandatory limits but rather a set of example approaches intended to reflect the type of methods commonly applied to construction noise. In broad terms, the example criteria are based on a set of fixed limit values which, if exceeded, may result in a significant effect unless ambient noise levels are sufficiently high to provide a degree of masking of construction noise.

19.69 BS5228-1 Annex E Table E.1 presents a range of threshold values assigned according to the ambient sound level at the receptor, categorised from A to C, with Category A featuring the lowest thresholds for construction noise.

19.70 The Category B guidance values detailed in BS 5228-1 Annex E have been used to numerically define the magnitude levels presented in the tables below. Category B has been selected based on the ambient noise levels measured during the noise survey, as presented in Section 'Baseline Conditions' of this Chapter.

19.71 The presented levels have been normalised to free-field daytime noise levels occurring over a time period, T_{wd}, equal to the duration of a working day. Core working hours for construction of the proposed development are 07:00 to 19:00 on weekdays and 07:00 to 13:00 Saturdays. The construction noise impact magnitude criteria for these core working hours are summarised in Table 19-1 below. Durations for construction activities associated with the Proposed development are provided in Section 'Impact Assessment – Construction Phase'.

Table 19-1: Magnitude of Impact – Construction Noise

Magnitude	Duration	
	Less than 4 weeks	**4 weeks or more**
High	$L_{Aeq,Twd}$ > 80 dB	$L_{Aeq,Twd}$ > 75 dB
Medium	75 dB < $L_{Aeq,Twd}$ ≤ 80 dB	70 dB < $L_{Aeq,Twd}$ ≤ 75 dB
Low	70 dB < $L_{Aeq,Twd}$ ≤ 75 dB	65 dB < $L_{Aeq,Twd}$ ≤ 70 dB
Negligible	$L_{Aeq,Twd}$ ≤ 70 dB	$L_{Aeq,Twd}$ ≤ 65 dB

Construction Traffic Impacts

19.72 A temporary change in noise level may occur due to contributions from construction related traffic during construction of the Proposed development.

19.73 DMRB LA111 has been used to define the methodology to assess any potential impact of construction related traffic and determine its impact.

19.74 The change in the Basic Noise Level (BNL) due to the introduction of additional vehicles onto local highways as part of the construction of the Proposed development has been calculated using the method outlined in the CRTN[15] which considers:

- the change in traffic flow due to construction traffic;
- vehicle speed; and
- the percentage of Heavy Duty Vehicles (HDVs).

19.75 The CRTN methodology is suitable only for traffic flows of over 1,000 vehicles per 18-hour day, hereafter referred to as 'standard roads'.

19.76 The 18-hour BNL $L_{A10,18h}$ for 'standard roads' is calculated using the linear equation for Chart 3 of CRTN, reproduced in Equation 3 below. This equation is empirically derived and depends upon the traffic flow *Q*:

Equation 3: $$L_{10,18hr} = 29.1 + 10\log_{10} Q$$

19.77 This BNL is adjusted by a correction *C* to account for variations in mean traffic speed (*V)* and the percentage of HDVs (*p)* using the empirically derived equation in Chart 4 of CRTN, as given by Equation 4 below.

Equation 4: $$C = 33\log_{10}\left(V + 40 + \frac{500}{V}\right) + 10\log_{10}\left(1 + \frac{5p}{V}\right) - 68.8$$

19.78 Where the traffic flow *Q* is between 1,000 and 4,000 vehicles per day, this level is subject to further correction *K*, calculated for an assumed slant distance *d'* = 10 m, using Equation 5:

Equation 5: $$K = -16.6\left(\log_{10}\left(\frac{30}{d'}\right)\right)\left(\log_{10}\left(\frac{Q}{4000}\right)\right)$$

19.79 The table to Section 14.2 of CRTN presents a range of traffic speeds in km/h to be used for different road classifications, and these have been used as appropriate for the assessment of standard roads presented in this Chapter.

19.80 The magnitude of impact presented in Table 19-2 below has been applied in this assessment. This aligns with that stated in TAN and presents different levels of impact based on the change in construction traffic Basic Noise Level (BNL) $L_{A10,18hour}$.

Table 19-2: Magnitude of Impact – Construction Traffic Noise

Magnitude	Increase in BNL of closest public road used for construction traffic (dB)
High	BNL ≥ 5
Medium	3 ≤ BNL < 5

Magnitude	Increase in BNL of closest public road used for construction traffic (dB)
Low	1 ≤ BNL < 3
Negligible	BNL < 1

Construction Vibration Impact

19.81 BS 5228 2:2009+A1:2014 (BS 5228 Part 2) provides guidance on the impact of construction vibration in terms of annoyance, focusing on occupants within residential dwellings. Criteria are based on the peak particle velocity (PPV) value.

19.82 For the Proposed development, the use of vibratory plant has been considered likely, with the use of a vibratory hammer piling rig identified as likely to result in adverse impacts on the NVSRs.

19.83 The assessment has been undertaken with reference to the guidance in Table E.1 of BS 5228-2:2009+A1:2014. This guidance provides empirically derived formula for the prediction of vibration impacts arising from mechanised construction works. The resultant PPV (v_{res}) due to vibratory piling may be calculated using the following Equation 6 below:

$$V_{res} = \frac{K_v}{x^{\delta}} \qquad \textit{Equation 6}$$

- v_{res}: PPV (mm/s);
- k_v: scaling factor associated with the probability of exceedance;
- x: source-receiver separation distance along ground surface (m); and
- δ: dimensionless empirical constant.
    - Start up and run down: δ = 1.2
    - All operations: δ = 1.3
    - Steady state operations: δ = 1.4

19.84 BS 5228 Part 2 has been used to determine the significance of any construction vibration effects within this assessment. The magnitude of impact, and associated effects in accordance with BS 5228 Part 2, are presented in Table 19-3.

Table 19-3: Magnitude of Impact – Construction Vibration

Magnitude	Vibration Level, PPV, mms^{-1}	Effect
High	PPV ≥ 10	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments

Magnitude	Vibration Level, PPV, mms^{-1}	Effect
Medium	1 ≤ PPV < 10	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
Low	0.3 ≤ PPV < 1	Vibration might be just perceptible in residential environments.
Negligible	PPV < 0.3	Vibration might be just perceptible in the most sensitive situations for most vibration frequences associated with construction. At lower frequencies, people are less sensitive to vibration.

19.85 Further comment is provided in Note C of Table B.1 in Annex B of BS 5228-2:2009+A1:2014 which states the following:

'Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. The values are provided to give an initial indication of potential effects, and where these values are routinely measured or expected then an assessment in accordance with BS 6475-1 or -2, and/or other available guidance, might be appropriate to determine whether the time varying exposure is likely to give rise to any degree of adverse comment.'

19.86 In line with BS 5228, professional judgement has been used to assess whether a slight/moderate or moderate/slight effect occurs, based on the occurrence of any vibration generating events, to determine if it is significant in line with EIA terminology.

Operational Phase (Permanent)

Operational Noise Impacts (excluding traffic)

19.87 Noise sources assumed to be associated with operation of the proposed development at the time of undertaking this assessment are not confirmed, however will include activity within the proposed workshops and community space, fixed plant (including substation), use of the car parking areas and additional boats in the marina. The Fishermen's compound and Coastguard and research building will also have associated noise sources. Examples of fixed plant that may be used within the proposed development include heating and cooling systems (for example Air Source Heat Pumps (ASHPs) and Heat Ventilation and Cooling (HVAC) units).

19.88 BS 4142 and IEMA have been used to define the assessment methodology to assess any potential impacts and effects relating to operational noise from the Proposed development. The criteria within these follow the guidance set out within TAN.

19.89 BS 4142 is applicable to industrial and commercial sound, and assesses the difference between the 'Rating Level' and existing background sound level. Regarding this assessment, noise associated with fixed plant is applicable. The magnitude of impact for fixed plant is defined in Table 19-4.

Table 19-4: Magnitude of Impact – Fixed Plant During Operation

Magnitude	Difference Δ between rating sound Level $L_{Ar,Tr}$ and background sound level $L_{A90,T}$ (dB)	Descriptors
High	Δ ≥ 10	A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
Medium	5 ≤ Δ < 10	A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
Low	0 ≤ Δ < 5	Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.
Negligible	-10 ≤ Δ < 0	

19.90 Due to the uses of the proposed workshops being unknown, the assessment has focused on setting noise limit at NVSRs, to avoid a significant adverse effect. The limits relate to activity within the proposed workshops and fixed plant. This approach was agreed with the EHO at DGC.

19.91 For all other operational noise sources (excluding road traffic), guidance within IEMA has been consulted to define the magnitude of impact. The magnitude of impact for all other operational sources is defined in Table 19-5.

Table 19-5: Magnitude of Impact – Car Park Users, Boats

Magnitude	Sound level change Δ $L_{Aeq,T}$ (dB), T = either 16 hour day or 8 hour night
High	Δ ≥ 10
Medium	5 ≤ Δ < 10
Low	3 ≤ Δ < 5
Negligible	0 ≤ Δ < 3

19.92 At the time of assessment, the proposed end users of the workshops and likely activities within them, including any plant details, are currently unknown. Therefore, an assessment based on setting of noise

limits at NVSRs, to avoid a significant adverse effect, has been undertaken. This approach has been agreed with DGC.

19.93 In regard to the community space, car park usage and additional boats in the marina, a qualitative assessment has been undertaken, based on the information provided by the project team, and in Chapter 16: Transportation, and Proposed development design.

