



Environmental Statement

CHAPTER 14 – Noise and Vibration

Langstone FCERM Scheme

January 2025

Langstone FCERM Scheme Environmental Statement

Chapter 14

Noise and Vibration

Contents

14	Noise and Vibration	14-1
14.1	Introduction.....	14-1
14.2	Key Legislation, Policy and Guidance Considerations	14-1
14.3	Methodology and Approach to EIA	14-2
14.3.1	Noise	14-2
14.3.2	Vibration	14-2
14.3.3	Establishing the baseline	14-3
14.4	Baseline Conditions	14-4
14.4.1	Sensitive receptors	14-4
14.4.2	Baseline noise surveys	14-5
14.4.3	Baseline monitoring results.....	14-6
14.4.4	Summary of baseline results	14-8
14.5	Identification of Effect Pathways	14-9
14.6	Potential Impacts During Construction.....	14-10
14.6.1	Construction Noise Criteria.....	14-10
14.6.2	Predicted Construction Noise Levels	14-10
14.6.3	Summary of the Results	14-13
14.6.4	Potential vibration impacts.....	14-17
14.7	Construction Impact Assessment	14-17
14.7.1	Airborne noise due to construction activities and traffic movements	14-18
14.7.2	Ground borne vibration	14-21
14.8	Cumulative Effects.....	14-22
14.9	Conclusions.....	14-24
14.10	References	14-27

Figures

Figure 14.1: Baseline monitoring locations	14-5
Figure 14.2: Scheme frontage and Noise Model Assessment Locations	14-12

Tables

Table 14.1: BS 5228-1 ABC Method.....	14-2
Table 14.2: Guidance on the effects of vibration levels	14-3
Table 14.3: Transient vibration guide values for cosmetic damage	14-3
Table 14.4: Ecological receptors potentially affected by the Langstone FCERM Scheme	14-4
Table 14.5: Sound monitoring locations.....	14-5
Table 14.6: Average baseline noise levels (dB) for monitoring location N1	14-6
Table 14.7: Average baseline noise levels (dB) for monitoring location N2	14-7
Table 14.8: Average baseline noise levels (dB) for monitoring location N3	14-7
Table 14.9: Average baseline noise levels (dB) for monitoring location N4	14-7
Table 14.10: Average baseline noise levels (dB) for monitoring location N5	14-8
Table 14.11: Average baseline noise levels (dB) for monitoring location N6	14-8
Table 14.12: Summary of the average measured sound levels	14-9
Table 14.13: Summary of EIA Scoping for noise and vibration potential impact pathways	14-9
Table 14.14: ABC method impact threshold values.....	14-10
Table 14.15: Frontage 1A - Construction noise impact on nearby sensitive receptors	14-13
Table 14.16: Frontage 2 Construction Noise Impact on Nearby Sensitive Receptors	14-14
Table 14.17: Frontage 3 Construction Noise Impact on Nearby Sensitive Receptors	14-15
Table 14.18: Frontage 4 Construction Noise Impact on Nearby Sensitive Receptors	14-16
Table 14.19: Frontage 5 Construction Noise Impact on Nearby Sensitive Receptors	14-16
Table 14.20: Indicative numbers of dwellings affected by noise levels >65db	14-18
Table 14.21: Summary of sheet pile types, lengths and anticipated piling duration proposed for the Scheme	14-19
Table 14.22: Properties in close proximity to the proposed sheet pile wall	14-21
Table 14.23: Assessment of potential cumulative effects on sensitive receptors to airborne noise	14-23
Table 14.24: Overview of potential Impacts, necessary mitigation and residual impacts	14-25

14 Noise and Vibration

14.1 Introduction

This chapter provides an impact assessment of the proposed scheme on noise and vibration. As set out in **Section 3.**, the Core Scheme has been divided into five frontages (1A, 2, 3, 4 and 5). The Additional Scheme (Frontage 1B and 6) is not funded at the current time and has therefore not been assessed as part of this chapter. The impact assessment details the necessary mitigation and residual impacts to demonstrate the environmental acceptability of the scheme. **Chapter 3 (Proposed Scheme)** includes a description of each frontage and the design proposal associated with each.

14.2 Key Legislation, Policy and Guidance Considerations

The noise and vibration impact assessment has been undertaken within the context of relevant legislation and government policies and these are summarised below.

The following policy, legislation and guidance will be applicable with regard to any assessment of noise in terms of the potential for onshore impacts. Underwater noise is considered in **Chapter 8 (Marine Ecology)**.

- **The Control of Pollution Act, 1974 (COPA).** Section 60 of the Act provides powers to Local Planning Authority officers to serve an abatement notice in respect of noise nuisance from construction works.
- **Environmental Protection Act, 1990 (EPA).** Section 79 of the Act defines statutory nuisance with regard to noise and determines that Local Planning Authorities have a duty to detect such nuisances in their area.
- **National Planning Policy Framework (NPPF).** The NPPF states that planning policies and decisions should aim to:
 - avoid noise giving rise to significant adverse impacts on health and quality of life as a result of new development;
 - mitigate and reduce, to a minimum, other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
 - recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
 - identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.
- **Noise Policy Statement for England (NPSE).** This document was published by DEFRA in 2010 and has three policy aims with regard to management of noise:
 - Avoid significant adverse impacts on health and quality of life;
 - Mitigate and minimise adverse impacts on health and quality of life; and
 - Where possible, contribute to the improvement of health and quality of life.
- **Guidance** – the assessment will make reference to the following UK guidance:
 - BS7445-1:2003 parts 1 and 2

- BS 5228-1:2009+A1-2014 – Noise
- BS 5228-2:2009+A1-2014 – Vibration

14.3 Methodology and Approach to EIA

Section 1.3 of this ES provides detailed information on the methodology and approach used to inform this EIA, but best practice guidance has been used in relation to noise and vibration.

14.3.1 Noise

BS 5228-1 ‘Code of practice for noise and vibration control on construction and open sites’ provides a ‘best practice’ guide for noise control and includes sound power level (L_w) data for individual plant as well as a calculation method for noise and construction activities.

The assessment of construction noise impacts has been undertaken based on ‘example method 1 – the ABC method’ as defined in BS 5228 1:2009+A1:2014. **Table 14.1** provides guidance in terms of appropriate threshold values to define the onset of significant construction noise impact at residential receptors based upon existing ambient noise levels. Other project-specific factors, such as the number of receptors affected and the duration and character of the impact, are considered to determine if there is a significant impact.

Table 14.1: BS 5228-1 ABC Method

Assessment Category and Threshold Value Period	Impact		
	Category A (a)	Category B (b)	Category C (c)
Night-time (23:00 – 07:00)	45	50	55
Evening and Weekends (d)	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
NOTE 1: A potential significant impact is indicated if the $L_{Aeq,T}$ noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.			
NOTE 2: If the ambient sound level exceeds the Category C threshold values given in the table (i.e. the ambient sound level is higher than the above values), then a potential significant impact is indicated if the total $L_{Aeq,T}$ noise level for the period increases by more than 3 dB due to site noise.			
NOTE 3: Applies to residential receptors only.			
(a) Category A: Threshold values to use when ambient sound 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 value			
(c) Category C: Threshold values to use when ambient sound 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, 07:00 – 23:00 Sundays.			

14.3.2 Vibration

BS5228-2:2009+A1:2014 ‘Code of practice for noise and vibration control on construction and open site – Part 2: Vibration’ provides guidance on vibration levels that can cause disturbance to humans and have potential to damage structures.

