A12.0 Noise and vibration

A12.1 Methodology

A12.1.1 Methodology used to describe the existing environment

The description of the existing environment with regard to noise and vibration has been informed through a combination of desk-based review of existing information and targeted survey work. The scope of the survey was agreed with F.I.G. Planning and Building Services through the environmental scoping process, and is described in **Section A12.1.1.1**.

It should be noted that the impact of the COVID-19 pandemic may have impacted the baseline noise levels in the area during the time the baseline noise survey was undertaken. Where appropriate, data from previous baseline noise surveys undertaken within Stanley prior to the COVID-19 pandemic (**Section A12.2.2**) have also been used to inform the assessment.

A12.1.1.1 Site-specific baseline noise survey

Characterisation of the existing noise environment was conducted by undertaking a desk-based study of existing available geographical information (including aerial and satellite photography and mapping data) in order to determine the nearest noise sensitive receptors (NSRs) to the location of the proposed scheme and potential existing noise sources. This exercise was undertaken to identify suitable locations for surveying of baseline noise levels.

The principal sources of noise within and around the location of the proposed scheme are vessel activity associated with FIPASS and the TDF, vehicle movements on the local road network and activity in the industrial zone adjacent to FIPASS. Based on the findings of the desk-based review of geographical information and the review of existing noise sources in the area, residential NSRs potentially affected by the proposed scheme were identified and are detailed in **Table 12.1**

Table 12.1 Noise sensitive receptor locations

Receptor ID	Coordinates (WGS84-UTM-21S)		Description
NSR1	442875	4272533	Residential receptors within Stanley Growers premises; medium sensitivity.
NSR2	442677	4272611	Residential receptors within proposed Tussac House Extra Care Facility and other residential receptors along Ross Road; medium sensitivity.
NSR3	442644	4272408	Liberty Lodge residential premises, representative of residential receptors along Rowlands Rise, Ross Road and other nearby residential roads; medium sensitivity.
NSR4	443264	4272625	Accommodation at Seafarer’s Mission; medium sensitivity (the understanding is that the Seafarer’s Mission is not permanently occupied, however it has been included within the assessment as a residential receptor as a worst-case scenario).

Following completion of the desk-based review, a site-specific baseline noise survey was undertaken in January and February 2021, the approach to which was defined within the Environmental Scoping Report (**Ref. 4**). The survey comprised short-term attended baseline noise monitoring at Coastel Road (ST1) and long-term unattended monitoring at Stanley Growers (LT1) (see **Figure 12.1**).

Key

- Proposed scheme footprint
- Construction phase site layout
- Noise survey locations
- Noise sensitive receptors

REV	DATE	DESCRIPTION	BY	CHK	APP
P03	01.12.21	THIRD ISSUE	GC	SC	MS
P02	17.06.21	SECOND ISSUE	FC	SC	MS
P01	19.05.21	FIRST ISSUE	JT	SC	MS

CLIENT

DESIRE THE RIGHT

bam nuttall

PROJECT

New Port Facility at the Falkland Islands

TITLE

Noise Sensitive Receptor and Baseline Survey Locations

Marlborough House, Marlborough Crescent
Newcastle upon Tyne, NE1 4EE
Tel +44(0)191 2111300
Email: info.newcastle@rhdhv.com
Website: www.royalhaskoningdhv.com
Royal HaskoningDHV
Enhancing Society Together

DRAWN	CHECKED	APPROVED
FC	SC	MS

DATE	SCALE	REF.
01.12.21	1:8,000	

FIGURE No.	SUITABILITY	REVISION
12.1	S2	P03

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The monitoring locations were selected based on their proximity to existing and future sensitive receptor locations (namely Tussac House Extra Care Facility) and are considered appropriate to characterise the baseline noise environment. Further detail regarding the monitoring is provided in **Table 12.2**.

Table 12.2 Baseline noise monitoring locations

Measurement location	Coordinates (WGS84-UTM-21S)		Start date and time	Duration (hh:mm)	Description
LT1	443056	4272594	07/02/21 19:27	212:25	Long-term noise monitoring location at Stanley Growers premises, representative of the noise environment at NSR1, NSR2 and NSR3.
ST1	443804	4272695	08/01/21 17:10	00:30	Short-term monitoring location at Coastel Pier, representative of noise environment at NSR4.
			09/01/21 05:55	00:30	

The noise levels measured during the surveys included the following noise indices:

- $L_{Aeq,T}$ – the equivalent continuous sound pressure level. This is most commonly used to describe sound levels that fluctuate with time, providing an ‘average’ noise level over a specified time period.
- L_{Amax} – the maximum sound pressure level occurring within the defined measurement period.
- L_{A90} – statistical parameter representing the sound pressure level exceeded for 90% of the measurement period. This parameter is used to describe the ‘background sound level’ (as defined within BS 4142) and is indicative of the general noise level in the absence of any higher level, short duration events that occur during the period.
- L_{A10} – statistical parameter representing the sound pressure level exceeded for 10% of the measurement period. This parameter is considered a useful descriptor of road traffic noise.

Prior to the baseline noise survey, both the noise monitoring instrument (a 3M Sound Pro SE/DL Type 1 sound meter) and the calibration unit were sent to the UK for calibration. The calibration certificate can be found in **Appendix 10**. Weather monitoring was undertaken at each of the monitoring locations whilst noise monitoring was ongoing using a Davis Vantage Vue weather station (see **Plate 12.1**).

Plate 12.1 Weather station used during the January and February 2021 baseline noise survey

A12.1.1.2 Desk-based review of noise survey data from other surveys in the area

A desk-based assessment was undertaken to determine the availability of baseline noise monitoring data from other surveys undertaken within the area. The results from these surveys are detailed in **Section A12.2**.

A12.1.2 Methodology for assessment of potential construction phase impacts

A12.1.2.1 Temporary fixed and mobile construction plant

A construction phase noise and vibration impact assessment has been undertaken to assess the potential impact at the nearest residential receptors and within nearby areas of potential ecological importance (which has informed the assessment of potential impacts on marine, coastal and terrestrial ecology presented in **Section A9** and **A10**).

Thresholds for potential impact were determined from the methodology contained within BS 5228-1:2009+A1:2014, *Code of Practice for Noise and Vibration Control on Construction and Open Sites* (BS 5228-1).