Operational Noise (Traffic)

19.94 In addition to the operational noise from the Proposed development, vehicle movements to and from the Proposed development have the potential to generate additional noise at NVSRs located in the immediate vicinity of the local road network.

19.95 DMRB LA111 has been used to define the methodology to assess any potential impact of operational related traffic noise on NVSRs. Traffic data has been provided by the appointed transport consultant within the Project Team, to allow this assessment to be undertaken.

19.96 DMRB LA111 considers the traffic noise change in the short term and long term. These terms are calculated as follows:

- Short term: Do Minimum Opening Year (DMOY) compared against Do Something Opening Year (DSOY); and
- Long-term: DMOY compared against Do Something Future Year (DSFY)

19.97 This potential noise impact has been considered using the calculated road traffic noise levels, without and with the Proposed development. The magnitude of any change in noise levels at NVSRs has been determined in accordance with the criteria in Table 19-6. This replicates Table 3.54a and 3.54b from DMRB LA111.

Table 19-6: Magnitude of Impact – Operational Traffic

Magnitude	Change in Noise Level		Descriptors
	Short-term	Long-term	
High	> 5 dB increase	> 10 dB increase	Impact resulting in a considerable change in baseline environmental conditions predicted either to cause statutory objectives to be significantly exceeded or to result in severe undesirable/desirable consequences on the receiving environment.
Medium	3.0 – 4.9 dB increase	5.0 – 9.9 dB increase	Impact resulting in a discernible change in baseline environmental conditions predicted either to cause statutory objectives to be marginally exceeded or to result in

Magnitude	Change in Noise Level		Descriptors
	Short-term	Long-term	
			undesirable/desirable consequences on the receiving environment.
Low	1.0 – 2.9 dB increase	3.0 – 4.9 dB increase	Impact resulting in a discernible change in baseline environmental conditions with undesirable/desirable conditions that can be tolerated
Negligible	0.1 – 0.9 dB increase	0.1 – 2.9 dB increase	No discernible change in the baseline environmental conditions, within margins of error of measurement

Sensitivity of Receptor

19.98 TAN aims to provide guidance on the assessment of significance of noise impacts for various common situations. This guidance incorporates both a process for the allocation of differing levels of sensitivity to NVSRs and an example of qualitative descriptors for assessing qualitative impacts on NVSRs.

19.99 At Stage 1, TAN defines a process for allocation of sensitivity ratings from 'low' to 'high' to noise sensitive receptors and provides a table (Table 2.1) which is replicated in Table 19-7 below.

Table 19-7: Receptor sensitivity

Sensitivity	Descriptors
High	Receptors where people or operations are particularly susceptible to noise. Examples of NSR: • Residential, including private gardens where appropriate. • Quiet outdoor areas used for recreation • Conference facilities • Theatres/Auditoria/Studios • Schools during the daytime • Hospitals/residential care homes • Places of worship
Medium	Receptors moderately sensitive to noise, where it may cause some distraction or disturbance. Examples of NSR:

Sensitivity	Descriptors
	• Offices • Bars/Cafes/Restaurants where external noise may be intrusive. • Sports grounds when spectator noise is not a normal part of the event and where quiet conditions are necessary (e.g. tennis, golf, bowls)
Low	Receptors where distraction or disturbance from noise is minimal. Examples of NSR: • Buildings not occupied during working hours • Factories and working environments with existing high noise levels • Sports grounds when spectator noise is a normal part of the event • Night Clubs

Magnitude of Impact

19.100 At Stage 2, the quantitative assessment of the noise impact from a noise generating development is based on the change in the noise climate before and after the new source of noise is introduced. TAN defines a process for allocation of sensitivity ratings from 'low' to 'high' to NVSRs, this has been replicated in Table 19-8.

19.101 The quantitative criteria used in the assessment for magnitude of impact in respect of the different sources assessed, as presented in Table 19-1 to Table 19-6 above, have been defined in line with TAN.

Table 19-8: Definition of Terms relating to Magnitude of Impact

Descriptor for Magnitude of Impact	Descriptors
High (referred to as Major in TAN)	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse).
	Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium (referred to as Moderate in TAN)	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse).
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).

Descriptor for Magnitude of Impact	Descriptors
Low (referred to as Minor in TAN)	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse)
	Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse)
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).

19.102 At Stage 3, TAN requires a qualitative assessment to allow the consideration of additional factors to augment the quantitative evaluation. This may result in an adjustment to the magnitude of impacts determined at Stage 2. Table 2.5 of TAN presents an example of assigning descriptors for qualitative impacts from noise on residential properties, which is replicated in Table 19-9.

Table 19-9: Qualitative Noise Impact Descriptors

Perception	Criteria for Descriptor for Residential Dwellings	Descriptor for Qualitative Impact
Noticeable (Very disruptive)	Significant changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm.	High (referred to as Major in TAN)
Noticeable (Disruptive)	Causes an important change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion. 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 character of the area.	Medium (referred to as Moderate in TAN)
Noticeable (Mildly intrusive)	Noise can be heard and may cause small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows more often. Potential for non-awakening sleep disturbance.	Low (referred to as Minor in TAN)

Perception	Criteria for Descriptor for Residential Dwellings	Descriptor for Qualitative Impact
	Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	
Just Noticeable (Non intrusive)	Noise can be heard, but does not cause any change in behaviour or attitude, e.g. increasing volume of television; speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Negligible

Significance of Effect

19.103 The overall significance of effects, detailed in Table 19-10, was determined taking into account sensitivity and magnitude, as set out above.

Table 19-10: EIA Matrix - Assigning significance of Effect

Sensitivity	Magnitude of Impact			
	High	**Medium**	**Low**	**Negligible**
High	Substantial	Moderate/ Substantial	Slight/ Moderate	Slight
Medium	Moderate/ Substantial	Moderate	Slight	Negligible/ Slight
Low	Moderate	Slight/ Moderate	Negligible/ Slight	Negligible
Negligible	Slight	Negligible or Slight	Negligible	Negligible

Limitations to Assessment

19.104 All sound surveys are limited by the instrumentation used to undertake the measurements. Uncertainty may arise as a result of the internal processes within the sound level meter to measure and process the measured data into the relevant noise indices. However, modern sound level meters are precision instruments. The equipment used for the baseline sound survey were Class 1 instruments according to BS EN 61672-1:2003, with a sampling cycle of 100 ms and a minimum measurement range of A-weighted levels between 20 dB and 100 dB. The uncertainty due to fluctuations in temperature and humidity is ≤ 0.5 dB. The accuracy of the equipment used has been monitored via calibration both prior to and upon completion of the survey at each position.

19.105 Any influence due to human error has been minimised by ensuring that all sound monitoring equipment was installed safely and securely. All measurements were undertaken at height of 1.2 to 1.5 m above

local ground level and 3.5 m from other reflective surfaces to minimise interference from reflected sound waves.

19.106 The uses of the proposed workshops are unknown at the time of assessment, therefore their potential impact cannot be assessed. Due to this, an alternative approach has been adopted, setting noise limits at NVSRs, to avoid a significant adverse effect. This approach was agreed with the EHO at DGC.

Baseline Conditions

Sound Survey

19.108 In order to determine existing baseline noise levels, an attended sound survey was undertaken at two locations (ML1 and ML2) during the daytime and night-time period, to capture ambient and background sound levels representative of the NVSRs.

19.109 Survey location ML1 was located on the grass verge between Breastworks Car Park and Markey Street. Monitoring was undertaken between 22:45 on the 29th January 2025 and 01:15 on the 30th January 2025, and between 09:45 and 13:00 on the 30th January 2025.

19.110 Survey location ML2 was located off Cairnryan Road, east of the Proposed development. Monitoring was undertaken between 22:15 on the 29th January 2025 and 01:30 on the 30th January 2025, and between 09:45 and 13:00 on the 30th January 2025.

19.111 At both locations road traffic noise was dominant, however Market Street was notably busier, with noise from use of the car parks along this road contributing to the acoustic environment. Throughout the surveys there was no audible noise from boats within the marina.

Picture 19-1: Stranraer Marina from ML1 during the daytime survey

Picture 19-2: Stranraer Marina from ML1 during the night-time survey

19.112 All sound level surveys were carried out using a 'Class 1' sound level meter (SLM), in accordance with BS 7445-2:1991[19]. Each SLM was calibrated before use and the calibration checked after use and it was observed that no significant drift occurred during any survey period. Data were logged of the broadband A-weighted sound pressure level in 100 ms samples with the required periods extracted in post-processing.

19.113 During the surveys, weather conditions were dry, and wind speeds were below 5 m/s. Therefore, no periods were removed from the data due to weather.

19.114 A summary of the measured data is provided in Table 19-11. The selected background L_{A90} values have been based on the quietest 15-minute value within the survey period. The quietest period has been selected due to the short survey period, which is believed to provide the most robust assessment. Due to errors identified with the meter at ML2, it was not possible to provide a break-down of the L_{A90} levels at this location and instead only the average over the period is provided. Although the quietest L_{A90} 15-minute period at ML2 cannot be obtained, it is believed the average L_{A90} at ML2 is still appropriate to use, as opposed to dismissing this location from the assessment and adopting those levels captured solely at ML1.

