



CHAPTER 12: NOISE AND VIBRATION

12.1 INTRODUCTION

12.1.1 This chapter of the ES has been produced by Hydrock to assess the potential noise and vibration impacts associated with the Proposed Development. In particular it considers:

- The potential effects of noise and vibration during the construction phase of the Proposed Development on Existing Sensitive Receptors;
- The potential effect of changes to the existing noise environment associated with the Proposed Development when operational, at Existing Sensitive Receptors;
- The potential effect of existing noise sources at Proposed Sensitive Receptors within the Proposed Development; and,
- The potential effect of proposed noise and vibration sources within the Proposed Development, at Existing and Proposed Noise Sensitive Receptors.

12.1.2 In accordance with current policy and guidance, this chapter describes the following:

- The methods used to assess potential noise and vibration impacts and effects;
- Current baseline conditions at, and in the vicinity of, the Proposed Development;
- Potential impacts and effects arising from noise and vibration sources;
- Details of mitigation measures required to prevent, reduce, or offset potential impacts; and,
- Residual impacts and effects upon the existing and future sensitive receivers that are likely to arise from the construction and occupational phases of the Proposed Development,

12.1.3 The Proposed Development comprises the Wider OPA, together with OPA Phase 1, which effectively represents Phase 1 of the overall Wider OPA Site. This Chapter addresses noise and vibration impacts and effects associated with the Wider OPA Site and OPA Phase 1 in parallel, in order to support discrete planning applications, respectively.



12.2 ASSESSMENT CRITERIA & METHODOLOGY

Previous Assessments

12.2.1 Hydrock undertook noise and vibration impact assessments associated with the construction and operational phases of the nearby Link Roads between Burnetts Lane and Bubb Lane, and at Allington Lane which facilitate site access in to the southern and north western parts of the Wider OPA Site.

12.2.2 The assessment was carried out in order to partially discharge Condition 32 attached to the extant planning permission for a residential development of up to 950 dwellings and associated infrastructure and facilities (ref: X/19/86475), within the Wider OPA Site. The assessment comprised A noise assessment report was submitted (dated 02/12/19), following which the condition was discharged on the 5th March 2020 (ref: DC/19/87026).

Scoping Opinion

12.2.1 An EIA Scoping Report was submitted to Eastleigh Borough Council on 20 April 2020. A summary of the noise and vibration assessment methodology outlined within the scoping report is as follows:

- Assessment of potential noise and vibration effects associated with the construction phase of the development, undertaken in accordance with BS 5228-1:2009+A1:2014 and BS 5228-2:2009+A1:2014;
- Assessment of potential noise effects associated with development-generated road traffic, in accordance with CRTN and the DRMB;
- Assessment of potential effects associated with proposed ancillary equipment associated with the proposed Development will be set in accordance with BS4142:2014 + A1:2019. In particular, with reference to proposed employment and education land uses; and,
- Assessment of potential noise effects at proposed sensitive areas within the Proposed Development during the operational Phase of the Development (future scenario).



12.2.2 The formal Scoping Opinion was issued by Eastleigh Borough Council (EBC) on 12th August 2020, and has been considered during this assessment. While the Scoping Opinion agrees in principle with the above proposed methodology, additional comments regarding noise and vibration were included as follows:

12.2.3 The Scoping Opinion states:

'Road receptors may be more distant than the nominal distances indicated in the report for assessments, due to traffic movement patterns brought about by the traffic growth resulting from such a large development itself, and also due to the improved road infrastructure with the creation of the link road and a through route from Bubb Lane to Allington Lane and onward to Eastleigh Town Centre. This last point is important when considering the scope of the air pollution and noise studies as there is a potential for resulting changes and increases in traffic to impact these in locations where air pollution and noise are already very elevated and exceed national guideline values. In particular, air pollution in the Eastleigh Air Quality Management Area and noise in the Noise Important Areas, (as defined under the European noise directive, END), which exist in Eastleigh town on the A335, Southampton Road, Leigh Road and Twyford Roads, but also on quieter roads where relative changes are large.'