The approach utilised in this assessment is the threshold based 'ABC' method detailed within BS 5228-1, which specifies a construction noise limit at residential receptors based on the existing ambient noise level and for different periods of the day. The predicted construction noise levels have been assessed against noise limits derived from advice within Annex E of BS 5228-1. **Table 12.3**, reproduced from Table E.1 of BS 5228-1, presents guidance criteria for construction noise thresholds at residential receptors.

Table 12.3 Construction noise threshold levels based on the ABC method

Assessment category and threshold value period	Threshold value, L_{Aeq} (dB)		
	Category A [A)]	Category B [B)]	Category C [C)]
Night-time (23.00 – 07.00)	45	50	55
Evenings and weekends [D)]	55	60	65
Daytime (07.00 – 19.00) and Saturdays (07.00 – 13.00)	65	70	75
[A)] Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.			
[B)] Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values.			
[C)] Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.			
[D)] 19.00–23.00 weekdays, 13.00–23.00 Saturdays and 07.00–23.00 Sundays.			

The 'ABC method' described in BS 5228 establishes that there is no impact below the three thresholds presented above. BS 5228 states:

> *"If the site noise level exceeds the appropriate category value, then a potential significant effect is indicated. The assessor then needs to consider other project-specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect."*

Construction phase noise levels have been calculated using the methods and guidance in BS 5228, based on the numbers, type of construction plant, and activities within the site, with corrections to account for:

- the 'on-time' of the plant, as a percentage of the assessment period;

- distance from source to receptor;
- acoustic screening by barriers, buildings or topography; and,
- ground type.

Baseline noise data from monitoring location LT1, as presented in **Table 12.18** shows that nearby residential receptors are defined by the Category A threshold for all reference periods; therefore, construction phase noise impacts have been assessed using the impact magnitude presented in **Table 12.4**.

Table 12.4- Construction noise magnitude of effect criteria

Magnitude of effect	Construction noise level (dB $L_{Aeq,T}$)		
	Daytime	Evenings and weekends	Night-time
Very low	<65	<55	<45
Low	≥65 – <66	≥55 – <56	≥45 – <46
Medium	≥66 - <68	≥56 - <58	≥46 - <48
High	≥68 - <70	≥58 - <60	≥48 - <50
Very high	≥70	≥60	≥50

SoundPLAN noise modelling software was utilised to predict the noise from construction plant associated with the proposed scheme. The software implements accepted national and international acoustic calculation standards.

BS 5228-1 provides calculation methodologies for construction plant, however; this calculation method is more suitable for distances up to 300m (as stated in section F.2.2.2 of BS 5228-1). Due to the separation distance between construction plant and NSRs, and the increasing importance of meteorological effects at greater distances, the methodology provided in ISO 9613-2 was utilised in the noise model.

A three-dimensional model was created using topographical data of the local area incorporating buildings, plans and elevations of the site. All identified receptor points within the noise model were positioned at heights of 1.5m above the local ground level. Ground surfaces within the study area are generally considered 'soft' with much of the intervening ground between the NSRs and the proposed work areas consisting of grassland and vegetated areas; therefore, an assumed ground attenuation factor[7] of 1.0 was included for onshore areas. For marine areas, a ground attenuation factor of 0.0 (hard ground) was implemented.

A12.1.2.2 Road traffic noise

Construction road traffic noise impacts have been assessed in accordance with the guidance provided in Highways England Design Manual for Roads and Bridges (DMRB), (LA111 Revision 2, May 2020).

In order to assess the noise impact of increased traffic flows along the local road network during construction, Basic Noise Level (BNL) calculations were undertaken in accordance with the methodology provided in Calculation of Road Traffic Noise (CRTN) using the predicted 18-hour Annual Average Weekday Traffic (AAWT) flows. BNL calculations, as outlined in CRTN Chart 3, and applying HGV percentage corrections from Chart 4, were conducted for baseline and construction phase traffic flows. The calculation uses the 18-hour AAWT traffic flows, HGV percentage and average vehicle speed to calculate the $L_{A10,18hr}$ at a reference distance of 10m from the nearest carriageway.

[7] The ground attenuation factor accounts for sound reflected by the ground surface interfering with the sound propagating directly from source to receiver within the noise modelling calculations.

Traffic data for the noise assessment were generated as 18hr AAWT (see **Section A14.2**) (as required by the CRTN methodology) for base 2022 and base 2022 + peak construction scenarios. The data were provided for the total traffic flow per link, the composition of the flow with percentage HGVs and speed data.

Increases in road traffic associated with the proposed construction phase have been determined by assessing the change in BNL. Impact magnitude criteria for construction traffic, as detailed in Table 3.17 of the DMRB, are displayed in **Table 12.5**.

Table 12.5 Construction road traffic noise magnitude of effect

Magnitude of effect	Increase in BNL of closest public road used for construction traffic (dB)
Major / high - very high	≥ 5.0
Moderate / medium	3.0 - 4.9
Minor / low	1.0 - 2.9
Negligible / very low	< 1.0

There are residential dwellings along several of the identified road links; therefore, medium receptor sensitivity is assumed for the construction road traffic noise assessment.

A12.1.2.3 Construction vibration

Ground-borne vibration can result from construction works and may lead to perceptible levels of vibration at nearby receptors, which at higher levels can cause annoyance to residents. In extreme cases, cosmetic or structural building damage can occur; however, vibration levels have to be of a significant magnitude for this effect to be manifested and such cases are rare.

High vibration levels generally arise from ‘heavy’ construction works such as piling, deep excavation or dynamic ground compaction.

Annex E of BS 5228-2:2009+A1:2014 contains empirical formulae derived by Hiller and Crabb (2000) from field measurements to predict peak particle velocity (PPV) (and, for some activities, probability of PPV being exceeded) for vibratory compaction, dynamic compaction, percussive and vibratory piling, the vibration of stone columns and tunnel boring operations. A series of calculations, following these methodologies, were carried out based on typical construction activities that have the potential to impart sufficient energy into the ground, applying reasonable worst case assumptions in order to determine set-back distances at which critical vibration levels may occur.

For construction vibration, the vibration level and related magnitude of effects presented in **Table 12.6** were adopted based on Table B-1 of BS 5228-2. These levels and effects are based on human perception of vibration in residential environments.