19.115 Full details showing the visual time histories are provided in **Appendix 19.2** (**Volume 2**).

[19] British Standards Institution. British Standard 7445-2:1991 Description and measurement of environmental noise - Part 2: Guide to the acquisition of data pertinent to land use

Table 19-11: Baseline Sound Level Data

Location	Daytime				Night-time			
	$L_{Aeq, 3H}$ (dB)	Average $L_{A90, 15\ min}$ (dB)	Selected $L_{A90, 15\ min}$ (dB)	L_{AFmax} (dB)	$L_{Aeq, 3H}$ (dB)	Average $L_{A90, 15\ min}$ (dB)	Selected $L_{A90, 15\ min}$ (dB)	L_{AFmax} (dB)
ML1	72	58	54	92	64	54	53	92
ML2	68	48	-	99	58	42	-	88

Sensitive Receptors

19.116 The NVSRs listed in Table 19-12 below (and as shown on Figure 19.1) have the potential to be impacted by both the construction and operation of the Proposed development. The NVSRs have been selected based on their proximity to the Proposed development, being the closest and experiencing the highest impact. Those receptors co-located with NVSRs, or located further away, will experience an impact equal to, or less, than that identified within this Chapter.

19.117 The sensitivity of the NSRs has been assigned based on guidance in Table 19-7. The monitoring location representative of the NVSR is also presented in Table 19-12.

Table 19-12: Potentially Affected Sensitive Receptors

Receptor	Description	Sensitivity	Representative Monitoring Location
NVSR1	Residential dwellings along Agnew Crescent	High	ML1
NVSR2	Commercial Inn	High	ML1
NVSR3	Quay Head View Aparthotel	High	ML1
NVSR4	Scottish Children's Reporters Administration, 10 Market Street	Medium	ML1
NVSR5	Burns House, 32 Harbour Street	Medium	ML1
NVSR6	Commercial Premises off Harbour Street	Medium	ML2

Receptor	Description	Sensitivity	Representative Monitoring Location
NVSR7	Stranraer Police Station	Medium	ML2
NVSR8	Residential dwellings off Fisher Street	High	ML2
NVSR9	Stranraer Tourist Information Centre	Medium	ML1

Future Baseline

19.118 The traffic data provided for the assessment includes traffic flows for a 2028 and 2043 baseline scenario, the opening year, and 15 years beyond the opening year of the Proposed development, respectively. This data includes traffic flows from all approved development in the area which would have an influence on the local road network to Stranraer. The data shows a small increase in traffic flows on the immediate road network to the Proposed development, as shown in Appendix 19.4. However, this increase in traffic flows has no influence on the calculated $L_{A10,18hour}$ between 2026, 2028 and 2043. The increase in traffic however may cause a small increase in the ambient noise levels (L_{Aeq}), on those captured at the time of assessment.

19.119 Using the measured noise levels for the assessment, as opposed to those at the time of opening of the proposed development, a more robust assessment is provided.

Impact Assessment

19.120 There are no embedded mitigation measures relevant to noise and vibration as part of the proposed development design. The impact assessment assumes no mitigation will be implemented.

Construction Phase

Construction Noise

19.121 A quantitative assessment of the potential noise impact during on-site construction works has been undertaken. The following activities are considered, with their associated durations of work:

- Site Establishment (10 days)
- Marine Works
  - New Sheet Piled Wall at Breastworks and Install Sheet Piles (105 days)
  - Dredging, Breakwater and East Car Park Revetment and Reclamation (190 days)
  - Extend Breakwater (20 days)
  - New Marina Facility (97 days)
  - Marine Plant Install, Piling and Installation of Pontoons (120 days)
  - Install West Link bridge and Demobilise Marine Plant (26 days)
- Construct workshops in Boatyard (145 days)
- Construct SCAMPP/Coastguard Building (160 days)
- Refurbish Existing Harbourmaster Building (100 days)
- Car Parks and Hardstandings
  - East Car Park Works (123 days)
  - West Car Park Works (28 days)
  - Breastworks Car Park (5 days)
  - Extend Boatyard (37 days)
  - Fishermans Compound (8 days)
- Demobilise (10 days)

19.122 Predictions of construction noise at the NVSRs identified in Table 19-12 have been derived for each of the activities above, using the methodology as set out in Section 'Impact Assessment Methodology'.

19.123 To help inform the EIA process, the predicted plant list for each phase of construction has been provided by the pre-construction Contractor (Balfour Beatty Civil Engineering Limited (BBCEL)). Sound level data for each item of construction plant has been sourced from manufacturer stated levels, or use of Annex C of BS 5228-1. The complete list of construction plant and their associated sound level data is included at Appendix 19.3 (**Volume 2**).

19.124 As the exact location of plant is unknown, for the purpose of the predictions, it has been assumed all plant will be operating in the same location of the activity, for the whole duration of the working period, except for 2 hours each day to account for break times (i.e. working 10 out of 12 hours per day, or 5 out of 6 hours on a Saturday). The predictions therefore reflect the worst-case scenario, assuming all plant is focussed within the same location, and operating constantly for 10 hours per day/ 5 hours on Saturday. However, in reality, construction plant is likely to be distributed throughout the working area and working at different times throughout the day.

19.125 The predicted construction noise levels resulting from each activity at the NVSRs are summarised in Table 19-13. Full details of the calculations are provided in Appendix 19.3 (**Volume 2**).

19.126 As shown in Table 19-13, the impact at the NVSRs, and resulting significance, range from slight to substantial, particularly those NVSRs situated closest to the proposed development, and activities such as dredging, piling activities, works at Breastworks Car Park, and demobilisation. The assessment has assumed all plant will operate in one location, and working constantly for a 10 hour (or 5 hours on a Saturday) period. The noise levels predicted therefore are very likely to be higher than what will be experienced during the construction phase. However, mitigation is therefore proposed to reduce any potential impact.

Construction Traffic

19.127 Traffic data used in this assessment has been provided by the project team's transport consultant. Traffic data has been provided for two road links, Market Street and Harbour Access Road, in 18 hour Annual Average Weekly Traffic (AAWT) format. The average speed measured during the survey has been used on each road. Only traffic data on Market Street has been considered, as the Harbour Access Road does not have NVSRs located along it.

19.128 Traffic data was provided for the following scenarios:

- Scenario 1 – 2026 Baseline – baseline traffic flows in the year 2026; and
- Scenario 2 – 2026 Baseline + proposed construction traffic – baseline traffic flows, plus construction traffic associated with the proposed development

19.129 A summary of the traffic flow data and associated noise levels for each of the links and scenarios is provided in Appendix 19.4 (**Volume 2**). The change in noise arising on the road link as a result of the proposed development has been calculated for the following:

- Scenario 2 – Scenario 1

19.130 With reference to Appendix 19.4, the noise change on Market Street is + 0.5 dB. This change results in a negligible impact. Therefore, at high sensitivity NVSRs (as defined in Table 19-12), with a negligible impact of magnitude, the significance of effect in regard to construction traffic noise is **slight.** The

effects however are considered to be **not significant**, as the minor increase in noise level would have no effect on the residual sound levels experienced by receptors in the area.

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Table 19-13: Summary of Predicted Construction Noise Levels

Receptor	Activity													
	Site Establishment (Less than 4 weeks)	Magnitude of impact	Significance of effect	New Sheet Piled Wall at Breastworks (More than 4 weeks)	Magnitude of impact	Significance of effect	Dredging, Breakwater and East Car Park Revetment and Reclamation (More than 4 weeks)	Magnitude of impact	Significance of effect	Extend Breakwater (Less than 4 weeks)	Magnitude of impact	Significance of effect	New Marina Facility (More than 4 weeks)	Magnitude of impact	Significance of effect
NVSR1	79	Medium	Moderate / Substantial	63	Negligible	Slight	76	High	Substantial	51	Negligible	Slight	63	Negligible	Slight
NVSR2	72	Low	Slight / Moderate	68	Low	Slight / Moderate	80	High	Substantial	52	Negligible	Slight	67	Low	Slight / Moderate
NVSR3	79	Medium	Moderate / Substantial	69	Low	Slight / Moderate	81	High	Substantial	52	Negligible	Slight	69	Low	Slight / Moderate
NVSR4	80	Medium	Moderate	70	Medium	Moderate	82	High	Moderate / Substantial	53	Negligible	Negligible / Slight	70	Medium	Moderate
NVSR5	87	High	Moderate / Substantial	85	High	Moderate / Substantial	97	High	Moderate / Substantial	53	Negligible	Negligible / Slight	72	Medium	Moderate
NVSR6	75	Low	Slight	62	Negligible	Negligible / Slight	88	High	Moderate / Substantial	51	Negligible	Negligible / Slight	63	Negligible	Negligible / Slight
NVSR7	62	Negligible	Negligible / Slight	56	Negligible	Negligible / Slight	75	High	Moderate / Substantial	49	Negligible	Negligible / Slight	58	Negligible	Negligible / Slight
NVSR8	68	Negligible	Slight	66	Low	Slight / Moderate	78	High	Substantial	52	Negligible	Slight	68	Low	Slight / Moderate
NVSR9	86	High	Moderate / Substantial	82	High	Moderate / Substantial	92	High	Moderate / Substantial	54	Negligible	Negligible / Slight	75	High	Moderate / Substantial