12.2.4 In order to address this paragraph, noise impacts associated with development generated road traffic are considered in the vicinity of Eastleigh Town Centre, including some of the links referenced. In addition, other pertinent areas located a considerable distance from the Proposed Development are considered, including road links towards the West End and Chartwell Green.

'Similarly, there are uncertainties in the likely timescale over which the development will be constructed and become operational, this will affect the validity of some of the assumptions underpinning both air pollution and noise impact assessments, and the detail of how these have been considered in the various future scenarios which will be used to assess the scale of impacts should be included in the ES.'

12.2.5 In order to provide a robust assessment, and account for uncertainties within the methodology with respect to the timescale over which the Wider OPA will be constructed and occupied, it is assumed that the Wider OPA Site is fully occupied during the predicted 'opening year'.

'It is understood from the information in the Scoping Report regarding noise that piling may be required for the proposed development. Fish are particularly sensitive to vibration that may arise as a result of piling or other noisy percussive activities during construction within or close to watercourses. This and other habitats should be included as a potential significant effect to be



assessed in the ES. Following discussion at the 1HH Ecology Working Group further information on the impacts from sediments and on salmon spawning specifically is needed...

Consideration needs to be given not only to the human impact of noise, but also the impacts on sensitive ecological receptors such as the River Itchen including, but not limited to, the impact on the migration of fish.'

- 12.2.6 Consideration of potential noise and vibration impacts and effects on migratory fish, and other significant ecological receptor locations, have been considered. This includes, Chalcroft Tolls Ecology Area, Quobleigh Ecological Area and Central Stream Corridor, as highlighted on the 'OHH Sensitive Ecology Areas – Noise' figure (Figure x.x), provided by Johns Associates, the Ecologist for this project.

'Vibration is scoped in for the construction phase and the operational phase due to through traffic and heavy traffic utilising the new link road and travelling through to Allington Lane / Eastleigh road and on to Eastleigh Town. Vibration impacts from Chalcroft Business Park HGVs is a known local issue.'

- 12.2.7 Potential vibration impacts and effects associated with the construction and operational phase is considered in this assessment as appropriate, in accordance with current guidance and available information. In particular, some commentary on HGVs and vibration is included, with respect to Existing Sensitive Receptors.

'It is important that adequate representation of existing background noise and vibration levels is demonstrated, which needs to take account of other noise sources including transport networks and the Chalcroft Business Park. Periods of noise monitoring should be sufficient to establish typical noise levels with a reasonable degree of certainty.'

- 12.2.8 Background noise levels have been established in accordance with current guidance, in particular BS4142 with respect to industrial noise sources at Chalcroft Business Park. Background vibration levels, i.e. vibration from existing sources are also considered within the assessment, however the only nearby significant vibration source is considered to be the London to Portsmouth via Basingstoke rail line, approximately 70m to the south of the Wider OPA Site.

Legislative Context

- 12.2.9 The key legislation relevant to the Proposed Development are:



- Control of Pollution Act, 1974 (COPA); and,
- Environmental Noise (England) Regulations^{12.2}, 2006

Planning Policy and Guidance

National Planning Policy

12.2.10 The following national planning policy is considered applicable:

National Planning Policy Framework, 2019,

12.2.11 The 'National Planning Policy Framework' (NPPF), February 2019, Ministry of Housing, Communities and Local Government, sets out the United Kingdom Government's planning policies for adoption in England and how they should be applied.