Table 12.6 Construction vibration - magnitude of effect

Vibration limit PPV ($mm.s^{-1}$)	Interpreted significance to humans	Magnitude of effect
<0.3	Vibration might just be perceptible in the most sensitive situations for most vibration frequencies associated with construction	Very low
≥0.3 - <1.0	Vibration might just be perceptible in residential environments	Low
≥1.0 - <10.0	It is likely that vibration at this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents	Medium

Vibration limit PPV ($mm.s^{-1}$)	Interpreted significance to humans	Magnitude of effect
≥10.0	Vibration is likely to be intolerable for any more than a brief exposure to this level	High - very high

The response of a building to ground-borne vibration is affected by the type of foundation, ground conditions, the building construction and the condition of the building. For construction vibration, the vibration level and effects detailed in **Table 12.7** were adopted based on BS 5228-2. Limits for transient vibration, above which cosmetic damage could occur, are given numerically in terms of PPV.

Table 12.7 Transient vibration guide values for cosmetic damage

Type of building	PPV in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings	50 $mm.s^{-1}$ at 4 Hz and above	
Un-reinforced or light framed structures Residential or light commercial type buildings	15 $mm.s^{-1}$ at 4 Hz increasing to 20 $mm.s^{-1}$ at 15 Hz	20 $mm.s^{-1}$ at 15 Hz increasing to 50 $mm.s^{-1}$ at 40 Hz and above

Table 12.8 lists the minimum set-back distances at which vibration levels of reportable significance for typical construction activities may occur; set back distances were derived using the calculation methods provided in BS 5228-2.

Table 12.8 Predicted distances at which vibration levels of reportable significance may occur

Activity	Set-back distance at which vibration level (PPV) occurs			
	0.3 $mm.s^{-1}$	1.0 $mm.s^{-1}$	10 $mm.s^{-1}$	15 $mm.s^{-1}$
Vibratory compaction (start-up)	166m	65m	9m	6m
Vibratory compaction (steady state)	102m	44m	8m	6m
Percussive piling (20kJ rig)	140m	60m	10.5m	7.5m

Table 12.9, reproduced from research (Rockhill *et al*, 2014), details minimum safe separation distances for piling activities from buildings to reduce the likelihood of cosmetic damage occurrence.

Table 12.9 Receptor proximity for indicated piling methods

Building type (limits on vibrations from Eurocode 3)	Piling method		
	Press-in	25 kJ drop hammer	170 kW 27 Hz vibrohammer
Architectural merit	2.6 m	29.6 m	27.7 m
Residential	0.5 m	11.8 m	13.8 m
Light commercial	0.14 m	5.9 m	5.5 m
Heavy industrial	0.06 m	3.9 m	3.7 m

Building type (limits on vibrations from Eurocode 3)	Piling method		
	Press-in	25 kJ drop hammer	170 kW 27 Hz vibrohammer
Buried services	0.03 m	2.9 m	2.2 m

Vibration from piling works associated with construction of the proposed quay are considered the most likely source of potential vibration impacts. Given the distance between piling activity and the nearest receptor location (approximately 200m), the resultant PPV levels would be of very low magnitude of effect; representing an impact of negligible significance at medium sensitivity receptors. Therefore, based on the above, further consideration of impacts from vibration are not considered necessary.

A12.1.3 Methodology for assessment of potential operational phase impacts

The operational phase assessment considers road traffic associated with the proposed scheme and potential noise impacts connected with vessel movements, fixed and mobile plant and cargo handling on sensitive receptors.

Operational phase vibration impacts were scoped out of the assessment and have therefore not been considered further.

A12.1.3.1 Industrial and commercial noise

Background context

BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* (BS 4142) describes a method of determining the level of noise of an industrial noise source and the existing background sound level[8], and the effect this has on people. The guidance incorporates a requirement for the assessment of uncertainty in environmental noise measurements and introduces the concepts of 'significant adverse impact' rather than likelihood of complaints. BS 4142 requires the consideration of the characteristics of the sound under investigation, time of day and frequency of occurrence.

Assessment is undertaken by subtracting the measured background sound level from the rating level for sources of sound; the greater this difference, the greater the magnitude of effect. The information in **Table 12.10** has been reproduced from guidance detailed in BS 4142.

Table 12.10 Information from BS 4142 regarding noise impact significance

Difference between rating level and background sound level	Implications of change according to BS 4142
Difference of around +10 dB or more	Likely to be an indication of a significant adverse impact, depending on the context
Difference of around +5 dB	Likely to be an indication of an adverse impact, depending on context
Other	The lower the rating level 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

[8] The terminology of 'background sound level' is taken from BS 4142 and is used to describe the noise level that is exceeded for 90% of the time (L_{A90}). This differs from the 'ambient sound level' which is used to describe the sound pressure level of the totally encompassing sound at a given time, over a given time interval ($L_{Aeq,T}$).

When assessing the noise from a source, which is classified as the Rated Noise Level, it is necessary to have regard to the acoustic features that may be present in the specific noise. Section 9.1 of BS 4142 allows for a correction to be applied to the rating level accounting for certain acoustic features (where present), as follows:

- Tonality - a penalty of 2 dB can be applied 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 penalty of 3 dB can be applied 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.
- Intermittency - If intermittency is readily distinctive against the existing acoustic environment, a penalty of 3 dB can be applied.
- Other sound characteristics - Where the specific sound feature characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the existing noise environment, a penalty of 3 dB can be applied.

The specific sound level, free from sounds influencing the ambient sound at the assessment location, is evaluated over the appropriate reference time interval:

- 1 hour during daytime hours (07:00 to 23:00 hours); and,
- 15 minutes during night-time hours (23:00 to 07:00 hours).

Site-specific approach

To predict noise from the operational aspects of the proposed scheme, SoundPLAN noise modelling software was utilised. The model incorporated proposed buildings, proposed fixed and mobile plant and vessel and HGV movements associated with the proposed scheme. The model also included nearby residential dwellings and other buildings in the study area, intervening ground cover and topographical information.

Noise levels for the operational phase were predicted at the NSR locations detailed in **Table 12.1**. Section 11 of BS 4142 states that:

"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."

Therefore, in addition to comparison of the predicted operational phase noise levels associated with the proposed scheme against the existing background sound level (L_{A90}), assessment on the predicted level alone and its likelihood of perceived impact has also been undertaken.