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Receptor	Activity														
	Marine Plant Install, Piling and Installation of Pontoons (More than 4 weeks)	Magnitude of impact	Significance of effect	Install West Linkbridge and Demobilise Marine Plant (Less than 4 weeks)	Magnitude of impact	Significance of effect	Buildings - Boatyard Workshop (More than 4 weeks)	Magnitude of impact	Significance of effect	SCAMPP / Coastguard Building (More than 4 weeks)	Magnitude of impact	Significance of effect	Refurbish existing Harbourmaster Building (More than 4 weeks)	Magnitude of impact	Significance of effect
NVSR1	63	Negligible	Slight	50	Negligible	Slight	70	Low	Slight / Moderate	69	Low	Slight / Moderate	66	Low	Slight / Moderate
NVSR2	67	Low	Slight / Moderate	53	Negligible	Slight	68	Low	Slight / Moderate	69	Low	Slight / Moderate	66	Low	Slight / Moderate
NVSR3	69	Low	Slight / Moderate	55	Negligible	Slight	69	Low	Slight / Moderate	69	Low	Slight / Moderate	66	Low	Slight / Moderate
NVSR4	71	Medium	Moderate	61	Negligible	Negligible / Slight	66	Low	Slight	67	Low	Slight	65	Negligible	Negligible / Slight
NVSR5	73	Medium	Moderate	55	Negligible	Negligible / Slight	61	Negligible	Negligible / Slight	61	Negligible	Negligible / Slight	61	Negligible	Negligible / Slight
NVSR6	64	Negligible	Negligible / Slight	49	Negligible	Negligible / Slight	58	Negligible	Negligible / Slight	58	Negligible	Negligible / Slight	58	Negligible	Negligible / Slight
NVSR7	58	Negligible	Negligible / Slight	44	Negligible	Negligible / Slight	56	Negligible	Negligible / Slight	56	Negligible	Negligible / Slight	56	Negligible	Negligible / Slight
NVSR8	69	Low	Slight / Moderate	57	Negligible	Slight	63	Negligible	Slight	64	Negligible	Slight	63	Negligible	Slight
NVSR9	76	High	Moderate / Substantial	58	Negligible	Negligible / Slight	71	Medium	Moderate	72	Medium	Moderate	69	Low	Slight

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Receptor	Activity																	
	East Car Park Works (More than 4 weeks)	Magnitude of impact	Significance of effect	West Car Park Works (Less than 4 weeks)	Magnitude of impact	Significance of effect	Breastworks Car Park (Less than 4 weeks)	Magnitude of impact	Significance of effect	Extend Boatyard (More than 4 weeks)	Magnitude of impact	Significance of effect	Fishermans Compound (Less than 4 weeks)	Magnitude of impact	Significance of effect	Demobilise (Less than 4 weeks)	Magnitude of impact	Significance of effect
NVSR1	60	Negligible	Slight	89	High	Substantial	74	Low	Slight / Moderate	73	Medium	Moderate / Substantial	67	Negligible	Slight	87	High	Substantial
NVSR2	61	Negligible	Slight	84	High	Substantial	78	Medium	Moderate / Substantial	71	Medium	Moderate / Substantial	68	Negligible	Slight	80	Medium	Moderate / Substantial
NVSR3	62	Negligible	Slight	82	High	Substantial	85	High	Substantial	71	Medium	Moderate / Substantial	69	Negligible	Slight	86	High	Substantial
NVSR4	64	Negligible	Negligible / Slight	74	Low	Slight	89	High	Moderate / Substantial	67	Low	Slight	68	Negligible	Negligible / Slight	87	High	Moderate / Substantial
NVSR5	72	Medium	Moderate	64	Negligible	Negligible / Slight	81	High	Moderate / Substantial	62	Negligible	Negligible / Slight	64	Negligible	Negligible / Slight	94	High	Moderate / Substantial
NVSR6	85	High	Moderate / Substantial	61	Negligible	Negligible / Slight	69	Negligible	Negligible / Slight	60	Negligible	Negligible / Slight	61	Negligible	Negligible / Slight	82	High	Moderate / Substantial
NVSR7	72	Medium	Moderate	58	Negligible	Negligible / Slight	63	Negligible	Negligible / Slight	57	Negligible	Negligible / Slight	59	Negligible	Negligible / Slight	69	Negligible	Negligible / Slight
NVSR8	65	Low	Slight / Moderate	69	Negligible	Slight	79	Medium	Moderate / Substantial	65	Low	Slight / Moderate	66	Negligible	Slight	76	Medium	Moderate / Substantial
NVSR9	62	Negligible	Negligible / Slight	84	High	Moderate / Substantial	96	High	Moderate / Substantial	73	Medium	Moderate	71	Low	Slight	93	High	Moderate / Substantial

Construction Vibration

19.131 A quantitative assessment of the potential vibration levels experienced by the NVSRs due to piling. The calculations have focussed on the piling associated with the new sheet pile wall at Breastworks Car Park.

19.132 The impacts have been predicted using Equation 6 within this Chapter, as replicated from BS 5228 Part 2. The calculations have been undertaken based upon the threshold scaling factors outlined in Annex E of BS 5228-2:2009+A1:2014 which correspond to a 33% probability of exceedance as a conservative approach. The calculations have been undertaken for the 'All operations' constant. The results are presented in Table 19-14.

Table 19-14: Vibration Level at NVSRs

Receptor	Vibration Level, PPV, mms^{-1}	Magnitude of Impact	Significance of Effect
NVSR1	0.3	Low	Slight/Moderate
NVSR2	0.5	Low	Slight/Moderate
NVSR3	0.7	Low	Slight/Moderate
NVSR4	0.8	Low	Slight
NVSR5	8.4	Medium	Moderate
NVSR6	0.2	Negligible	Negligible/Slight
NVSR7	0.1	Negligible	Negligible/Slight
NVSR8	0.4	Low	Slight/Moderate
NVSR9	3.4	Medium	Moderate

19.133 As shown in Table 19-14 the magnitude of impact at the NVSRs range from low to medium. With regard to the resulting significance, when taking account of the sensitivity of the receptors, this ranges from negligible to moderate, with the resulting significance level range from negligible/slight at NVSRs 6 and 7, to moderate at NVSR5. The assessment concludes an adverse significant effect at NVSRs 1 – 5, and NVSRs 8 – 9.

19.134 The assessment has assumed a conservative approach; however, it is acknowledged the exceedance at some of the NVSRs can be quantified to a significant effect. Additional mitigation is therefore proposed to reduce any potential impacts.

Operational Phase

19.135 Operational phase noise sources associated with the proposed development that were considered in this assessment include:

- Proposed workshops
- Marine research facility
- Fishermen's compound
- Coastguard accommodation
- Proposed community space on reclaimed land
- Fixed plant associated with any new buildings/development, including substation area
- Car parking usages
- Additional boats in the marina

19.136 Due to the uses of the proposed workshops being unknown, as well as the use/likely plant associated with the marine research facility, the assessment has focused on setting noise limit at NVSRs, to avoid a significant adverse effect. The limits relate to activity within the proposed workshops, marine research facility, and fixed plant. This approach was agreed with the EHO at DGC. The assessment of the Fishermen's Compound and Coastguard accommodation, community space, car park usage and additional berths is discussed later in this Chapter.

Proposed Workshops, Marine Research Facility, and Fixed Plant

19.137 In accordance with BS4142, the lower the rating level is relative to the representative background sound level, the less likely it is that proposed noise sources will have an adverse impact on nearby NSVRs.

19.138 Noise limits have been set in accordance with BS 4142. It is believed appropriate that limits are set based on the rating level meeting the background sound level during the daytime and night-time period. The noise limits at the NVSRs are shown in Table 19-15.

Table 19-15: Noise Limits at NVSRs

Receptor	Highest Acceptable Noise Level from the Proposed Development (dB(A))	
	Daytime	Night-time
NVSR1	54	53
NVSR2	54	53
NVSR3	54	53

Receptor	Highest Acceptable Noise Level from the Proposed Development (dB(A))	
	Daytime	Night-time
NVSR4	54	53
NVSR5	54	53
NVSR6	48	42
NVSR7	48	42
NVSR8	48	42
NVSR9	54	53

19.139 It is noted that the above limits take into account any acoustic features of the sound, whether being of a tonal, impulsive or intermittent nature, or anything else which may cause annoyance or disturbance to the NVSR. Therefore, it is not the specific sound level alone which needs to meet these noise levels, but rather the specific sound plus any acoustic feature corrections applied.

Reclaimed land, Car Park Usage, Fishermen's Compound, Coastguard Accommodation, and Additional Berths

19.140 The reclaimed land to the east will include land for community space and additional car parking. The community space may be used for hosting public events and markets on certain limited days. The marina area however already host regular and significant events which residents of the local area will be used to and likely partake. Events include the Oyster Festival and Christmas Fun Fair. Events are unlikely to coincide with each other, and therefore any noise generation from the proposed community space would likely blend with the existing soundscape of Stranraer marina. As a result, noise from occasional use of the community space has been scoped out of the assessment.

19.141 In regard to the proposed car park on the reclaimed land, the project team's transport consultant, has stated the current capacity of the existing car parks satisfies the requirements for any future use. Therefore, the proposed eastern car park will likely have limited usage. As a result, an assessment of car park noise has been scoped out of the assessment. Furthermore, the proposed motorhome stances will have minimal noise associated, except for road traffic noise, which has been assessed within the traffic assessment. The noise impacts specifically associated with the motorhome stances have been scoped out of the assessment.

19.142 As part of the proposals, the Fishermen's Compound and Coastguard accommodation will be upgraded and modernised. There will be no change to the use of the buildings and associated activities. As there will be no change to the use, the associated noise sources are unlikely to change, except for potential introduction of fixed plant, which has been considered earlier in the assessment. As a result, use of the Fishermen's Compound and Coastguard accommodation has been scoped out of the assessment.