Table 14.2 details Peak Particle Velocity (PPV) vibration levels and provides a semantic scale for the description of construction vibration impacts on human receptors based on guidance contained in BS 5228-2. PPV can be described as the instantaneous maximum velocity reached by a vibrating element as it oscillates about its rest position.

Table 14.2: Guidance on the effects of vibration levels

Peak Particle Velocity Level	Description	Approximate Distance to Receptor
<0.3 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	>= 20 m
0.3 to <1 mm/s	Vibration might be just perceptible in residential environments.	10 m to < 20 m
1.0 to < 10 mm/s	It is likely that vibration of this level in residential environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.	5 m to < 10 m
>= 10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.	< 5 m

Table 14.3 presents the numerical limits for transient vibration, above which cosmetic damage could occur in terms of the component PPV to different types of building.

Table 14.3: Transient vibration guide values for cosmetic damage

Type of building	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures	50 mm/s at 4 Hz and above	50 mm/s at 4 Hz and above
Industrial and heavy commercial buildings		
Unreinforced or light framed structures	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz
Residential or light commercial buildings		
NOTE 1: Values referred to are at the base of the building		
NOTE 2: For line 2, at frequencies below 4 Hz, a maximum displacement of 0.6mm (zero to peak) is not to be exceeded.		

14.3.3 Establishing the baseline

A desk-based study was undertaken to describe and identify the sensitive receptors to noise and vibration within close proximity to the Langstone FCERM Scheme. In addition, to enable assessment of the potential impacts of the proposed scheme, site specific noise surveys (baseline and impact assessment) were undertaken by AECOM. This chapter focuses on potential impacts associated with human receptors. Potential impacts to marine and ornithological receptors are detailed within **Chapter 8 (Marine Ecology)** and **Chapter 11 (Ornithology)** and are not repeated in this chapter.

The noise survey report is summarised in sections **14.4** (baseline) and **14.6** and **14.7** (impact assessment) but is included as **ES Appendix O** in full. **Appendix A of ES Appendix O**

includes a glossary of acoustic terms, but the definition of the most common acoustic terms used in this assessment are listed below. Details of the site haul routes, and compound areas are considered in **Chapter 3 (Proposed Scheme)**.

Acoustic Glossary Terminology -

- **A" Weighting** – commonly used to simulate the frequency response of the ear.
- **Decibel** – units used to measure sound intensity.
- **L_{Aeq,T}** – Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.

14.4 Baseline Conditions

The majority of the Langstone FCERM Scheme is located within a quiet coastal residential area, with some residential properties in the immediate vicinity. There are also several local businesses in the vicinity of the works, including the Ship Inn and Royal Oak public houses, and Langstone Sailing Club. Other sensitive receptors include visitors to the area, adjacent heritage assets (listed buildings) and ecological receptors.

14.4.1 Sensitive receptors

A number of designated environmental sites, and their supporting habitats, are located in close proximity to the Langstone FCERM Scheme; please refer to **Chapter 7 (Designated Sites and Features)** of this ES. These designated sites may be considered sensitive because of their ecological importance and may be affected by noise and vibration.

The main ecologically noise sensitive receptors that could be affected by the proposed construction activities are listed below in **Table 14.4**.

Table 14.4: Ecological receptors potentially affected by the Langstone FCERM Scheme

Ecological Receptor	Distance from the proposed Langstone FCERM scheme
Species associated with the Solent Maritime SAC	Adjacent/overlaps
Species associated with the Chichester and Langstone Harbours SPA, Ramsar and SSSIs	Adjacent/overlaps

Areas of green open space designated as Solent Waders and Brent Goose Strategy sites are located within 1km of the scheme, as well as the Langstone Mill Pond and its associated heronry. Potential noise and vibration impacts have been assessed as part of the construction noise assessment for the Langstone FCERM scheme. However, see **Chapter 11 (Ornithology)** for details of these sites as well as potential impacts and mitigation identified to ornithological receptors.

Other sensitive receptors include residential dwellings and local businesses. Although the works are of direct benefit to these receptors by providing flood and erosion protection, on-going liaison with these properties throughout the project has been important in understanding potential impacts/informing them of potential disturbance.

14.4.2 Baseline noise surveys

Baseline noise surveys have been undertaken by AECOM to establish existing noise levels along the full scheme area (included in full as **ES Appendix O**). Location N1 is located within the Additional Scheme area (Frontage 1B), but the baseline surveys have been included in the baseline section of this chapter to represent baseline data for the wider area.

Measurements were taken at six locations between the 1st and 12th December 2021. Continuous measurements were taken to establish ambient sound levels during daytime, evening and night-time periods. These time periods are defined as follows:

- LAeq_(12hr) Daytime 07:00 to 19:00hrs
- LAeq_(4hr) Evening 19:00 to 23:00hrs
- LAeq_(8hr) Night-time 23:00 to 07:00 hrs

The unattended sound level monitoring instruments were housed within a weatherproof box with sufficient batteries to power the instrument for the full measurement duration. Appropriate outdoor all-weather kits were used on all microphones. The sound monitoring locations are presented in **Table 14.5** and **Figure 14.1**. The sound monitoring locations were chosen to identify baseline sound levels at sensitive receptors such as residential & commercial properties and sensitive ecological sites.

Table 14.5: Sound monitoring locations

Monitoring Location	Description	GPS co-ordinates (N,W)
N1	Harbourside properties (foreshore)	50.838251, -0.985155
N2	Billy Line footpath	50.838028, -0.982206
N3	Langstone Sailing Club	50.836736, -0.981185
N4	Ship Inn car park	50.837531, -0.980554
N5	Footpath in front of Green Cottage	50.838416, -0.980054
N6	Royal Oak	50.839545, -0.979334



Figure 14.1: Baseline monitoring locations

All measurements included a range of sound level indicators including L_{Aeq} , L_{A90} , L_{A10} and L_{AFmax} continuously sampled over 15 minutes as well as 1 second time intervals. Field calibrators were carried out for each instrument at the start and end of each measurement survey.

A weather station was installed in conjunction with monitoring location N1 to measure meteorological conditions. Data from the weather station was reviewed to assess if any sound data periods would need to be excluded from analysis. As per BS7445-2, intervals of data should only be selected during a period within which the sound level may be considered approximately steady with windspeeds below 5m/s and no heavy precipitation. During the assessment period, unsuitable meteorological conditions were present on the following dates and have therefore been excluded from the measurement analysis:

- Saturday 04/12/21
- Monday 06/12/21
- Tuesday 07/12/21
- Wednesday 08/12/21

Further information can be found in **ES Appendix O**.

14.4.3 Baseline monitoring results

14.4.3.1 Monitoring location N1 – Harbourside properties

Sound measurements were taken at the southern frontage of the Harbourside properties from 13:00 on 01/12/21 to 14:45 on 13/12/21. The microphone was located approximately 2m above ground level. The sound environment at this location was characterised by (from most dominant to least dominant sound):

- Road traffic on A3023, Langstone Road (approximately 200m away)
- Birdsong
- The tide going out

Table 14.6 below presents the average baseline sound level for the $L_{Aeq(12hr)}$, $L_{Aeq(4hr)}$ and $L_{Aeq(8hr)}$.