The long-term impact perceived for a change in noise level is presented in Table 7-13 of the IEMA Guidelines for Environmental Noise Impact Assessment (IEMA, 2014). These thresholds consider the overall change in $L_{Aeq,T}$ dB at NSRs due to the introduction of the proposed scheme.

The IEMA thresholds for sound level change are incorporated in **Table 12.11** are have been used in the assessment of operational phase noise associated with the proposed scheme.

Table 12.11 Operational phase noise magnitude of effect criteria for industrial/commercial noise sources

Rating level ($L_{Ar,Tr}$ dB)	Sound level change (dB $L_{Aeq,T}$) T = either 16hr day or 8hr night	Magnitude of effect
< Measured L_{A90}	< 3 dB	Very low
= Measured L_{A90} to + <5 dB	≥ 3 dB to < 5 dB	Low
Measured L_{A90} + 5 dB to <10 dB	≥ 5 dB to < 10 dB	Medium
≥ Measured L_{A90} + >10 dB	> 10 dB	High - very high

The baseline noise survey encapsulated noise associated with the existing FIPASS; therefore, comparison of the predicted operational phase noise level from the proposed scheme against the measured ambient noise levels will give an indication on the likely change in noise level perceived at the receptors.

A12.1.3.2 Road traffic noise

Operational phase road traffic noise impacts were assessed in accordance with the guidance provided in the DMRB, (LA111 Revision 2, May 2020).

Traffic data for the noise assessment were generated as 18hr AAWT (as required by the CRTN methodology) for base 2025 and base 2025 + operation scenarios (see **Section A14**). This is considered the earliest realistic year that the proposed scheme will be fully operational. **Section A14** also details the predicted total traffic flow per link, the composition of the flow with percentage HGVs and speed data.

All links were assessed following the BNL calculation procedure within CRTN to predict a relative $L_{A10,18hr}$ dB change for each link. The calculation also incorporates a correction for mean traffic speed and the percentage of heavy vehicles.

Operational road traffic noise impacts have been determined by assessing the change in $L_{A10,18hr}$. **Table 12.12** presents the magnitude of change (long term) criteria reproduced from Table 3.54b of the DMRB.

Table 12.12- Magnitude of effect criteria for operational phase road traffic noise

Magnitude of effect	Long-term noise change (dB $L_{10,18hr}$)
Major / high - very high	≥ 10
Moderate / medium	5.0 - 9.9
Minor / low	3.0 - 4.9
Negligible / very low	< 3.0

A12.1.4 Defining impact significance

Section A6.0 provides a summary of the general impact assessment methodology. The following confirms the approach used to define the impact significance relating to noise and vibration.

The definitions of sensitivity for the purpose of the noise and vibration assessment are provided in **Table 12.13**. The magnitude of each impact is as defined by the various numerical thresholds for each potential impact, as set out in earlier tables.

Table 12.13 Definition of sensitivity for the noise and vibration assessment

Sensitivity	Examples
High / very high	Noise receptors have been categorised as high sensitivity where noise may be detrimental to vulnerable receptors. Such receptors include certain hospital wards (e.g. operating theatres or high dependency units) or care homes at night. Vibration receptors have been categorised as high sensitivity where the receptors are listed buildings or Scheduled Monuments.
Medium	Noise receptors have been categorised as medium sensitivity where noise may cause disturbance and a level of protection is required but a level of tolerance is expected. Such subgroups include residential accommodation, private gardens, hospital wards, care homes, schools, universities, research facilities, national parks, (during the day) and temporary holiday accommodation at all times.

Sensitivity	Examples
	Vibration receptors have been categorised as medium sensitivity where the structural integrity of the structure is limited but the receptor is not a listed building or Scheduled Monument.
Low	Noise receptors have been categorised as low sensitivity where noise may cause short duration effects in a recreational setting although particularly high noise levels may cause a moderate effect. Such subgroups include offices, shops, outdoor amenity areas, long distance footpaths, doctor's surgeries, sports facilities and places of worship. Vibration receptors have been categorised as low sensitivity where the structural integrity of the structure is expected to be high.
Very low	Noise receptors have been categorised as negligible sensitivity where noise is not expected to be detrimental. Such subgroups include warehouses, light industry, car parks, and agricultural land. Vibration receptors have been categorised as negligible sensitivity where vibration is not expected to be detrimental.

Table 12.14 sets out the assessment matrix adopted for the noise and vibration assessment with definitions of the resulting impact significance provided in **Table 12.15**.

Table 12.14 Definition of the significance of potential noise and vibration impacts

Receptor sensitivity	Magnitude of effect				
	Very high	High	Medium	Low	Very low
High / very high	Major	Major	Major	Moderate	Minor
Medium	Major	Major	Moderate	Minor	Negligible
Low	Major	Moderate	Minor	Negligible	Negligible
Very low	Moderate	Minor	Negligible	Negligible	Negligible

Table 12.15 Definition of impact noise and vibration impact significance

Significance	Examples
Major	Very large or large change in receptor condition, both adverse or beneficial, which are likely to be important considerations at a regional or district level because they contribute to achieving national, regional or local objectives, or could result in exceedance of statutory objectives and / or breaches of legislation.
Moderate	Intermediate change in receptor condition, which are likely to be important considerations at a local level.
Minor	Small change in receptor condition, which may be raised as local issues but are unlikely to be important in the decision-making process.
Negligible	No discernible change in receptor condition.

A12.2 Baseline conditions

A12.2.1 Data from the site-specific baseline noise survey

Results from the baseline noise survey undertaken on 8/9 January 2021 (ST1) and 7 to 16 February 2021 (LT1) are provided in **Table 12.16**. Data were excluded for measurements undertaken in adverse weather conditions (wind speeds >5m/s or precipitation) due to their uncertainty, as described in BS 4142. It is understood that wind speeds above 5m/s occur frequently near the footprint of the proposed scheme and surrounding area and may have an effect on the prevailing sound level. Therefore, noise levels presented in this section may actually be lower than the true noise experienced in the area levels when incorporating wind noise.