19.143 In regard to the additional berths, it is noted this will increase the number of boats within the marina. During the attended survey several boats were noted using the current marina, however noise was not audible during both the daytime and night-time period.

19.144 It is currently estimated there are around 500 visitors to the marina each year. Once operational, the proposed development could lead to an increase of up to 600/800 visitors in the first year of opening, and up to 1000/1200 five years after the additional berths have been opened. This approximately equates to a maximum of 2400 to 2450 boat movements currently, and potentially 6798 to 6998 boat movements five years after the additional berths have been opened. This equates to an approximate tripling of boat movements, which equates to approximately a 5 dB increase in boat related noise, over a five-year period. This increase however is at source, and all NVSRs are located at a distance away from the berths. The NSVRs are also partial screened from the berths, due to the lower height of the marina water compared to Breastworks Car Park and beyond. Furthermore, boat movements only occur over a season from mid-April until mid-October, and during the daytime only. In addition, boats are limited to a speed of 10 knots within the marina, meaning noise emissions from the boats will be low.

19.145 Due to the nature of the area, some noise is expected from the marina, and it is a noise source expected by local residents. Engines would only be used when boats enter or exit the marina area, which would be for a short duration. Once berthed, the only noise would be from occupants of the boat, likely carrying out light maintenance activities. Due to the distance of NVSRs from the marina, the lower height at which the boats would sit relative to existing car park level due to the proposed dredging activities, and the ambient noise in the area of Stranraer dominated by road traffic, noise from any additional boats is unlikely to be audible, or merge with the current soundscape of the area. As a consequence, further assessment of the noise resulting from the provision of additional berths is scoped out.

Operational Traffic

19.146 Traffic data used in this assessment has been provided by the project team's transport consultant. Traffic data has been provided for two road links, Market Street and Harbour Access Road, in 18 hour Annual Average Weekly Traffic (AAWT) format. The average speed measured during the survey has been used on each road. Only traffic data on Market Street has been considered, as the Harbour Access Road does not have NVSRs located along it.

19.147 Traffic data was provided for the following scenarios:

- Scenario 3 – 2028 Baseline – baseline traffic flows (DMOY)

- Scenario 4 – 2028 Baseline + proposed development – baseline traffic flows, plus traffic associated with the proposed development (DSOY)
- Scenario 5 – 2043 Baseline – baseline traffic flows (DMFY)
- Scenario 6 – 2043 Baseline + proposed development – baseline traffic flows, plus traffic associated with the proposed development (DSFY)

19.148 A summary of the traffic flow data and associated noise levels for the road link and scenarios is provided in Appendix 19.4 (**Volume 2**). The increase in noise arising on the road link as a result of the proposed development is provided in the last columns of the appendix, calculated using the methodology presented in CRTN.

19.149 The following noise change has been calculated:

- Scenario 4 – Scenario 3 (short term change)
- Scenario 6 – Scenario 3 (long term change)

19.150 With reference to Appendix 19.4, the noise change on Market Street is 0.1 dB in the short term and long term. The change results in a negligible impact on Market Street, in both the short term and long term period. Therefore, at high sensitivity NVSRs (as defined in Table 19-12), with a negligible impact of magnitude, the significance of effect in regard to operational traffic noise is **slight.** The effects however are considered to be **not significant**, as the minor increase in noise level would have no effect on the residual sound levels experienced by receptors in the area.

Do Nothing Scenario

19.151 The traffic data provided for the assessment includes traffic flows for a 2028 and 2043 baseline scenario, the opening year, and 15 years beyond the opening year of the proposed development, respectively, without the proposed development in place (a Do Nothing Scenario). This data includes traffic flows from all approved development in the area which would have an influence on the local road network to Stranraer. The data shows a small increase in traffic flows on the immediate road network to the proposed development. This increase in traffic flows has no influence on the calculated $L_{A10,18hour}$ between 2026, 2028 and 2043. This increase in traffic flows may result in a small increase in the ambient noise levels, on those captured at the time of assessment.

19.152 Therefore, when considering a 'Do Nothing Scenario', the acoustic environment would likely be similar to that experienced when undertaking the baseline survey work for the EIA of the proposed development.

Mitigation, Monitoring and Residual Effects

Mitigation/ Monitoring

Construction Noise and Vibration

19.153 Based on the outcome of the assessment, additional mitigation will be required to reduce noise and vibration impacts as to not result in significant adverse effects. Noise and vibration would be primarily managed through the Construction Environmental Management Plan (CEMP) developed for the project.

19.154 The following measures will be incorporated into the final CEMP, which will include a Noise and Vibration Management Plan (NVMP), and applied by the pre-construction Contractor (Balfour Beatty Civil Engineering Limited (BBCEL)) to control noise and vibration as far as practicable:

- Noise and vibration monitoring is undertaken throughout the works, with appropriate trigger levels set to ensure threshold values within BS 5228 are not exceeded. These are to be agreed with DGC;
- All vehicles, plant and equipment working within the site shall be fitted with efficient silencers. Position plant as far away from sensitive receptors as possible;
- Intermittently operating plant will be shut down in the intervening periods between operations. Start-up plant and vehicles sequentially rather than simultaneously. Avoid unnecessary revving of engines;
- Where possible low noise and vibration emitting plant would be selected;
- Were reasonably practicable, low vibration working methods should be employed. Isolate equipment using resilient mountings if vibration levels are deemed high;
- New plant would be used where practical and regular maintenance undertaken, including maintenance related to noise emissions;
- Consideration should be given to use of the most suitable plant, reasonable hours of working for operations which might give rise to perceptible noise and vibrations, and economy and speed of operations;
- Care will be taken when erecting or striking Heras fencing to avoid impact noise from banging steel. All operatives undertaking such activities will be instructed on the importance of handling the fencing to reduce noise to a minimum;
- Use rubber linings in, for example, chutes and dumpers to reduce impact noise;
- Reduce drop heights of materials. Load and unload as far away from sensitive receptors as possible;
- Wherever possible, the use of hydraulic attachments or other means of crushing concrete and hard materials will be used in preference to pneumatic breakers;

- Regular liaison with local residents to inform them of operations on site, including periods of temporary operations when noise levels would exceed those normally defined for the site; and
- Where vehicle reversing alarms are required, they should be designed to cause the lowest practical environmental impact; preferably they should be directional broadband noise emitters or automatically adjusted to ambient noise levels.

19.155 At times when the trigger level is being approached, the activity taking place will be reviewed and additional control measures will be implemented as above. When the trigger level has been exceeded, work on site will cease and the activity taking place will be reviewed. Control measures in place will be reviewed and works will be amended as necessary, to ensure noise and vibration levels are below the set trigger level.

19.156 A procedure for complaints will also be included within the final CEMP:

- The site manager (or equivalent) will record the details of the complaint, in a log held at the site office;
- Any noise or vibration complaint will be immediately investigated, and where necessary, measures will be implemented by the site manager to reduce noise or vibration levels associated with the construction activities responsible for the complaint;
- In the event of a noise or vibration complaint, consideration will be given to the nature of the operations which were taking place at the time. As necessary, the relevant operational procedures which caused the complaint will be reviewed and improvements implemented by the site manager. In addition, the wind speed and direction at the time of the complaint will be noted, as this might have contributed to the level of noise received by the complainant;
- Complaints will be dealt with immediately, and the timeframe for resolving noise or vibration issues will be 24 hours. Works will be ceased where suitable controls cannot be implemented within 24 hours;
- Within 48 hours of receiving the complaint, the complainant will be informed by the Site Manager of the results of the investigation and of what remedial actions have been taken;
- Details of all noise or vibration complaints, and any actions undertaken as a result of investigations, will be recorded by the site manager in the log; and
- If justified noise or vibration complaints persist, the site manager will arrange for independent noise or vibration monitoring to be carried out at the location of the complainant to determine the scale and nature of noise or vibration levels received. The results of the noise or vibration monitoring will be independently evaluated to determine if permitted noise or vibration limits have been breached. Based on the

findings of the noise or vibration monitoring results, appropriate actions will be taken by the site manager to reduce noise or vibration emissions as appropriate.

Operational Noise

19.157 Based on the rating level of the proposed development meeting the noise limits stated within Table 19-15, no additional mitigation in relation to the operational phase is required. However as the uses of the proposed workshops are currently unknown, it is believed appropriate to suggest mitigation, which once operational, will assist in managing noise to avoid the potential for significant adverse effects. Such mitigation, which can be secured through the implementation of an Operational Noise Management Plan, may include:

- Raising awareness to occupants of the proposed development to the impact of noise;
- Ensuring occupants keep noise generation to a minimum;
- Avoid noise generating activities at sensitive periods, such as night-time (23:00 to 07:00) and early morning (07:00 to 08:00);
- Shut doors to premises wherever possible to reduce noise breakout;
- No idling of vehicles;
- Complaints process;
    - The Client (or equivalent) will record the details of the complaint, in a log held at the site office.
    - Any noise complaint will be immediately investigated, and where necessary, measures will be implemented by the Client to reduce noise levels associated with the operational activities responsible for the complaint.
    - In the event of a noise complaint, consideration will be given to the nature of the operations which were taking place at the time. As necessary, the relevant operational procedures which caused the complaint will be reviewed and improvements implemented by the Client. In addition, the wind speed and direction at the time of the complaint will be noted, as this might have contributed to the level of noise received by the complainant.
    - Complaints will be dealt with immediately, and the timeframe for resolving noise or vibration issues will be 24 hours. Works will be ceased where suitable controls cannot be implemented within 24 hours.
    - Within 48 hours the complainant will be informed by the Client of the results of the investigation and of what remedial actions have been taken.
    - Details of all noise complaints, and any actions undertaken as a result of investigations, will be recorded by the Client in the log.
    - If justified noise complaints persist, the Client will arrange for an independent noise investigation to be carried out at the location of the complainant to determine the scale and nature of noise levels received. The results of the

noise monitoring will be independently evaluated to determine if permitted noise limits have been breached. Based on the findings of the noise monitoring results, appropriate actions will be taken by the Client to reduce noise emissions as appropriate.