Table 14.6: Average baseline noise levels (dB) for monitoring location N1

Time period	Average baseline sound level (dB)
$L_{Aeq(12hr)}$ 07:00 – 19:00	52
$L_{Aeq(4hr)}$ 19:00 – 23:00	49
$L_{Aeq(8hr)}$ 23:00 – 07:00	47

14.4.3.2 Monitoring location N2 – Billy Line footpath

Sound measurements were taken on the west bounds of the property located at 48 Langstone Road from 13:00 on 01/12/21 to 14:45 on 13/12/21. The microphone was located approximately 2.5m above ground level. The sound environment at this location was characterised by (from most dominant to least dominant sound):

- Road traffic on A3023, Langstone Road (approximately 40m away)
- Aircraft passing by overhead

- Activity from the residents along the Billy Line (dogs barking, distant conversation etc)
- Distant clanging of metal from Langstone Sailing Club to the south

Table 14.7 below presents the average baseline sound level for the $LA_{eq(12hr)}$, $LA_{eq(4hr)}$ and $LA_{eq(8hr)}$.

Table 14.7: Average baseline noise levels (dB) for monitoring location N2

Time period	Average baseline sound level (dB)
$LA_{eq(12hr)}$ 07:00 – 19:00	54
$LA_{eq(4hr)}$ 19:00 – 23:00	50
$LA_{eq(8hr)}$ 23:00 – 07:00	46

14.4.3.3 Monitoring location N3 – Langstone Sailing Club

Sound measurements were taken at the west bounds of Langstone Sailing Club from 13:00 on 01/12/21 to 14:45 on 13/12/21. The microphone was located approximately 1.2m above ground level. The sound environment at this location was characterised by (from most dominant to least dominant sound):

- Road traffic on A3023, Langstone Road (approximately 40m away)
- Clanging of masts in the wind from sail boats moored/on land at Langstone Sailing Club
- Birdsong

Table 14.8 below presents the average baseline sound level for the $LA_{eq(12hr)}$, $LA_{eq(4hr)}$ and $LA_{eq(8hr)}$.

Table 14.8: Average baseline noise levels (dB) for monitoring location N3

Time period	Average baseline sound level (dB)
$LA_{eq(12hr)}$ 07:00 – 19:00	54
$LA_{eq(4hr)}$ 19:00 – 23:00	51
$LA_{eq(8hr)}$ 23:00 – 07:00	50

14.4.3.4 Monitoring location N4 – Ship Inn car park

Sound measurements were taken in the Ship Inn's courtyard from 13:00 on 01/12/21 to 14:45 on 13/12/21. The microphone was located approximately 3m above ground level. The sound environment at this location was characterised by (from most dominant to least dominant sound):

- Road traffic on A3023 , Langstone Road (approximately 30m away)
- Movement from vehicles in the car park
- Customers entering/exiting the pub during operational hours
- Music coming from inside the pub during operational hours

Table 14.9 below presents the average baseline sound level for the $LA_{eq(12hr)}$, $LA_{eq(4hr)}$ and $LA_{eq(8hr)}$.

Table 14.9: Average baseline noise levels (dB) for monitoring location N4

Time period	Average baseline sound level (dB)
$LA_{eq(12hr)}$ 07:00 – 19:00	66
$LA_{eq(4hr)}$ 19:00 – 23:00	62
$LA_{eq(8hr)}$ 23:00 – 07:00	59

14.4.3.5 Monitoring location N5 – Footpath in front of Green Cottage

Sound measurements were taken at the east frontage edge of Green Cottage's boundary fence. As per other monitoring locations, measurements began at 13:00 on 01/12/21, however during the measurement period Storm Barra caused flooding of the area surrounding Green Cottage on 07/12/21. Consequently, the sound level meter took on water damage and the data from the measurement was lost. In lieu of an unattended survey, a 2-hour attended measurement was taken during the collation of the sound level monitors on 13/12/21. This started at 14:35 and finished at 16:35. The microphone was located approximately 1.2m above ground level. The sound environment at this location was characterised by (from most dominant to least dominant sound):

- Road traffic on A3023, Langstone Road (approximately 100m away)
- Birdsong
- Leaves rustling in the wind
- Distance sound of a wind chime from a nearby residential property

Table 14.10 below presents the average baseline sound level for the $L_{Aeq,2h}$, $L_{A90,15min}$ and $L_{A10,2h}$.

Table 14.10: Average baseline noise levels (dB) for monitoring location N5

Time period	Average baseline sound level (dB)
$L_{Aeq,2h}$	59
$L_{A90,15min}$	60
$L_{A10,2h}$	55

14.4.3.6 Monitoring location N6 – Royal Oak

Sound measurements were taken at the eastern boundary of the Royal Oak's beer garden from 13:00 on 01/12/21 to 14:45 on 13/12/21. The microphone was located approximately 2m above ground level. The sound environment at this location was characterised by (from most dominant to least dominant sound):

- Pedestrians using the nearby coastal line footpath
- Distant road traffic on A3023, Langstone Road (approximately 200m away)
- Birdsong
- Tide going out

Table 14.11 below presents the average baseline sound level for the $L_{Aeq(12hr)}$, $L_{Aeq(4hr)}$ and $L_{Aeq(8hr)}$.

Table 14.11: Average baseline noise levels (dB) for monitoring location N6

Time period	Average baseline sound level (dB)
$L_{Aeq(12hr)}$ 07:00 – 19:00	55
$L_{Aeq(4hr)}$ 19:00 – 23:00	51
$L_{Aeq(8hr)}$ 23:00 – 07:00	49

14.4.4 Summary of baseline results

Table 14.12 below shows a summary of the average measured sound levels for the $L_{Aeq(12hr)}$, $L_{Aeq(4hr)}$ and $L_{Aeq(8hr)}$ at the six locations.

Table 14.12: Summary of the average measured sound levels

Monitoring Location	Daytime	Evening	Night-time
	L _{Aeq} (12hr) 07:00 – 19:00	L _{Aeq} (4hr) 19:00 – 23:00	L _{Aeq} (8hr) 23:00 – 07:00
N1	52	49	47
N2	54	50	46
N3	54	51	50
N4	66	62	59
N5*	-	-	-
N6	55	51	49

*Results for monitoring location N5 are presented in **Table 14.10**.

The baseline results have been used to inform the construction noise impact assessment for the Langstone FCERM Scheme.

14.5 Identification of Effect Pathways

The scope of the noise and vibration impact assessment has been informed by the EIA Scoping Report produced for the scheme (Coastal Partners, 2020) and the associated Scoping Opinions received from Havant Borough Council (HBC) and the Marine Management Organisation (MMO) in February 2021 and May 2021 respectively (see **Appendix A**). **Table 14.13** below provides a summary of the potential impact pathways scoped in and out of the assessment with respect to noise and vibration receptors.

Table 14.13: Summary of EIA Scoping for noise and vibration potential impact pathways

Potential Impact Pathway	Scoping Decision	Notes
Traffic noise (construction)	Scoped in	Changes in road traffic noise as a result of the Scheme may result in increases in noise at nearby sensitive receptors. Further assessment is therefore required.
Airborne noise (construction)	Scoped in	Due to the proximity of the proposed works to sensitive receptors, airborne noise is scoped in for further assessment.
Ground borne vibration (construction)	Scoped in	The Scheme has the potential to generate high levels of vibration at nearby sensitive receptors including historic and listed buildings. Ground borne vibration is therefore scoped in for further assessment.
Changes in noise and vibration (operation)	Scoped out	The operation of the proposed scheme will not result in any changes in noise and vibration levels. Only minimal maintenance such as visual inspections are anticipated. Changes in noise and vibration for the operational phase is therefore scoped out for further assessment.

In summary, the potential impacts on sensitive receptors to noise and vibration during the construction of the proposed scheme that have been scoped in for further assessment are:

- Traffic noise
- Airborne noise
- Ground borne vibration

These potential impacts are assessed in more detail in **Section 14.6** for the construction phase of the proposed scheme. No potential impact pathways have been identified for the operational phase of the proposed scheme.