Table 12.16 Baseline noise survey results

Measurement location	Reference period	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)	L_{A10}* (dB)	L_{A90}* (dB)
ST1	Daytime (07:00 - 23:00)	41.2	57.7	44.1	31.8
	Night-time (23:00 - 07:00)	42.6	68.4	44.7	31.8
LT1	Daytime (07:00 - 23:00)	49.4	93.1	43.8	36.1
	Night-time (23:00 - 07:00)	42.2	74.5	38.0	34.0

*displayed as the arithmetic average value

Results from the baseline survey at measurement location LT1 are provided in accordance with the reference periods outlined in BS 5228-1 (as referred to in **Table 12.3**) and are displayed in **Table 12.17**.

Table 12.17 Baseline noise survey results, BS 5228 reference periods

Measurement location	Reference period	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)	L_{A10}* (dB)	L_{A90}* (dB)
LT1	Daytime	50.8	93.1	45.7	37.0
	Evenings and weekends	44.0	75.9	40.1	34.4
	Night-time	42.2	74.5	38.0	34.0

*displayed as the arithmetic average value

In order to assess potential noise impacts associated with operation of the proposed scheme, the 'typical' existing background sound level, L_{A90}, has been determined. Measured background sound levels at LT1 are considered representative of all nearby residential premises.

Statistical analysis including the arithmetic average, modal distribution, median and standard deviation are presented in **Table 12.18** for daytime and night-time reference periods, respectively.

Table 12.18 Baseline sound level statistical analysis, LT1

Reference period	Statistical L_{A90} analysis			
	Most repeated (mode)	Mean average	Median	Standard deviation
Daytime (07:00 - 23:00)	32	36	35	4.4
Night-time (23:00 - 07:00)	32	34	32	3.7

During the daytime, there is strong correlation between the median and mean average values; therefore, a daytime noise level of 35 dB L_{A90} is deemed 'typical' and was used in the operational noise assessment.

Measured background sound levels during the night-time show a strong correlation between the modal and median average values; therefore, a level of 32 dB L_{A90} was used in the operational noise assessment.

A12.2.2 Data from desk-based review

As noted in **Section A12.1.1.2**, a desk-based assessment has been undertaken to supplement the information gained from the site-specific noise survey. The review established that three other baseline noise surveys have been undertaken within Stanley prior to the 2021 site-specific survey. A summary of the results from these surveys is provided in **Table 12.19**.

Table 12.19 Summary of results from the three other baseline noise surveys undertaken in Stanley prior to the site specific survey (Premier Oil, 2018)

Date	Survey location	Time period	$L_{Aeq,T}$ (dB)	L_{A90} (dB)
2013	Liberty Lodge	Day time	45.3	38.9
		Night-time	38.8	35.7
	Coastel Finger Pier	Day time	43.4	37.7
		Night-time	37.5	34.4
2014	Stanley Growers	Daily	48.0 – 49.1	Not reported
	TDF	Daily	53.3 – 58.7	Not reported
2016	Liberty Lodge	Daily	45.3	41.7

Daytime $L_{Aeq,T}$ noise levels at Stanley Growers (LT1) from 2014 are consistent with those measured in 2021, therefore indicating that potential effects associated with Covid-19 on the existing noise environment are negligible at NSRs considered in the noise assessment.

Daytime $L_{Aeq,T}$ noise levels at Coastel Finger Pier (ST1) from 2013 are comparable with those measured in 2021. It is recognised that there has been growth in vessel use within the harbour from 2013 to 2021, however based on the short-term monitoring results from ST1, it is concluded that COVID-19 has had limited impact on the noise environment within the more industrialised area surrounding the proposed scheme.

It is considered that the measured noise levels at Stanley Growers are representative of those at all identified NSRs within the study area for the noise assessment. As the 2021 baseline survey was undertaken for approximately eight days with simultaneous weather data logging, there is a higher degree of confidence in the noise data recovered from the 2021 site-specific survey compared to that generated from previous surveys. Therefore, data from the 2021 survey have been used in the subsequent assessments.

A12.2.3 Future evolution of the baseline in the absence of the proposed scheme

It is understood that there are proposals to construct a new power station on the laydown and stockpile area shown on **Figure 4.1**. Such a development, if constructed, has potential to increase the noise environment in the immediate area. There are no other known developments proposed in the immediate area which are likely to influence the baseline noise environment, in the absence of the proposed scheme.

A12.3 Potential impacts during construction

A12.3.1 Temporary fixed and mobile construction plant

The proposed construction phasing, location of works, equipment type and number of plant has been sourced from the indicative construction programme. A review of the construction programme concluded that the period between weeks 46 and 50 is considered the worst case for potential noise impacts due to the number of simultaneous construction activities being undertaken (including piling for the proposed quay, which is generally considered to represent the largest source of noise disturbance).

Table 12.20 outlines the assumed construction phase noise sources that informed the noise predictions. Where possible, noise source levels were taken from Annex C of BS 5228-1 and incorporate on-time corrections as outlined in BS 5228-1. Noise from on-site measurements and similar projects of equipment form part of Royal HaskoningDHV's (RHDHV's) library and have been used for the calculation of construction noise, where suitable.

Table 12.20 Details of assumed construction plant

Activity / work area	Plant	Quantity	BS 5228 reference	L_{Aeq} (dB) at 10m	Operational on-time (%)
General site equipment	Mobile Elevating work Platform (MEWP)	1	C4.57	67	90
	Excavator 8t	1	C2.8	70	90
	Lorry tractor 44t	1	C6.27	76	90
	Telehandler	1	C2.35	71	90
	Generator 12kVA	1	C4.82	56	100
	Generator 20kVA	1	C4.82	56	100
	Generator 6kVA	1	C4.76	61	100
	Generator 200kVA	1	C4.87	65	100
	Crawler excavator	1	C5.18	80	90
	Dump truck 6t	1	C4.8	56	80
	Crawler crane 100t	1	C3.28	67	90
	Crawler crane 300t	1	C4.50	71	80
	Safety boat	1	RHDHV	77	10
	MultiCat – 700bhp	1	RHDHV	77	80
Dismantling / decommissioning FIPASS	Pumps	1	C3.26	75	10
	MEWP	1	C4.57	67	85
	Scissor lift	2	C2.8	70	10
	Excavator 8t	1	C2.8	70	85
	Generator	4	C4.82	56	10
	Hook lift lorry 32t	1	C6.27	76	80
	Excavator 50t	1	C2.14	79	80
	Excavator 35t	2	C2.16	75	80
	Lorry tractor 44t	1	C6.27	76	85
	Tipper trailer	1	C6.27	76	50
Concrete precast works	Batching plant	1	D6.10	78	25
	Loading shovel	1	C2.26	79	30
	Telehandler	1	C2.35	71	85
	Static concrete pump	1	C3.26	75	25
	Concrete mixer truck	1	C4.18	75	25