Residual Effects

Construction Noise

19.158 Based on the additional mitigation set out above, the following corrections have been applied to the plant, as set out in Table 19-16.

Table 19-16: Noise reduction levels for typical construction plant

Plant	Mitigation Measure	A-weighted sound reduction dB	Justification
Earth-moving plant (e.g. bulldozer, excavator, crane, loader)	Fit more efficient exhaust sound reduction equipment	5 to 10 dB	Table B.1, Annex B, BS 5228 - 1:2009+A1:2014
Compressors and generators	Fit more efficient exhaust sound reduction equipment	Up to 10 dB	Table B.1, Annex B, BS 5228 - 1:2009+A1:2014

19.159 The highest reductions from Table 19-16 have been applied to the plant. This approach is believed appropriate based on the age of the plant contained with BS 5228, where newer machinery, as compared to 2014 (the date of publication of BS 5228) would be used in the construction of the Proposed development. Newer plant would likely have lower noise levels. However other measures, such as those detailed in paragraph 19.154 have not been incorporated into the residual assessment, as the CEMP is yet to be finalised.

19.160 The impact assessment has been repeated, as shown in Table 19-17. Full details of the calculations are provided in Appendix 19.5 (**Volume 2**).

19.161 As shown in Table 19-17, the impact at the NVSRs, and resulting significance, have the potential to be reduced as a result of applying mitigation. Details on exact plant, its location of use, construction programme, and on-times of plant are still in development. Due to this, a reasonable worst-case assumption has been made, with all plant assumed in the same location and working continuously for 10 hours per day (5 hours on a Saturday). It is anticipated that refinements to the plant, programme, and on-times will be made as the project is further developed, which may result in a reduction in the severity and number of significant adverse effects from the works.

19.162 However, it is likely that, despite these refinements, the nature of the works is likely to result in significant adverse effects during the following phases at the specified NVSRs:

- Site Establishment – NVSR5 and NVSR9;
- New Sheet Piled Wall at Breastworks – NVSR5 and NVSR9;
- Dredging, Breakwater and East Car Park Revetment and Reclamation – NVSRs 3 – 6, NVSR9;
- Breastworks Car Park – NVSR4; and
- Demobilisation – NVSR1, NVSRs 2 – 5, NVSR9

19.163 With implementation of the CEMP however, and installation of hoarding along the site boundary facing onto Market Street, these significant adverse effects could be avoided. Hoarding will reduce noise levels further by removing line of sight between the noise source and the NVSR. In addition, noise monitoring in place during the works, with appropriate trigger levels to be agreed with DGC, will notify the pre-construction Contractor (Balfour Beatty Civil Engineering Limited (BBCEL)) when works could cause an adverse effect. At times when the trigger level is being approached, the activity taking place will be reviewed and additional control measures will be implemented as above. When the trigger level has been exceeded, work on site will cease and the activity taking place will be reviewed. Control measures in place will be reviewed and works will be amended as necessary, to ensure noise and vibration levels are below the set trigger level.

19.164 Furthermore, with regard to site establishment, Breastworks Car Park, and demobilisation, these activities are of a shorter term in duration (less than 4 weeks). The plant for each phase of works are unlikely to be in use for the whole working period, for example, the diesel pressure washer during demobilisation; this plant is likely to be used only once all other plant is removed from the working area. The predicted levels presented in Table 19-17 assume however all plant will be used at the same time and located on the site boundary closest to the NVSR.

19.165 In regard to the activity ‘Dredging, Breakwater and East Car Park Revetment and Reclamation’, the predicted levels presented in Table 19-17 assume all these activities will occur concurrently; however in reality these activities would be phased, reducing the number of plant in use and consequent construction noise levels at NVSRs.

19.166 Furthermore, in regard to dredging, and the new sheet piled wall, the predictions do not take into account existing harbour wall screening. The predicted levels presented in Table 19-17 assume all construction plant within the marina is at the same level as the NVSRs. In reality, the marina is at a lower elevation to these NVSRs and therefore plant will be partially screened, resulting in lower construction noise levels than those predicted.

19.167 Taking these factors into consideration, noise levels can be managed during the construction phase so that significant adverse effects can be avoided.

Construction Vibration

19.168 With implementation of the CEMP, such as through those measures identified in paragraph 19.154, vibration can be controlled to avoid significant adverse effects.

Table 19-17 Summary of Predicted Construction Noise Levels – With Mitigation

Receptor	Value	Significance of Effect	Mitigation	Noise Level (dB(A))	Magnitude of Residual Impact	Significance of Residual Impact
Site Establishment						
NVSR1	High	Moderate / Substantial	As detailed in Table 19-16	69	Negligible	Slight
NVSR2	High	Slight / Moderate		62	Negligible	Slight
NVSR3	High	Moderate / Substantial		69	Negligible	Slight
NVSR4	Medium	Moderate		70	Negligible	Negligible / Slight
NVSR5	Medium	Moderate / Substantial		77	Medium	Moderate
NVSR6	Medium	Slight		65	Negligible	Negligible / Slight
NVSR7	Medium	Negligible / Slight		52	Negligible	Negligible / Slight
NVSR8	High	Slight		58	Negligible	Slight
NVSR9	Medium	Moderate / Substantial		76	Medium	Moderate
New Sheet Piled Wall at Breastworks						
NVSR1	High	Slight	As detailed in Table 19-16	53	Negligible	Slight
NVSR2	High	Slight / Moderate		58	Negligible	Slight
NVSR3	High	Slight / Moderate		59	Negligible	Slight

Receptor	Value	Significance of Effect	Mitigation	Noise Level (dB(A))	Magnitude of Residual Impact	Significance of Residual Impact
NVSR4	Medium	Moderate		60	Negligible	Negligible / Slight
NVSR5	Medium	Moderate / Substantial		75	Medium	Moderate
NVSR6	Medium	Negligible / Slight		52	Negligible	Negligible / Slight
NVSR7	Medium	Negligible / Slight		46	Negligible	Negligible / Slight
NVSR8	High	Slight / Moderate		56	Negligible	Slight
NVSR9	Medium	Moderate / Substantial		72	Medium	Moderate
Dredging, Breakwater and East Car Park Revetment and Reclamation						
NVSR1	High	Substantial	As detailed in Table 19-16	66	Low	Slight / Moderate
NVSR2	High	Substantial		70	Low	Slight / Moderate
NVSR3	High	Substantial		71	Medium	Moderate / Substantial
NVSR4	Medium	Moderate / Substantial		72	Medium	Moderate
NVSR5	Medium	Moderate / Substantial		87	High	Moderate / Substantial
NVSR6	Medium	Moderate / Substantial		78	High	Moderate / Substantial
NVSR7	Medium	Moderate / Substantial		65	Low	Slight
NVSR8	High	Substantial		68	Low	Slight / Moderate

Receptor	Value	Significance of Effect	Mitigation	Noise Level (dB(A))	Magnitude of Residual Impact	Significance of Residual Impact
NVSR9	Medium	Moderate / Substantial		82	High	Moderate / Substantial
Extend Breakwater						
NVSR1	High	Slight	As detailed in Table 19-16	41	Negligible	Slight
NVSR2	High	Slight		42	Negligible	Slight
NVSR3	High	Slight		42	Negligible	Slight
NVSR4	Medium	Negligible / Slight		43	Negligible	Negligible / Slight
NVSR5	Medium	Negligible / Slight		43	Negligible	Negligible / Slight
NVSR6	Medium	Negligible / Slight		41	Negligible	Negligible / Slight
NVSR7	Medium	Negligible / Slight		39	Negligible	Negligible / Slight
NVSR8	High	Slight		42	Negligible	Slight
NVSR9	Medium	Negligible / Slight		44	Negligible	Negligible / Slight
New Marina Facility						
NVSR1	High	Slight	As detailed in Table 19-16	50	Negligible	Slight
NVSR2	High	Slight / Moderate		54	Negligible	Slight
NVSR3	High	Slight / Moderate		56	Negligible	Slight
NVSR4	Medium	Moderate		57	Negligible	Negligible / Slight
NVSR5	Medium	Moderate		59	Negligible	Negligible / Slight

Receptor	Value	Significance of Effect	Mitigation	Noise Level (dB(A))	Magnitude of Residual Impact	Significance of Residual Impact
NVSR6	Medium	Negligible / Slight		50	Negligible	Negligible / Slight
NVSR7	Medium	Negligible / Slight		45	Negligible	Negligible / Slight
NVSR8	High	Slight / Moderate		55	Negligible	Slight
NVSR9	Medium	Moderate / Substantial		62	Negligible	Negligible / Slight
Marine Plant Install, Piling and Installation of Pontoons						
NVSR1	High	Slight	As detailed in Table 19-16	53	Negligible	Slight
NVSR2	High	Slight / Moderate		57	Negligible	Slight
NVSR3	High	Slight / Moderate		59	Negligible	Slight
NVSR4	Medium	Moderate		61	Negligible	Negligible / Slight
NVSR5	Medium	Moderate		63	Negligible	Negligible / Slight
NVSR6	Medium	Negligible / Slight		54	Negligible	Negligible / Slight
NVSR7	Medium	Negligible / Slight		48	Negligible	Negligible / Slight
NVSR8	High	Slight / Moderate		59	Negligible	Slight
NVSR9	Medium	Moderate / Substantial		66	Low	Slight
Install West Linkbridge and Demobilise Marine Plant						
NVSR1	High	Slight		40	Negligible	Slight