14.6 Potential Impacts During Construction

This section provides an assessment of the potential noise and vibration impacts resulting from the construction of the Langstone FCERM Scheme. Frontages 1B and 6 (Additional Scheme) have been excluded from the assessment in this chapter, however the results for these frontages are represented in **Appendix O**.

14.6.1 Construction Noise Criteria

As described in **Section 14.3.1**, the criteria for assessing construction noise impacts have been defined with reference to ‘the ABC method’ as defined in BS 5228-1:2009+A1:2014. The results of the baseline sound survey (as noted in **Section 14.4**) have been used to define the threshold values presented in **Table 14.14** for the assessment of significant impacts due to construction noise. The values shown represent thresholds for each time period for each frontage whereby if they are exceeded, there is the potential for significant impacts to sensitive receptors. The assessment locations are illustrated on **Figure 14.2**.

Table 14.14: ABC method impact threshold values

Assessment Location	Daytime $L_{Aeq, 12hr}$ (07:00 – 19:00)	Evening $L_{Aeq, 4hr}$ (19:00 – 23:00)	Night $L_{Aeq, 8hr}$ (23:00 – 07:00)
Frontage 1A	65	55	45
Frontage 2	65	55	45
Frontage 3	65	55	55
Frontage 4	65	60	50
Frontage 5	65	55	50

14.6.2 Predicted Construction Noise Levels

Noise contour maps have been produced relating to the noise generated by the anticipated activities for the construction of each of the frontages. CadnaA (version 2022 MR 2 (32bit) (build: 193.5260) software has been used to produce the contour maps.

Due to the progressive nature of the works, a single sample area has been modelled for each activity at the most sensitive locations along their respective frontage as a means of determining a worst-case scenario. It is understood that piling activities are only planned along coastal areas and, as such, have been modelled at a frontage coastal line nearest to a noise sensitive receptor location. These locations are illustrated in **Figure 14.2**.

Noise contour maps have been produced to identify all properties falling within the appropriate threshold values as defined in **Table 14.14**. The contour maps for each frontage can be viewed in **Appendix E of ES Appendix O**. For the purposes of the construction noise assessment, the noise contour lines have been split up into three bands:

- Red – properties within the red contour may experience a significant impact during daytime period (07:00 – 19:00).
- Orange – Properties within the orange contour lines may experience significant impact during the evening period (19:00 – 23:00).

- Yellow – Properties within the yellow contour lines may experience a significant impact during the night (23:00 – 7:00).

It is assumed that each individual activity will not be operating constantly throughout an entire shift. As noted in **Table 14.14**, at frontage location F3, the evening and night-time threshold values were the same at 55dB $L_{Aeq,T}$. Consequently, noise contours have only been split into two bands for this frontage: red for the daytime period, and orange for evening and night period.

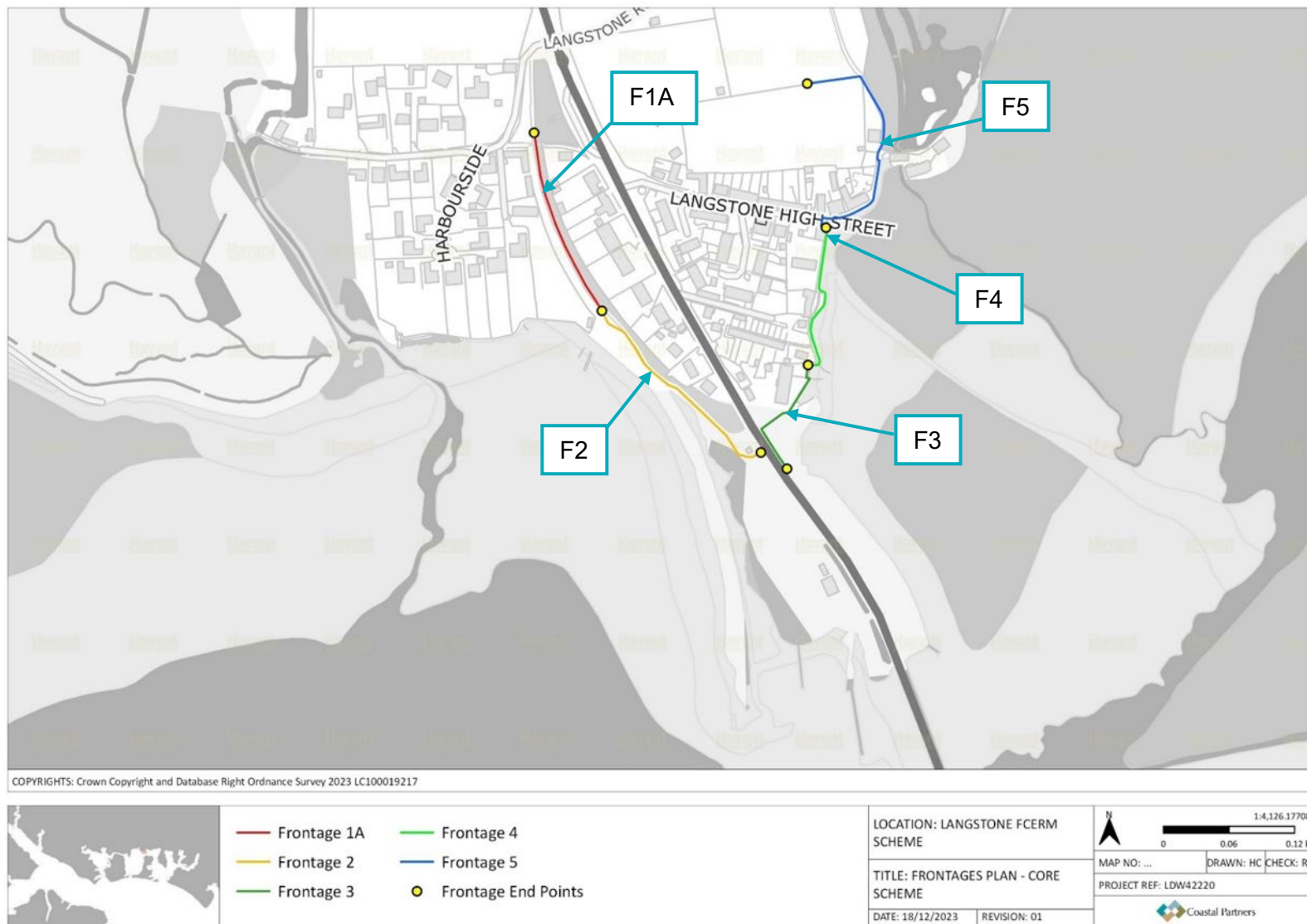


Figure 14.2: Scheme frontage and Noise Model Assessment Locations

14.6.3 Summary of the Results

Residential impacts have been assessed following the BS 5228-1 'ABC' method. The ABC method 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.'* Noise contour maps presented in **Appendix E of ES Appendix O** have been analysed to assess the impact on nearby dwellings across daytime, evening, and night-time periods. The following sections provide a high-level summary of the results for each frontage. Further detail regarding the potential impacts and mitigation to be adopted throughout construction is available in **Section 14.7**. A description of the proposed construction works for each frontage is provided in **Chapter 3 (Proposed Scheme), Section 3.2**. **Tables 14.15 to 14.19** include a reference to the corresponding noise contour map which can be viewed in **Appendix E of ES Appendix O**.