Activity / work area	Plant	Quantity	BS 5228 reference	L_{Aeq} (dB) at 10m	Operational on-time (%)
	Tractor 142kW	1	C4.74	80 (dB L_{Amax})	15
	Compressor	1	C5.5	65	25
	Generator 200kVA	1	C4.87	65	85
	Wheel crane 90t	1	C4.39	77	15
Surficial silt removal works	Cutter suction head + pump	1	C5.40	68	80
	Excavator 50t	1	C2.14	79	5
	Dump truck	1	C2.30	79	10
	Pumps	1	C3.26	75	80
Causeway construction	Crawler excavator	1	C2.2	77	80
	Dump truck	4	C2.30	79	90
Bund construction	Crawler excavator	1	C5.18	80	85
	Vibratory roller	2	C5.20	75	20
	Dump truck 6t	1	C4.8	56	85
	Dump truck	2	C2.30	79	90
Combi-wall construction	Crawler crane 100t	1	C3.28	67	85
	Crawler crane 300t	1	C4.50	71	85
	Concrete mixer truck	1	C4.18	75	10
	Tractor 142 KW	1	C4.74	80	25
	Vibratory piling rig	1	C3.8	88	10
	Hydraulic hammer piling rig	2	C3.2	87	40
	Grout mixer & pump	1	C4.24	67	20
	Excavator 25-35t	1	C2.16	75	80
	Compressor	4	C5.5	65	80
	Generator 6kVA	1	C4.76	61	85
	Welding set 400A	1	C3.31	73	40
	Crane mounted auger	1	C3.16	79	40
	Telehandler	1	C2.35	71	85
Erection of buildings	Telehandler	1	C2.35	71	85
	Crawler crane 100t	1	C3.28	67	85
	Crawler excavator	1	C5.18	80	85
	MEWP	1	C4.57	67	85
	Scissor Lift	2	C2.8	70	60
	Excavator 8t	1	C2.8	70	85

Activity / work area	Plant	Quantity	BS 5228 reference	L_{Aeq} (dB) at 10m	Operational on-time (%)
	Generator	4	C4.82	56	10
	Lorry tractor 44T	1	C6.27	76	85
	Generator 12 kVA	1	C4.82	56	85
	Generator 20 kVA	1	C4.82	56	85

Construction works will typically be undertaken six days per week (Monday to Saturday); however, depending on the progression and sequencing of works, there may be a requirement for works to be undertaken on Sundays. Working hours will typically by from 7am – 7pm. However, certain critical path construction phase activities (namely the construction of the causeway and all of the backfilling operations) would need to be double-shifted, working across an extended window from 7am to 11pm.

Predicted noise levels associated with construction plant are displayed in **Table 12.21** and **Table 12.22** for daytime and evenings and weekends reference periods, respectively.

Table 12.21 Predicted construction noise levels, daytime

Receptor ID	Predicted noise level (LAeq, T dB)	Derived BS 5228 threshold (LAeq, T dB)	Magnitude of effect
NSR1	52.4	65	Very low
NSR2	53.8	65	Very low
NSR3	50.4	65	Very low
NSR4	55.9	65	Very low

Table 12.22 Predicted construction noise levels, evenings and weekends

Receptor ID	Predicted noise level (LAeq, T dB)	Derived BS 5228 threshold (LAeq, T dB)	Magnitude of effect
NSR1	51.9	55	Very low
NSR2	53.3	55	Very low
NSR3	49.8	55	Very low
NSR4	55.2	55	Low

The predicted noise levels associated with construction plant are of very low magnitude of effect at all identified NSRs during the daytime in accordance with the BS 5228 criteria. During the evening and weekends reference period, low magnitude of effect is predicted at NSR4 and very low at all other receptors considered in the assessment.

All NSRs are considered to be medium sensitivity; therefore, the resulting significance of impact will be **negligible** during the daytime and, at worst, **minor adverse** impact during the night-time in accordance with the impact matrix criteria presented in **Table 12.14**.

Although the predicted construction noise levels are below the BS 5228 criteria, some of the characteristics associated with piling activities in particular may give rise to a higher level of *perceived* impact at the receptor locations. Control of construction noise through implementation of Best Practical Means (BPM) (detailed below) should be employed to reduce the likelihood of potential impacts during the construction period.

A12.3.1.1 Mitigation and residual impact

Although no specific noise mitigation measures are required to achieve the BS 5228 construction noise thresholds, the following BPM for noise mitigation should be employed to reduce the potential for adverse impact:

- Implementation of a piling dolly to reduce the noise generated by the impact between the hammer and the pile.
- Informing local residents about the construction works, particularly piling activity, including the timing and duration of any particularly noisy elements.
- Ensuring plant and machinery is turned off when not in use.
- Using modern, quiet equipment and ensuring such equipment is properly maintained and regularly inspected.
- Implement a grievance mechanism (e.g. complaint procedure) for local residents to report nuisance and other issues, including contact details for a site representative.

The residual impact will of **negligible** significance.

A12.3.2 Road traffic noise

To inform the road traffic noise assessment, construction traffic data in the form of 18hr AAWT flows, percentage HGVs and average speeds on the surrounding road network were used); values are presented in **Table 12.23**. The assumptions and limitations noted in **Section A14.14** should be noted with regard to the assessment of road traffic noise (specifically around the impact of the COVID-19 pandemic).

Table 12.23 18hr AAWT construction phase traffic flows

Link ID	Link description	Average speed (mph)	Base 2022		Base 2022 + peak construction	
			18hr AAWT	HGV%	18hr AAWT	HGV%
1	Darwin Road	40	2,044	7.8	2,418	21.9
2	Stanley Bypass	40	2,044	7.8	2,540	25.5
3	FIPASS Road (north of Coastel Road junction)	25	290	38.7	294	39.6
4	FIPASS Road (South of Coastel Road junction)	25	682	22.1	808	33.3
5	Airport Road	40	2,044	7.8	2,047	7.9
6	Coastel Road	25	396	10.2	412	10.3

In accordance with the DMRB guidance, the change in predicted BNL along each link was calculated using the methodology outlined in CRTN. The calculation method accounts for HGV percentage and average road speed. Results for predicted construction road traffic impacts are shown in **Table 12.24**.