Receptor	Value	Significance of Effect	Mitigation	Noise Level (dB(A))	Magnitude of Residual Impact	Significance of Residual Impact
NVSR2	High	Slight	As detailed in Table 19-16	43	Negligible	Slight
NVSR3	High	Slight		45	Negligible	Slight
NVSR4	Medium	Negligible / Slight		51	Negligible	Negligible / Slight
NVSR5	Medium	Negligible / Slight		45	Negligible	Negligible / Slight
NVSR6	Medium	Negligible / Slight		39	Negligible	Negligible / Slight
NVSR7	Medium	Negligible / Slight		34	Negligible	Negligible / Slight
NVSR8	High	Slight		47	Negligible	Slight
NVSR9	Medium	Negligible / Slight		48	Negligible	Negligible / Slight
Buildings - Boatyard Workshop						
NVSR1	High	Slight / Moderate	As detailed in Table 19-16	60	Negligible	Slight
NVSR2	High	Slight / Moderate		58	Negligible	Slight
NVSR3	High	Slight / Moderate		59	Negligible	Slight
NVSR4	Medium	Slight		56	Negligible	Negligible / Slight
NVSR5	Medium	Negligible / Slight		51	Negligible	Negligible / Slight
NVSR6	Medium	Negligible / Slight		48	Negligible	Negligible / Slight
NVSR7	Medium	Negligible / Slight		46	Negligible	Negligible / Slight

Receptor	Value	Significance of Effect	Mitigation	Noise Level (dB(A))	Magnitude of Residual Impact	Significance of Residual Impact
NVSR8	High	Slight		53	Negligible	Slight
NVSR9	Medium	Moderate		61	Negligible	Negligible / Slight
SCAMPP / Coastguard Building						
NVSR1	High	Slight / Moderate	As detailed in Table 19-16	59	Negligible	Slight
NVSR2	High	Slight / Moderate		59	Negligible	Slight
NVSR3	High	Slight / Moderate		59	Negligible	Slight
NVSR4	Medium	Slight		57	Negligible	Negligible / Slight
NVSR5	Medium	Negligible / Slight		51	Negligible	Negligible / Slight
NVSR6	Medium	Negligible / Slight		48	Negligible	Negligible / Slight
NVSR7	Medium	Negligible / Slight		46	Negligible	Negligible / Slight
NVSR8	High	Slight		54	Negligible	Slight
NVSR9	Medium	Moderate		62	Negligible	Negligible / Slight
Refurbish existing Harbourmaster Building						
NVSR1	High	Slight / Moderate	As detailed in Table 19-16	56	Negligible	Slight
NVSR2	High	Slight / Moderate		56	Negligible	Slight
NVSR3	High	Slight / Moderate		56	Negligible	Slight

Receptor	Value	Significance of Effect	Mitigation	Noise Level (dB(A))	Magnitude of Residual Impact	Significance of Residual Impact
NVSR4	Medium	Negligible / Slight		55	Negligible	Negligible / Slight
NVSR5	Medium	Negligible / Slight		51	Negligible	Negligible / Slight
NVSR6	Medium	Negligible / Slight		48	Negligible	Negligible / Slight
NVSR7	Medium	Negligible / Slight		46	Negligible	Negligible / Slight
NVSR8	High	Slight		53	Negligible	Slight
NVSR9	Medium	Slight		59	Negligible	Negligible / Slight
East Car Park Works						
NVSR1	High	Slight	As detailed in Table 19-16	50	Negligible	Slight
NVSR2	High	Slight		51	Negligible	Slight
NVSR3	High	Slight		52	Negligible	Slight
NVSR4	Medium	Negligible / Slight		54	Negligible	Negligible / Slight
NVSR5	Medium	Moderate		62	Negligible	Negligible / Slight
NVSR6	Medium	Moderate / Substantial		75	Medium	Moderate
NVSR7	Medium	Moderate		62	Negligible	Negligible / Slight
NVSR8	High	Slight / Moderate		55	Negligible	Slight
NVSR9	Medium	Negligible / Slight		52	Negligible	Negligible / Slight

Receptor	Value	Significance of Effect	Mitigation	Noise Level (dB(A))	Magnitude of Residual Impact	Significance of Residual Impact
West Car Park Works						
NVSR1	High	Substantial	As detailed in Table 19-16	79	Medium	Moderate / Substantial
NVSR2	High	Substantial		74	Low	Slight / Moderate
NVSR3	High	Substantial		72	Low	Slight / Moderate
NVSR4	Medium	Slight		64	Negligible	Negligible / Slight
NVSR5	Medium	Negligible / Slight		54	Negligible	Negligible / Slight
NVSR6	Medium	Negligible / Slight		51	Negligible	Negligible / Slight
NVSR7	Medium	Negligible / Slight		48	Negligible	Negligible / Slight
NVSR8	High	Slight		59	Negligible	Slight
NVSR9	Medium	Moderate / Substantial		74	Low	Slight
Breastworks Car Park						
NVSR1	High	Slight / Moderate	As detailed in Table 19-16	64	Negligible	Slight
NVSR2	High	Moderate / Substantial		68	Negligible	Slight
NVSR3	High	Substantial		75	Low	Slight / Moderate
NVSR4	Medium	Moderate / Substantial		79	Medium	Moderate

Receptor	Value	Significance of Effect	Mitigation	Noise Level (dB(A))	Magnitude of Residual Impact	Significance of Residual Impact
NVSR5	Medium	Moderate / Substantial		71	Low	Slight
NVSR6	Medium	Negligible / Slight		59	Negligible	Negligible / Slight
NVSR7	Medium	Negligible / Slight		53	Negligible	Negligible / Slight
NVSR8	High	Moderate / Substantial		69	Negligible	Slight
NVSR9	Medium	Moderate / Substantial		86	High	Moderate / Substantial
Extend Boatyard						
NVSR1	High	Moderate / Substantial	As detailed in Table 19-16	63	Negligible	Slight
NVSR2	High	Moderate / Substantial		61	Negligible	Slight
NVSR3	High	Moderate / Substantial		61	Negligible	Slight
NVSR4	Medium	Slight		57	Negligible	Negligible / Slight
NVSR5	Medium	Negligible / Slight		52	Negligible	Negligible / Slight
NVSR6	Medium	Negligible / Slight		50	Negligible	Negligible / Slight
NVSR7	Medium	Negligible / Slight		47	Negligible	Negligible / Slight
NVSR8	High	Slight / Moderate		55	Negligible	Slight
NVSR9	Medium	Moderate		63	Negligible	Negligible / Slight

Receptor	Value	Significance of Effect	Mitigation	Noise Level (dB(A))	Magnitude of Residual Impact	Significance of Residual Impact
Fisherman's Compound						
NVSR1	High	Slight	As detailed in Table 19-16	57	Negligible	Slight
NVSR2	High	Slight		58	Negligible	Slight
NVSR3	High	Slight		59	Negligible	Slight
NVSR4	Medium	Negligible / Slight		58	Negligible	Negligible / Slight
NVSR5	Medium	Negligible / Slight		54	Negligible	Negligible / Slight
NVSR6	Medium	Negligible / Slight		51	Negligible	Negligible / Slight
NVSR7	Medium	Negligible / Slight		49	Negligible	Negligible / Slight
NVSR8	High	Slight		56	Negligible	Slight
NVSR9	Medium	Slight		61	Negligible	Negligible / Slight
Demobilise						
NVSR1	High	Substantial	As detailed in Table 19-16	77	Medium	Moderate / Substantial
NVSR2	High	Moderate / Substantial		70	Negligible	Slight
NVSR3	High	Substantial		76	Medium	Moderate / Substantial
NVSR4	Medium	Moderate / Substantial		77	Medium	Moderate
NVSR5	Medium	Moderate / Substantial		84	High	Moderate / Substantial

Receptor	Value	Significance of Effect	Mitigation	Noise Level (dB(A))	Magnitude of Residual Impact	Significance of Residual Impact
NVSR6	Medium	Moderate / Substantial		72	Low	Slight
NVSR7	Medium	Negligible / Slight		59	Negligible	Negligible / Slight
NVSR8	High	Moderate / Substantial		66	Negligible	Slight
NVSR9	Medium	Moderate / Substantial		83	High	Moderate / Substantial