14.6.3.1 Frontage 1A (Billy Line Footpath)

The key construction activity for Frontage 1A is the placement of granular material. The contour maps in **Appendix E of ES Appendix O** indicate that this construction activity would have a temporary significant impact upon surrounding sensitive receptors during all time periods due to the close proximity to the proposed works. During the daytime period, the properties located directly adjacent to the Billy Line would be impacted. The same applies to both the evening and nighttime periods, however properties further inland would also be impacted during these two time periods.

Table 14.15 provides a summary of the likely construction plant associated with the construction and whether this is likely to cause a temporary significant impact during daytime, evening, and nighttime periods.

Table 14.15: Frontage 1A - Construction noise impact on nearby sensitive receptors

Frontage 1A activities	Plant	Impact on nearby dwellings			Figure reference (Appendix E of ES Appendix O)
		Daytime (07:00 – 19:00)	Evening (19:00 – 23:00)	Nighttime (23:00 – 07:00)	
Placing of granular material	35t Excavator	Yes	Yes	Yes	11.9
	Wacker plate for compacting aggregate	Yes	Yes	Yes	11.10
	18t single drum roller compacting general fill	Yes	Yes	Yes	11.11
	Bulldozer	Yes	Yes	Yes	11.12
	Dump truck	Yes	Yes	Yes	11.13

14.6.3.2 Frontage 2 (Billy Line Embankment)

Analysis of the noise contour maps in **Appendix E of ES Appendix O** indicate that all construction activities planned at Frontage 2 would have a temporary significant impact upon surrounding sensitive receptors during all time periods due to the close proximity to the works. The key construction activities along Frontage 2 are:

- Placing of granular material
- Breaking
- Vibration piling
- Percussive piling

During the daytime, construction works would significantly impact properties directly east of the Billy Line along Langstone Road. If works were to continue to the evening and night period, properties further inland would also experience a significant impact. **Table 14.16** provides a summary of the likely construction plant associated with the construction and whether this is likely to cause a temporary significant impact during daytime, evening, and nighttime periods.

Table 14.16: Frontage 2 Construction Noise Impact on Nearby Sensitive Receptors

Frontage 2 activities	Plant	Impact on nearby dwellings			Figure reference (Appendix E of ES Appendix O)
		Daytime (07:00 – 19:00)	Evening (19:00 – 23:00)	Nighttime (23:00 – 07:00)	
Placing of granular material	Excavators	Yes	Yes	Yes	11.21
	Wacker plate for compacting aggregate				11.22
	18t single drum roller compacting general fill				11.23
	Bulldozer				11.24
	Dump truck				11.25
Breaking	Breaking of asphalt	Yes	Yes	Yes	11.26
Vibration piling	Movax vibro piling rig	Yes	Yes	Yes	11.27
Percussive piling	Percussive piling rig	Yes	Yes	Yes	11.28

14.6.3.3 Frontage 3 (A3023 to The Look Out)

Analysis of the noise contour maps in **Appendix E of ES Appendix O** indicate that the majority of construction activities planned at Frontage 3 would have a temporary significant impact at nearby sensitive receptors. The key construction activities along Frontage 3 are:

- Placing of concrete in situ
- Cranes for lifting glass panels
- Excavations
- Vibration piling
- Percussive piling

All activities during the daytime (except for cranes lifting glass panels) would have a significant impact at the Ship Inn, activities during the evening and night would have a significant impact at the Ship Inn and residential properties north of the Ship Inn. Potential use of vibratory and percussive piling would result in a significant impact on properties located approximately 250m north into Langstone Village during all periods of operation.

Table 14.17 provides a summary of the likely construction plant associated with the construction and whether these are likely to cause a temporary significant impact during different time periods.

Table 14.17: Frontage 3 Construction Noise Impact on Nearby Sensitive Receptors

Frontage 3 activities	Plant	Impact on nearby dwellings			Figure reference (Appendix E of ES Appendix O)
		Daytime (07:00 – 19:00)	Evening (19:00 – 23:00)	Nighttime (23:00 – 07:00)	
Placing of concrete in situ	26t Pre-mix concrete truck, discharging	Yes	Yes	Yes	11.29
	26t Concrete truck, placing concrete				11.30
Cranes for lifting glass panels	40t Crawler crane	No	Yes	Yes	11.31
	50t Crawler crane				
	70t Crawler crane				
Excavations	35t Excavator	Yes	Yes	Yes	11.32
	21t Excavator				11.33
	13t Excavator				11.34
	8t Excavator				11.35
	5t Excavator				
Vibration piling	Movax vibro piling rig	Yes	Yes	Yes	11.37
Percussive piling	Percussive piling rig	Yes	Yes	Yes	11.36

14.6.3.4 Frontage 4 (Look Out to Winklemarket)

Analysis of the noise contour maps in **Appendix E of ES Appendix O** indicate that all construction activities planned at Frontage 4 would have a significant temporary impact upon surrounding sensitive receptors during all time periods due to the close proximity of the works along the coastal wall. The key construction activities along Frontage 4 are:

- Placing of concrete in situ
- Excavations
- Vibration piling
- Percussive piling

During the daytime the majority of works would only have a significant impact on properties directly on the eastern coast of Langstone Village. If works were to continue to the evening and night period, properties further inland would also experience a significant impact.

Table 14.18 provides a summary of the likely construction plant associated with the construction and whether these are likely to cause a temporary significant impact during different time periods.

Table 14.18: Frontage 4 Construction Noise Impact on Nearby Sensitive Receptors

Frontage 4 activities	Plant	Impact on nearby dwellings			Figure reference (Appendix E of ES Appendix O)
		Daytime (07:00 – 19:00)	Evening (19:00 – 23:00)	Nighttime (23:00 – 07:00)	
Placing of concrete in situ	26t Pre-mix concrete truck, discharging	Yes	Yes	Yes	11.38
	26t Concrete truck, placing concrete				11.39
Excavations	35t Excavator	Yes	Yes	Yes	11.40
	21t Excavator				11.41
	13t Excavator				11.42
	8t Excavator				11.43
	5t Excavator				
Vibration piling	Movax piling rig	Yes	Yes	Yes	11.44
Percussive piling	Percussive piling rig	Yes	Yes	Yes	11.45

14.6.3.5 Frontage 5 (High Street to Royal Oak)

Analysis of the noise contour maps in **Appendix E, of ES Appendix O** indicate that all construction activities planned at Frontage 5 would have a temporary significant impact upon surrounding sensitive receptors during all time periods due to the proximity to the works along the coastal wall. The key construction activities along Frontage 5 are:

- Placing of granular material
- Placing of concrete in situ
- Vibration piling
- Percussive piling

During the daytime, the majority of works would only have an impact on properties directly on the coast of Langstone Village. The number of dwellings affected would increase further inland if works were to be undertaken during the evening and nighttime periods. The most impactful of activities in this area would be from percussive piling (if required).

Table 14.19 provides a summary of the likely construction plant associated with the construction and whether these are likely to cause a temporary significant impact during different time periods.