Table 12.24 Construction phase road traffic noise assessment

Link ID	Base 2022 (dB $L_{A10,18hr}$)	Base 2022 + peak construction (dB $L_{A10,18hr}$)	Change in noise level (dB)	Magnitude of effect
1	63.1	66.1	3.0	Medium
2	63.1	66.7	3.6	Medium
3	57.5	57.6	0.1	Very low
4	59.3	61.4	2.1	Low

Link ID	Base 2022 (dB $L_{A10,18hr}$)	Base 2022 + peak construction (dB $L_{A10,18hr}$)	Change in noise level (dB)	Magnitude of effect
5	63.1	63.1	0.0	Very low
6	54.7	54.9	0.2	Very Low

The predicted change in BNL due to peak construction traffic is of medium magnitude of effect along links 1 and 2. All NSRs along the local road network are considered medium sensitivity; therefore, the resulting significance of impact along these road links from peak construction traffic will be moderate adverse in accordance with the impact matrix presented in **Table 12.14**. However, it is understood that the nearest noise sensitive premises to link 1 is situated at a distance of approximately 800m from the nearest carriageway; therefore, noise impacts associated with link 1 at the nearby receptors are not considered significant (as the change would not be perceivable at the nearest receptor given the separation distance). An impact of **negligible** significance is predicted.

Link 2 runs south of the main residential area within Stanley therefore, there are several noise sensitive premises within the vicinity of the road. From **Section A14.3.1**, it is understood that construction timings for material deliveries used for trip generation are assumed to be during the daytime reference period, and therefore limited to the less sensitive period for potential noise impacts. These measures would be detailed in the CTMP which would be implemented as part of the construction phase. Impacts from peak construction traffic are considered temporary, short-term and reversible and are based on worst-case construction trip generation. An impact of **minor adverse** significance is therefore predicted.

Along all other road links, the assessment indicates very low to low magnitude of effect associated with peak construction traffic; therefore, indicating **minor adverse** impact significance, at worst.

A12.3.2.1 Mitigation and residual impact

No additional mitigation measures are required. The residual impact along all road links is of **minor adverse** significance at worst.

A12.4 Potential impacts during operation

A12.4.1 Industrial and commercial noise

Operational phase noise sources that were considered in the noise predictions relate to the proposed on-site fixed and mobile plant and loading / unloading from vessels and HGV deliveries.

For the purposes of the assessment, it is assumed that four vessels are simultaneously moored during both daytime and night-time reference periods; one cruise vessel, one tanker vessel and two fishing vessels. As there is no implementation of cold ironing, auxiliary engines are assumed to be operating for the duration in which vessels are moored at the quay as a worst-case scenario.

As reported in **Section A14.4.2**, it is estimated that there would be approximately 71 HGV deliveries per day during operation in 2025; this equates to an average of three deliveries per hour assuming 24hr operation. The sound power level associated with HGV movements is provided as Sound Exposure Levels (SEL_W); whereby the sound power level is normalised to a one second time interval for noise which is not continuous.

For the purpose of the assessment, it is assumed that there will be two sets of cargo offloading activities in operation at the proposed quay. Based on the number of HGV deliveries per hour, it is assumed that there will be 1.5 container movements per hour, per crane. Each straddle carrier is assumed to be operational 75% of the time.

Noise from the sub-stations, the pump house and plant within the plant room in Building A all have an assumed external sound power level of 80 dBA. These items of plant are considered to be in constant operation as a worst case scenario.

Operational phase noise predictions were undertaken assuming the noise sources displayed in **Table 12.25**, with representative sound power levels and operational on-time.

Table 12.25 Operational phase noise sources

Plant / activity	Number	Sound power level (dB L_{WA})	Operational on-time
Cruise vessel	1	100	100%
Tanker vessel	1	101	100%
Fishing vessel	2	88	100%
HGV deliveries	78	110 (SEL_w per HGV movement)	3 events per hour
Mobile crane	2	130 (SEL_w per cycle)	1.5 events per hour
Container impact onto quay	2	115 (SEL_w per cycle)	1.5 events per hour
Straddle carrier	2	96	75%
Building A	1	80	100%
Pump house	1	80	100%
Substation	1	80	100%

Predicted daytime noise levels at the NSRs, using the methodology described in **Section A12.1.3.2**, are presented in **Table 12.26**.

Noise from operational plant to be used on the proposed new quay is not considered to be perceptibly tonal as their individual contribution to the predicted noise levels at the NSRs are all lower than 20 dB L_{Aeq} (over 20 dB below the existing ambient noise level). Therefore, no penalty for tonality has been incorporated into the predicted rating level.

All plant is assumed to be in constant operation as a conservative approach, presenting the worst case scenario. Therefore, no penalty for perceptible intermittency was included.

Activity from the movement of material by cranes and telehandlers may result in perceptible impulsive characteristics; therefore, a +3 dB impulsivity correction was incorporated in the predicted rating level at each NSR during the daytime only.

Table 12.26 Operational phase noise assessment, daytime

Receptor ID	Predicted noise level (dB $L_{Aeq,T}$)	Rating noise level (dB $L_{Aeq,T}$)	Background sound level (dB L_{A90})	Excess of rating level above background sound level	Magnitude of effect
NSR1	33.5	36.5	35	1.5	Low
NSR2	35.6	38.6	35	3.6	Low
NSR3	33.2	36.2	35	1.2	Low
NSR4	41.8	44.8	35	9.8	Medium

The daytime operational phase noise assessment predicts low magnitude of effect at NSR1, NSR2 and NSR3. At medium sensitivity receptors the assessment indicates **minor adverse** impact significance.

At NSR4 a medium magnitude of effect is predicted, indicating **moderate adverse** impact significance depending on the context.

During the baseline survey it was noted that one of the dominant noise sources detected at Stanley Growers (LT1) was from traffic crossing the metal bridge / causeway on and off FIPASS. This noise source will be removed when FIPASS is dismantled.