Cumulative Effects

19.169 The following committed and reasonably foreseeable projects have been considered in the cumulative assessment:

- Planning Applications - Approved:
  - Installation of 4 electric vehicle charging points with associated charging upstands, supporting equipment cabinets and substation infrastructure (Planning Ref. 23/0739/CLP)
  - Erection of boat shelter with roof mounted solar panels; extension to boat yard including formation of hardstanding area, installation of pole mounted flood lights, erection of 2 metre high security fencing and formation of gated access; formation of instructor platform, equipment lay down area, open air showers, stepped access to the beach and erection of instructor shelter (Planning Ref. 23/0976/FUL)
  - Erection of watersports centre and installation of roof mounted solar photovoltaic panels, formation of additional parking area with associated hard and soft landscaping and formation of footpath (Planning Ref. 23/0970/FUL)
  - Consent under section 36 of the electricity act 1989 and deemed planning permission under section 57(2) of the town and country planning (Scotland) act 1997 for construction and operation of mid moile wind farm within the planning authority area of Dumfries and Galloway council (Planning Ref. 22/0394/S36)
  - change of use of part of former port to form haulage yard (class 6), siting of office, erection of 3 metre high security fencing and access gate and installation of security lighting columns (partially retrospective) (Planning Ref. 24/1407/FUL)
  - Formation of coastal habitat for seabirds including formation of inland pool with islands, water inlets and outlets from and into loch ryan, screening bunds up to 2 metre high, 3 bird hides, access routes, upgrading bridge crossing of corsewall burn, landscaping and associated works including relocation of excavated earth to southern field (Planning Ref. 24/1534/FUL)
  - Installation of one 10 metre high streetworks column, 3 antennas,1 network camera, 1 equipment cabinet and associated works (Planning Ref. 25/0778/FUL)
- Planning Applications - Awaiting Decision:
  - Erection of 77 dwellinghouses with roof mounted solar panels and air source heat pumps, formation of access and internal road and footpath layout, 178

car parking spaces, landscaping, suds drainage pond and associated infrastructure (Planning Ref. 24/2518/FUL)

- Erection of transport hub with roof mounted photovoltaic panels incorporating provision of secure bicycle locker storage for bicycles, e-bikes (electric bicycles) and acc-bikes (accessible electric bicycles), bike wash/pump/repair station, public toilets, bus waiting area(s), internal general purpose space and external shelter with fixed benching and installation of 5no. bike stands and 4no. electric vehicle charging units (Planning Ref. 25/1190/FUL)

- Marine Licenses - Approved:
  - Maintenance Dredging and sea deposit - Use of plough dredger to move material from the dredging area in to the deep void situated off the old Stena Line terminal between the East Pier and Ross Pier. Water injection will be used to liquefy and move any material under the marina pontoons which are inaccessible to the plough dredger. This material will then also be moved by plough dredging (Ref. 00008983)
  - Deposit of Oyster Shells - Marine Licence Application (Ref. 07059)
  - Capital Dredging and Sea Disposal - Loch Ryan Port, Cairnryan (Ref. 00009930)
- Marine Licenses - Awaiting Decision:
  - Construction of: Platform for instructor shelter. Removal of: 2 no. redundant sewer outfall pipes & debris, unlit beacon, removal of boulders, beach clearance (Ref. 00010825)
  - Marine Construction & Pontoon Deposit - 8 (pontoons) + 3 (racing markers). Moorings are for offshore pontoons as opposed to vessels. Small craft (eg. SUP, dinghies) will dock against the pontoons temporarily as rest stations. No vessels will be moored to the racing markers. (Ref. 00010841)
  - Marine Licence Application – 18 Moorings (Ref. 00010772)

Construction and Operational Noise Cumulative Impact

19.170 In regard to the marine license applications, these practices are standard and form part of the soundscape of a coastal town with a marina. The location of the applications is mainly offshore and considered at a distance from the proposed development which is unlikely to result in a cumulative impact.

19.171 In regard to the planning applications, for those approved, the only cumulative impact could relate to construction should it occur concurrently. The only approved developments in close proximity to the proposed development are Planning Refs 23/0739/CLP, 23/0976/FUL, 23/0970/FUL and 24/1407/FUL, however due to the size and nature of these developments, any noise generated from these would have negligible impact on the noise levels predicted from construction of the proposed development.

For those awaiting decision, only Planning Ref. 25/1190/FUL is deemed close enough to cause a potential cumulative impact. Due to the size and nature of the development however, it is unlikely to have any influence, with noise from the proposed development dominating.

Construction Traffic Noise Cumulative Impact

19.172 In regard to traffic associated with the committed and reasonably foreseeable projects, traffic flow data has been provided by the projects transport consultant which includes traffic associated with these projects on the road network assessed, in addition to traffic associated with the proposed development.

19.173 Traffic data was provided for the following scenarios:

- Scenario 1 – 2026 Baseline – baseline traffic flows in 2026; and
- Scenario 7 – 2026 Baseline + approved construction traffic – baseline traffic flows, plus construction traffic associated with approved development; and
- Scenario 8 – 2026 Baseline + approved construction traffic + proposed construction traffic – baseline traffic flows, plus construction traffic associated with approved development and the proposed development

19.174 A summary of the traffic flow data and associated noise levels for each of the links and scenarios is provided in Appendix 19.4 (**Volume 2**). The change in noise arising on the road link as a result of the proposed development, and other committed developments traffic has been calculated for the following:

- Scenario 8 – Scenario 1

19.175 With reference to Appendix 19.4, the noise change on Market Street is + 0.6 dB. This change results in a negligible impact. Therefore, at high sensitivity NVSRs (as defined in Table 19-12), with a negligible impact of magnitude, the significance of effect in regard to construction traffic noise is **slight.** The effects however are considered to be **not significant**, as the minor increase in noise level would have no effect on the residual sound levels experienced by receptors in the area.

Operational Traffic Noise Cumulative Impact

19.176 In regard to traffic associated with the committed and reasonably foreseeable projects, traffic flow data has been provided by the projects transport consultant which includes traffic associated with these projects on the road network assessed, in addition to traffic associated with the proposed development.

19.177 Traffic data was provided for the following scenarios:

- Scenario 3 – 2028 Baseline – baseline traffic flows (DMOY)
- Scenario 5 – 2043 Baseline – baseline traffic flows (DMFY)
- Scenario 9 – 2028 Baseline + approved development – baseline traffic flows, plus traffic associated with approved development
- Scenario 10 - 2028 Baseline + approved development + proposed development – baseline traffic flows, plus traffic associated with approved development and the proposed development

- Scenario 11 – 2043 Baseline + approved development – baseline traffic flows, plus traffic associated with approved development
- Scenario 12 - 2043 Baseline + approved development + proposed development – baseline traffic flows, plus traffic associated with approved development and the proposed development

19.178 A summary of the traffic flow data and associated noise levels for the road link and scenarios is provided in Appendix 19.4 (**Volume 2**). The increase in noise arising on the road link as a result of the proposed development is provided in the last columns of the appendix, calculated using the methodology presented in CRTN.

19.179 The following noise change has been calculated:

- Scenario 10 – Scenario 3 (short term change)
- Scenario 12 – Scenario 3 (long term change)

19.180 With reference to Appendix 19.4, the noise change on Market Street is + 0.3 dB in the short term and + 0.2 dB in the long term. The change results in a negligible impact on Market Street, in both the short term and long term period. Therefore, at high sensitivity NVSRs (as defined in Table 19-12), with a negligible impact of magnitude, the significance of effect in regard to operational traffic noise is **slight.** The effects however are considered to be **not significant**, as the minor increase in noise level would have no effect on the residual sound levels experienced by receptors in the area.

Summary and Conclusions

19.181 This chapter assesses the likely significant noise and vibration effects resulting from the proposed development, during both construction and operational phases.

19.182 To establish baseline noise levels, at a number of existing sensitive receptors an attended noise survey has been carried out.

19.183 The potential noise impacts affecting existing sensitive receptors with regard to construction associated with the proposed development have been considered and have been assessed using appropriate guidance. A robust, 'worst-case' scenario has been considered, with construction plant assumed all in the same location.

19.184 In regard to the operational phase, based on the end users of the proposed development being unknown, the assessment has focused on setting noise limit at NVSRs, to avoid a significant adverse effect.

Construction Noise and Vibration

19.185 During construction, noise and vibration has the potential to cause significant effects at nearby NVSRs. Therefore, additional mitigation and management strategies will be required to help minimise and alleviate, as far as reasonably practicable, the likelihood of significant adverse effects. The resultant worst case residual effects at the NVSRs are as follows, and only relate to certain activities during the construction period:

- NVSR1 – moderate/substantial (West Car Park Works, Demobilising)
- NVSR2 – slight/moderate (Dredging, Breakwater and East Car Park Revetment and Reclamation, West Car Park Works)
- NVSR3 – moderate/substantial (Dredging, Breakwater and East Car Park Revetment and Reclamation, Demobilising)
- NVSR4 – moderate (Dredging, Breakwater and East Car Park Revetment and Reclamation, West Car Park Works, Demobilising)
- NVSR5 – moderate/substantial (Dredging, Breakwater and East Car Park Revetment and Reclamation, Demobilising)
- NVSR6 – moderate/substantial (Dredging, Breakwater and East Car Park Revetment and Reclamation)
- NVSR7 – slight (Dredging, Breakwater and East Car Park Revetment and Reclamation)
- NVSR8 – slight/moderate (Dredging, Breakwater and East Car Park Revetment and Reclamation)
- NVSR9 - moderate/substantial (Dredging, Breakwater and East Car Park Revetment and Reclamation, Breastworks Car Park, Demobilising)

19.186 Examples of best practice measures which will be required to avoid significant and minimise adverse construction noise impacts are set out in paragraph 19.15419.154.

Operational Noise and Vibration

19.187 Based on the proposed development meeting the limits set at the NVSRs, there are **no predicted significant adverse effects** once the project is operational.

Development Generated Road Traffic Noise

19.188 The assessment has demonstrated traffic associated with both construction and operational phases of the proposed development will have a negligible impact, resulting in an overall **not significant** effect.

Mitigation Measures

19.189 Additional mitigation measures have been presented for both construction and operation of the proposed development to control noise and vibration as far as reasonably possible.