Table 14.19: Frontage 5 Construction Noise Impact on Nearby Sensitive Receptors

Frontage 5 activities	Plant	Impact on nearby dwellings			Figure reference (Appendix E of ES Appendix O)
		Daytime (07:00 – 19:00)	Evening (19:00 – 23:00)	Nighttime (23:00 – 07:00)	
Placing of granular material	35t Excavator				11.46
	Wacker plate for compacting aggregate				11.47

Frontage 5 activities	Plant	Impact on nearby dwellings			Figure reference (Appendix E of ES Appendix O)
		Daytime (07:00 – 19:00)	Evening (19:00 – 23:00)	Nighttime (23:00 – 07:00)	
	18t single drum roller compacting general fill	Yes	Yes	Yes	11.48
	Bulldozer				11.49
	Dump truck				11.50
Placing of concrete in situ	26t Pre-mix concrete truck, discharging	Yes	Yes	Yes	11.51
	26t Concrete truck, placing concrete				11.52
Vibration piling	Movax piling rig	Yes	Yes	Yes	11.53
Percussive piling	Percussive piling rig	Yes	Yes	Yes	11.54

14.6.3.6 Summary

In summary, all construction activities (except for the use of cranes to lift glass panels at Frontage 3) are likely to significantly impact nearby sensitive receptors throughout daytime, evening and nighttime periods. **Section 14.7** provides further information on the significance of the impacts where thresholds shown in **Table 14.14** are likely to be exceeded, and outlines the proposed mitigation measures to reduce or remove the potential impacts identified.

14.6.4 Potential vibration impacts

The potential impact from ground borne vibration is discussed in section **14.7.2** below, in accordance with the guidance set out in section **14.3.2**.

14.7 Construction Impact Assessment

The potential impacts of the construction of the Scheme to sensitive receptors within the study area has been assessed. A description of the significance of effect upon sensitive receptors potentially caused by each identified impact is provided below. Mitigation measures have been included that will be adopted throughout the construction phase, to reduce the effect.

A Construction Environmental Management Plan (CEMP) will be produced and followed to cover the construction and operational phases of the Scheme. An outline CEMP has been submitted alongside the planning and marine licence applications and will be updated where necessary. The CEMP controls construction activities to ensure negative impacts are prevented as much as possible. In addition to the CEMP, a Section 61 application will be submitted to the Local Planning Authority (LPA), which will outline the planned works, the working hours of the site and measures to mitigate the potential noise and vibration impacts by best practical means.

Potential impacts to marine receptors are considered in **Chapter 8 (Marine Ecology)** and potential impacts to ornithological receptors are considered in **Chapter 10 (Ornithology)**.

14.7.1 Airborne noise due to construction activities and traffic movements

As per the summary in **section 14.6.3.6**, all construction activities (except for the use of cranes to lift glass panels at Frontage 3) are likely to significantly impact nearby sensitive receptors throughout daytime, evening and nighttime periods. To aid interpretation of the potential impact, **Appendix G of ES Appendix O**, includes maps which illustrate the indicative extent of dwellings affected by noise during the daytime period, where noise levels exceed the 65db daytime threshold (these maps are also inclusive of Frontages 1B and 6 (Additional Scheme)). It should be noted that noise contour lines have been produced based on items of plant being placed in a 'worst case' scenario location where they have been deemed to have the most significant impact on residents. That being the case, as the items of plant move along the frontage, it may be that properties that currently show up on the maps in **Appendix G of ES Appendix O** as not being exposed may then become exposed.

The data shown on the maps in **Appendix G of ES Appendix O** has been summarised into **Table 14.20**, which shows the indicative number of properties affected by the loudest items of plant at each frontage location. In cases where percussive and vibratory (movax piling) is proposed, the next loudest plant item has also been presented in **Table 14.20** should the need for piling be omitted or alternative, less noisy construction methods are identified. Where the edge of a property falls within the noise contour, it has been included in the number of dwellings affected along each frontage.

Table 14.20: Indicative numbers of dwellings affected by noise levels >65db

Frontage	Equipment	Number of dwellings affected
F1A	Wacker plate	10
F2	Wacker plate	9
	Percussive piling	32
	Vibratory (movax) piling	5
F3	35t excavator	0
	Percussive piling	32
	Vibratory (movax) piling	6
F4	35t excavator	1
	Percussive piling	24
	Vibratory (movax) piling	8
F5	Wacker plate	5
	Percussive piling	23
	Vibratory (movax) piling	6

Table 14.20 shows that there are a number of activities whereby the 65db threshold during daytime hours (07:00 to 19:00) would be exceeded (see **Table 14.14** for threshold criteria). Based on the indicative number of dwellings affected shown in **Table 14.20**, the activity that is likely to have the most significant impact to nearby dwellings is percussive piling, however percussive piling will only be used when necessary to achieve the required design depth for

piles e.g. if difficult ground conditions are encountered. The number of dwellings affected reduces significantly during daytime hours (07:00 to 19:00) on the basis that vibratory piling will be used as standard. In certain circumstances other piling techniques may be required, for example where ground conditions mean that vibratory piling is not possible or where it is necessary to minimise vibration levels on nearby heritage assets such as the Listed Buildings and/or residential properties. See section **14.7.2** for further details.

Table 14.20 represents the indicative numbers of dwellings affected whereby the 65db threshold would be breached during daytime hours (07:00 to 19:00). The numbers of dwellings affected would likely increase if construction works extended into the evening (19:00 to 23:00) and nighttime periods (23:00 to 07:00). Piling activities will be restricted to daytime hours only (07:00 to 19:00). Due to the nature of the works in a tidal setting, it may be necessary for works to be undertaken during the evening and nighttime periods. However, a Section 61 application will be submitted to the Local Planning Authority (LPA) for approval, which will outline the planned works, the working hours of the site and measures to mitigate the potential noise and vibration impact by best practical means. This will be inclusive of a percussive piling method statement should the need for percussive piling arise.

As noted in **Chapter 8 (Marine Ecology)** sound levels produced by piling can vary in relation to numerous factors including the pile type and diameter/size, hammer size, substrate type and piling installation method (Popper et al., 2014). **Table 14.21** below summarises the types and lengths of sheet piles proposed within the Scheme design, as well as the anticipated duration of the piling works at each sub-frontage. The timescales shown are indicative.

Table 14.21: Summary of sheet pile types, lengths and anticipated piling duration proposed for the Scheme

Frontage / Location	Marine or Terrestrial Piling?	Pile Type	Pile Length (metres)	Anticipated Duration of Piling Works
Frontage 1A	N/A – no piling in this frontage			
Frontage 2 – northern section	Terrestrial	PU12	3.0	15 days
Frontage 2 – central section	Terrestrial	PU12	5.5	
Frontage 2 – southern section	Terrestrial	PU12	3.5	
Frontage 3 – A3023 wall	Terrestrial	L8 trench sheets	2.0	4 days
Frontage 3 – Ship Inn flood wall	Marine	PU28	6.38	5 days
Frontage 3 – Ship Inn Annex wall	Marine	PU28	3.8	2 days
Frontage 4 – Watchtower to Winklemarket	Marine	PU12	2.5	20 days
Frontage 5 – High Street	Marine	PU12	2.05	3 days
Frontage 5 – Royal Oak sea wall	Marine	PU12	1.2 to 1.8	10 days
Frontage 5 – Allotment flood wall	Terrestrial	L8 trench sheets	2.1	2 days

Frontage / Location	Marine or Terrestrial Piling?	Pile Type	Pile Length (metres)	Anticipated Duration of Piling Works
Frontage 5 – No.21 vehicle flood gate	Terrestrial	L8 trench sheets	1.65	1 day
Frontage 5 – Footpath flood wall	Terrestrial	L8 trench sheets	0.82	7 days

Table 14.21 shows that, in the context of the full construction period (see **Section 3.6 of Chapter 3 (Proposed Scheme)** for further details on the construction programme), the anticipated duration of the piling works is short term and will be undertaken in localised areas. With the adoption of vibratory (movax) piling as standard, any likely significant impact is reduced.

The sensitivity of receptors to potential airborne noise impacts is considered to be of high magnitude. Without mitigation measures in place, the overall significance is considered to be **moderate adverse** to sensitive receptors. Noise contour maps for each construction activity along each frontage can be viewed in Appendix E of **ES Appendix O**.