Therefore, an assessment of the difference between the predicted noise level ($L_{Aeq,T}$) against the measured daytime $L_{Aeq,T}$ level from the baseline survey (the ambient noise level) will provide more context for the assessment of operational noise. This difference is considered to indicate the likelihood of a significant change in noise level at the NSRs between the existing operations at FIPASS and those associated with the proposed scheme.

The difference in noise level at each receptor is presented in **Table 12.27**. Existing ambient noise levels ($L_{Aeq,T}$) at all receptors were determined from the measured daytime level at LT1.

Table 12.27 Predicted difference in noise level assessment, daytime

Receptor ID	Predicted noise level (dB $L_{Aeq,T}$)	Existing ambient noise level (dB $L_{Aeq,T}$)	Difference in noise level (dB)
NSR1	33.5	49.4	-15.9
NSR2	35.6	49.4	-13.8
NSR3	33.2	49.4	-16.2
NSR4	41.8	49.4	-7.6

From **Table 12.27** it is evident that the predicted noise level at the NSRs from the operation of the proposed scheme is far below the existing ambient noise level. As noted above, the removal of the FIPASS causeway, which was noted to be a major contributor to the ambient noise environment, is likely to be one of the main reasons for the predicted decrease in ambient noise level during the operation phase of the proposed scheme.

The above prediction indicates that the noise levels experienced at the NSRs ($L_{Aeq,T}$) are not likely to be greater than existing levels. Therefore, the likelihood for a significant change in noise level experienced at the NSRs due to the proposed scheme is low. In addition, predicted noise levels associated with the proposed scheme are within the recommended daytime noise level criteria for outdoor amenity areas provided in WHO 1999 at all NSRs, 50 to 55 dB L_{Aeq}.

Predicted night-time noise levels at the NSRs are presented in **Table 12.28**.

Table 12.28 Operational phase noise assessment, night-time

Receptor ID	Predicted noise level (dB $L_{Aeq,T}$)	Rating noise level (dB $L_{Aeq,T}$)	Background sound level (dB L_{A90})	Excess of rating level above background sound level	Magnitude of effect
NSR1	33.5	36.5	32	4.5	Low
NSR2	35.6	38.6	32	6.6	Medium
NSR3	33.2	36.2	32	4.2	Low
NSR4	41.8	44.8	32	12.8	High - very high

At NSR1 and NSR3 low magnitude of effect is predicted, indicating **minor adverse** impact significance during the night-time in accordance with the matrix **Table 12.14**

At NSR2, medium magnitude of effect is predicted, indicating **moderate adverse** impacts significance during the night-time, depending on the context.

The night-time assessment shows that high to very high magnitude of effect is predicted at NSR4, indicating **major adverse** significance at this receptor, depending on the context.

Again, the difference between the predicted noise level ($L_{Aeq,T}$) and the measured daytime $L_{Aeq,T}$ level from the baseline survey are considered an indication of the likelihood for a significant change in noise level at the NSRs.

The difference in noise level at each receptor is presented in **Table 12.29**. Existing ambient noise levels ($L_{Aeq,T}$) at all receptors were determined from the measured night-time level at LT1.

Table 12.29 Predicted difference in noise level assessment, night-time

Receptor ID	Predicted noise level (dB $L_{Aeq,T}$)	Existing ambient noise level (dB $L_{Aeq,T}$)	Difference in noise level (dB)
NSR1	33.5	42.2	-8.7
NSR2	35.6	42.2	-6.6
NSR3	33.2	42.2	-9.0
NSR4	41.8	42.2	-0.4

From **Table 12.29** it is seen that the predicted noise level at the NSRs from the operation of the proposed scheme are below the existing ambient noise level.

This indicates that the night-time noise levels experienced at the NSRs are not likely to be greater than existing levels in the presence of FIPASS. Therefore, the likelihood for a significant change in noise level experienced at the NSRs due to the proposed scheme is low.

Both daytime and night-time assessments indicate that predicted noise levels associated with operation of the proposed scheme are below the existing ambient sound level ($L_{Aeq,T}$) during operation of FIPASS. Therefore, it is concluded that the potential operational noise effects are of **negligible** significance based on the following:

- The proposed scheme is replacing and existing port facility (FIPASS) in a predominantly industrial area; and,
- The ambient noise level ($L_{Aeq,T}$ - encompassing all noise sources in the surrounding area) perceived at the NSRs due to the introduction of the proposed scheme are likely to be no greater than those currently experienced.

A12.4.1.1 Mitigation and residual impact

No mitigation measures are required. The residual impact would be of **negligible** significance.

A12.4.2 Road traffic noise

To inform the road traffic noise assessment, operational traffic data in the form of 18hr AAWT flows and percentage HGVs on the surrounding road network were used; values are presented in **Table 12.30**.

Table 12.30 18hr AAWT operational phase traffic flows

Link ID	Link description	Average speed (mph)	Base 2025		Base 2025 + operation	
			18hr AAWT	HGV%	18hr AAWT	HGV%
1	Darwin Road	40	2,052	7.8	2,179	9.6
2	Stanley Bypass	40	2,052	7.8	2,179	9.6
3	FIPASS Road (north of Coastel Road junction)	25	98	54.8	98	54.8
4	FIPASS Road (South of Coastel Road junction)	25	689	22.1	816	24.7
5	Airport Road	40	2,052	7.8	2,052	7.8
6	Coastel Road	25	403	10.2	476	14.6

In accordance with the DMRB guidance, the change in predicted BNL along each link were calculated using the methodology outlined in CRTN. The calculation method accounts for HGV percentage and average road speed. Results for predicted operational phase road traffic impacts are shown in **Table 12.31**.

Table 12.31 Operational phase road traffic noise assessment

Link ID	Base 2025 (dB L_{A10})	Base 2025 + operation (dB L_{A10})	Change in noise level (dB)	Magnitude of effect
1	63.1	63.7	0.6	Very low
2	63.1	63.7	0.6	Very low
3	54.0	54.0	0.0	Very low
4	59.3	60.4	1.1	Very low
5	63.1	63.1	0.0	Very low
6	54.8	56.5	1.7	Very low

The predicted change in BNL due to peak construction traffic are of very low magnitude of effect. All NSRs along the local road network are considered medium sensitivity; therefore, the resulting significance of impact will be **negligible**.

A12.4.2.1 Mitigation and residual impact

No mitigation measures are required. The residual impact would be of **negligible** significance.