The following mitigation measures / construction methodology requirements will be included within the CEMP for the works to minimise disturbance impacts resulting from airborne noise to sensitive receptors as far as possible.

Mitigation
- Best practice measures will be adopted throughout the construction period in accordance with guidance regarding mitigation measures 4, 6, 7 and 8 of the British Standards BS5228-1 'Code of practice for noise and vibration control on construction and open sites'. Best practicable methods will be adopted to keep noise emissions to a minimum. - Installation of piles will be undertaken using vibro piling techniques as standard. Percussive piling will only be used when necessary to achieve the required design depth. If percussive piling is required, a soft start procedure will be implemented for a minimum of 20 minutes. Should piling cease for a period greater than 10 minutes, then the soft start procedure will be repeated. - A Section 61 application will be submitted to the LPA which will outline the planned works, the working hours of the site and measures to mitigate the potential noise and vibration impact by best practical means. This will be inclusive of a percussive piling method statement should the need for percussive piling arise. - Unnecessary revving of engines will be avoided, and equipment will be switched off when not in use. - Haul routes within the site boundary will be well maintained. - Rubber linings in, for example, chutes and dumpers will be used to reduce impact noise. - The site speed limit will be restricted to 10mph. - Drop heights of materials will be minimised. - Plant and vehicles will be sequentially started up rather than altogether.

Mitigation

- Exhaust silence systems or acoustic engine covers will be used as appropriate.
- As far as reasonably practicable, sources of significant noise will be enclosed.
- Plant will always be used in accordance with manufacturers instructions. Care will be taken to use site equipment away from noise sensitive areas e.g., in close proximity to residential properties. Where this is not possible due to the nature of the works, advance warning will be given. Where possible, loading and unloading will also be carried out away from sensitive areas.
- Regular and effective maintenance by trained personnel will be undertaken to keep plant and equipment working to manufacturers specifications.
- Screening e.g., noise barriers and blinds will be used as appropriate.
- A communication strategy will be in place to ensure residents are kept up to date with Scheme progress and informed of any upcoming noisy work.
- Piling activities will be restricted to daytime hours only (07:00 to 19:00).

With the adoption of the mitigation above, the resultant impact is considered to be **minor adverse**. Whilst the data presented shows that there is the potential for noise impacts to nearby dwellings for the majority of activities, these impacts will be short term, localised and temporary in nature, and will have no lasting residual impact.

14.7.2 Ground borne vibration

Part of the design at Frontages 2, 3, 4 and 5 includes a sheet piled wall, and piling activities have the potential to negatively impact nearby local residents and properties. **Table 14.22** shows the properties that are situated closest to the sheet pile wall. The distances range between 3 m and 7 m.

Table 14.22: Properties in close proximity to the proposed sheet pile wall

Frontage	Closest address to the sheet piled wall	Distance (m)
F2	50A Langstone Road	7
F3	The Ship Inn	4
F4	24 The Winkle Market	3
F5	Royal Oak Havant	4

As per the guidance set out in **Table 14.2**, receptors at an approximate distance of less than 5 m, exposed to PPV ≥ 10 mm/s, vibration is likely to be intolerable for any more than brief exposure to this level. Receptors at an approximate distance of 5 m to <10 m, exposed to 1.0 to <10 mm/s, vibration will likely cause complaint but can be tolerated if advance warning and explanation has been given to residents.

Given the distances shown in **Table 14.22**, the construction vibration limit of 10 mm/s may not be achievable using impact or vibratory piling methods. It is recommended that, where practicable, a hydraulic press piling method is considered to limit the potential impact of vibration at sensitive receptors, where piling works are to be undertaken at a distance of less than 10 m to the properties listed in **Table 14.22**. However, it may be that only vibratory or percussive methods are feasible should difficult ground conditions be encountered during the

construction works i.e., if the ground is too hard or soft. A vibration risk assessment will be carried out prior to the commencement of vibratory and percussive piling works in close proximity to the receptors shown in **Table 14.22**.

The sensitivity of the receptors listed in **Table 14.22** to potential ground borne vibration impacts is considered to be of high magnitude. Without mitigation measures in place, the overall significance is considered to be **moderate adverse** to sensitive receptors.

The following mitigation measures / construction methodology requirements will be included within the CEMP for the works to minimise potential disturbance impacts resulting from ground borne vibration to sensitive receptors as far as possible.

Mitigation
• If practicable, a hydraulic press piling method will be considered to limit the potential impact of vibration at sensitive receptors. This method (if acceptable ground conditions are present) would apply where piling works are taking place within less than 10 m to the properties listed in Table 14.22. • A vibration risk assessment will be carried out in relation to vibratory (movax) and percussive piling, should these piling methods be required in close proximity to the receptors shown in Table 14.22. • A pre-works survey will be undertaken of adjacent buildings, to inspect for any pre-existing damage.

With the adoption of the mitigation above, the resultant impact is considered to be **minor adverse**.

14.8 Cumulative Effects

The guidance and methodology described in **Chapter 16 (Cumulative Impacts)** has been used to assess potential cumulative effects from the proposed Scheme works to sensitive receptors (residential) to noise and vibration within the study area. The proposed Scheme has the potential to affect sensitive receptors (residential) with airborne noise disturbance.

Table 16.1 lists the plans and projects scoped into the cumulative impacts assessment for the proposed scheme. Only projects within 250 metres of the proposed Scheme will be assessed, and therefore the following projects have been scoped out of the cumulative assessment:

- South Hayling Beach Management Plan (BMP) – located approximately 5.5km away.
- North Portsea Island FCERM Scheme – located approximately 4.5km away.
- Langstone Technology Park. Application for part demolition and reconfiguration of building 1000, reconfiguration of car park layout and new industrial units – located approximately 850 metres away.
- Land Adjacent to Bosmere Medical Centre. Proposal for new headquarters building for Portsmouth Water and new commercial buildings – located approximately 1.5km away.
- Land at Kingscroft Farm. Proposed development of land at Kingscroft farm for up to 120 dwellings – located approximately 2km away.
- Northney Marina maintenance dredging – located approximately 850 metres away.

- Rook farm – development of up to 300 dwellings – located approximately 5km away.
- Farlington Marshes Coastal Defence and Regulated Tidal Exchange (RTE) scheme – located approximately 3km away.
- Land to the rear of 49 - 71, Fathoms Reach, Hayling Island. Development of 51 dwellings – located approximately 5km away.
- Land north of Oysters, Station Road, Hayling Island. Development of 29 dwellings and associated highway works – located approximately 5km away.
- Land south of Saltmarsh Lane, Hayling Island. Development of up to 60 dwellings and associated landscape and highway works – located approximately 4.5km away.
- Land south of the Mallards and west of Langstone Road, Havant. Development of 65 dwellings – located approximately 450 metres away.
- Partial Reinstatement and Repair of existing sea wall to a height of 1.4m and Creation of an inner bund with a maximum height of 2.25m to protect habitat for wintering bird populations – located approximately 2km away.
- Redevelopment of a brownfield site to include the provision of 4No. Apartment blocks comprising of 90No. residential dwellings, parking, public open space, landscaping and other associated works, including demolition of existing buildings on site, with access from Palk Road – located approximately 1.8km away.

Table 14.23 below provides an assessment of potential cumulative impacts on sensitive receptors (residential) to noise and vibration on the plans and projects identified, in combination with the proposed scheme.

Table 14.23: Assessment of potential cumulative effects on sensitive receptors to airborne noise

Plan or Project	Potential for cumulative effects from airborne noise disturbance?
The North Solent Shoreline Management Plan (North Solent SMP)	Any potential effects from airborne noise from the implementation of the SMP and the PEMS strategy policies is assessed at the individual scheme level as schemes come forward.
Portchester to Emsworth FCERM Strategy (PEMS)	
Hayling Island Coastal Management Strategy (HICMS)	Any potential effects from airborne noise from the implementation of the HICMS policies will be assessed at individual scheme level as schemes come forward. The HICMS is currently in draft and has not yet been adopted by Havant Borough Council or approved by the Environment Agency.
Havant Borough Local Plan – The Core Strategy (2011) and The Allocations Plan (2014)	Any potential effects from airborne noise from the implementation of the Local Plan policies and the Allocations Plan will be assessed at individual scheme level as schemes come forward.
Havant Borough Regeneration Strategy	Any potential effects from airborne noise from the implementation of the Regeneration Strategy will be assessed at individual scheme level as schemes come forward.
King Charles III England Coast Path: Portsmouth to South Hayling Stretch	No. This part of the ECP route was approved by Secretary of State on 6 th March 2024. The next steps include liaison with landowners to discuss the location and design of any new infrastructure. Insufficient information available on the proposed works and timing, so an assessment of cumulative effects is not possible.

King Charles III England Coast Path: South Hayling to East Head Stretch	No. This part of the ECP is awaiting approval by the Secretary of State as part of the determination stage. Insufficient information available on the proposed works and timing, so an assessment of cumulative effects is not possible.
Southern Water 10-year marine licence application for minor maintenance works on their coastal outfalls (MMO reference MLA/2019/00027)	No. This marine licence was granted by the MMO in 2021 to Southern Water for minor maintenance work to their coastal outfalls covering a 10-year period. The licence covers 605 coastal outfalls which fall below Mean High Water Springs (MHWS) in the Southern Water region, two of which are located within the proposed Scheme area. Whilst the licence does include the use of piling activities, which have the potential to result in airborne noise, mitigation measures have been included such as the use of vibratory piling as standard. Due to the small scale of the minor maintenance activities (time and scale) and the mitigation measures included for these, alongside the mitigation measures included for the Langstone FCERM proposals, it is unlikely that there will be any significant cumulative effects on sensitive receptors (residents) to airborne noise.

The assessment above indicates that there are not likely to be significant cumulative effects on sensitive receptors (residential) due to airborne noise between the proposed Scheme and other plans and projects.

14.9 Conclusions

Table 14.24 below summarises the potential impacts on noise and vibration that could result from delivery of the Langstone Scheme. Where impacts have been identified, appropriate mitigation has been incorporated to remove or reduce this impact. Any residual impact resulting from the delivery of the scheme, after mitigation measures have been adopted; has been presented to demonstrate environmental acceptability.

In summary, the works are short term, localised and temporary in nature. The mitigation measures that will be in place throughout the construction works mean that the potential impacts identified can be considered minor for sensitive receptors (residential). In conclusion, the proposed works are considered environmentally acceptable, in terms of potential impacts to sensitive receptors (residential), following delivery of the mitigation measures in **Table 14.24**.

Table 14.24: Overview of potential Impacts, necessary mitigation and residual impacts

Potential Impact Pathways	Significance of impact	Mitigation and Residual Impacts
Airborne noise due to construction activities and traffic movements	Due to the sensitivity of receptors (residential) to airborne noise, the significance of the impact, without mitigation measures in place, is considered to be moderate adverse .	• Best practice measures will be adopted throughout the construction period in accordance with guidance regarding mitigation measures 4, 6, 7 and 8 of the British Standards BS5228-1 'Code of practice for noise and vibration control on construction and open sites'. Best practicable methods will be adopted to keep noise emissions to a minimum. • Installation of piles will be undertaken using vibro piling techniques as standard. Percussive piling will only be used when necessary to achieve the required design depth. If percussive piling is required, a soft start procedure will be implemented for a minimum of 20 minutes. Should piling cease for a period greater than 10 minutes, then the soft start procedure will be repeated. • A Section 61 application will be submitted to the LPA which will outline the planned works, the working hours of the site and measures to mitigate the potential noise and vibration impact by best practical means. This will be inclusive of a percussive piling method statement should the need for percussive piling arise. • Unnecessary revving of engines will be avoided, and equipment will be switched off when not in use. • Haul routes within the site boundary will be well maintained. • Rubber linings in, for example, chutes and dumpers will be used to reduce impact noise. • The site speed limit will be restricted to 10mph. • Drop heights of materials will be minimised. • Plant and vehicles will be sequentially started up rather than altogether. • Exhaust silence systems or acoustic engine covers will be used as appropriate. • As far as reasonably practicable, sources of significant noise will be enclosed. • Plant will always be used in accordance with manufacturers instructions. Care will be taken to use site equipment away from noise sensitive areas e.g., in close proximity to residential properties. Where this is not possible due to the nature of the works, advance warning will be given. Where possible, loading and unloading will also be carried out away from sensitive areas. • Regular and effective maintenance by trained personnel will be undertaken to keep plant and equipment working to manufacturers specifications. • Screening e.g., noise barriers and blinds will be used as appropriate. • A communication strategy will be in place to ensure residents are kept up to date with Scheme progress and informed of any upcoming noisy work.

Potential Impact Pathways	Significance of impact	Mitigation and Residual Impacts
		Piling activities will be restricted to daytime hours only (07:00 to 19:00). With the mitigation measures outlined above, the residual impact on sensitive receptors (residential) to airborne noise is expected to be of minor adverse significance.
Ground borne vibration	Due to the sensitivity of receptors to ground borne vibration, the significance of the impact, without mitigation measures in place, is considered to be moderate adverse .	- If practicable, a hydraulic press piling method will be considered to limit the potential impact of vibration at sensitive receptors. This method (if acceptable ground conditions are present) would apply where piling works are taking place within less than 10 m to the properties listed in Table 14.22. - A vibration risk assessment will be carried out in relation to vibratory (movax) and percussive piling, should these piling methods be required in close proximity to the receptors shown in Table 14.22 With the mitigation measures outlined above, the residual impact on sensitive receptors to ground borne vibration is expected to be of minor adverse significance.
Overall summary and confidence	The proposed Scheme works are considered environmentally acceptable, in terms of impacts on sensitive receptors from potential noise and vibration impacts. Confidence in this assessment is high for noise and vibration as it has been informed by a site-specific baseline noise survey, and the impact assessment conforms to specific British Standards guidance.	

14.10 References

Aecom (2024) Langstone Flood and Erosion Risk Management Scheme Construction Noise Assessment, January 2024.

British Standards Institute, (2009); BS 5228-1:2009+A1–2014 - Code of practice for noise and vibration control on construction and open sites: Noise, BSi, London

British Standards Institute, (2009); BS 5228-2:2009+A1–2014 - Code of practice for noise and vibration control on construction and open sites: Vibration, BSi, London

British Standards Institute, (2003); BS 7445 - Description and Measurement of Environmental Noise. Part 1 – Guide to Quantities and Procedures, BSi, London

Coastal Partners (2020) Langstone FCERM Scheme Environmental Scoping Report, November 2020.

Popper, A. and Hawkins, A., Fay, R., Mann, D., Bartol, S., Carlson, T., Coombs, S., Ellison, W., Gentry, R., Halvorsen, M., Løkkeborg, S., Rogers, P., Southall, B., Zeddies, D. and Tavalga, W. (2014) Sound Exposure Guidelines. 10.1007/978-3-319-06659-2_7.