12.2.12 The main aims of the NPPF are set out in section 11, as stated below.

"Planning policies and decisions should: Encourage multiple benefits from both urban and rural land, including through mixed use schemes and taking opportunities to achieve net environmental gains – such as developments that would enable new habitat creation or improve public access to the countryside;

recognise that some undeveloped land can perform many functions, such as for wildlife, recreation, flood risk mitigation, cooling/shading, carbon storage or food production;

give substantial weight to the value of using suitable brownfield land within settlements for homes and other identified needs, and support appropriate opportunities to remediate despoiled, degraded, derelict, contaminated or unstable land;

promote and support the development of under-utilised land and buildings, especially if this would help to meet identified needs for housing where land supply is constrained and available sites could be used more effectively (for example converting space above shops, and building on or above service yards, car parks, lock-ups and railway infrastructure); and

support opportunities to use the airspace above existing residential and commercial premises for new homes. In particular, they should allow upward extensions where the development would be consistent with the prevailing height and form of neighbouring properties and the overall street scene, is well designed (including complying with any local design policies and



standards), and can maintain safe access and egress for occupiers.”

12.2.13 Updates to the NPPF, published in 2019, also brings into effect the 'agent of change' principle.

This principle protects existing business, particularly licenced premises and venues, from unreasonable restrictions placed on them as a result of development permitted after they were established. However, in essence, any party bringing change to an area should be responsible for managing subsequent impacts.

12.2.14 The NPPF refers to guidance contained in 'Noise Policy Statement for England (NPSE), March 2010, Department for Environmental, Food and Rural Affairs' (NPSE). The NPSE is intended to apply to all forms of noise, with the exception of noise occurring in the workplace.

Noise Policy Statement for England, 2011

12.2.15 The NPSE provides advice regarding the impact of noise which should be assessed on the basis of 'adverse' and 'significant adverse' effect. However, the NPSE does not provide any specific guidance on assessment methods or threshold values at which different effects would occur. It should therefore be considered in combination with national noise guidance and standards.

12.2.16 Moreover, the NPSE advises that it is not possible to have 'a single objective noise-based measure'...that is applicable to all sources of noise in all situations. It further advises that the sound level at which an adverse effect occurs is 'likely to be different for different noise sources, for different receptors and at different times.'

Local Planning Policy

Current Planning Policy

12.2.17 Eastleigh Borough Local Plan 2001 - 2011

Emerging Planning Policy

12.2.18 Draft Eastleigh Borough Local Plan, 2011 - 2019

Guidance/ Best Practice

12.2.19 The following international guidance is considered applicable:

- World Health Organisation (WHO) Guidelines for Community Noise, 1999,



12.2.20 The following national guidance is considered applicable:

- Planning Practice Guidance (Live Document);
- British Standards 5228:2009 + A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise and Part 2: Vibration (BS5228-1 and -2);
- BRE Controlling particles, vapour and noise pollution from construction sites (Part 1 to 5), 2003;
- Design Manual for Roads and Bridges, Volume 11, Section 3, Part 7, 2011 (DMRB);
- British Standards 8233: 2014 'Sound insulation and noise reduction for buildings – Code of practice' (BS8233);
- Professional Practice Guidance: Planning and Noise, 2017 (ProPG);
- British Standard 4142:2014 + A1:2019 'Methods for rating and assessing industrial and commercial sound' (BS4142);
- British Standard 6472-1:2008 'Guide to evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting' (BS6472);
- Department of Transport – Calculation of Road Traffic Noise ,1988 (CRTN);
- Institute of Estuarine and Coastal Studies (IECS) Guidance on Construction and Waterfowl: Defining Sensitivity, Response, Impacts and Guidance, 2009
- Measurement and Interpretation of Underwater Noise During Construction and Operation of Offshore Wind Farms, Nedwell et al, 2007;
- Institute of Environmental Management and Assessment (IEMA) – Guidelines for Environmental Noise Impact Assessment, 2014.

Baseline Data Collection

12.2.21 Noise monitoring was undertaken at, and in the vicinity of, the site over four separate survey periods, as follows:

- 2nd November 2018 to 5th November 2018;



- 14th November 2019;
- 14th October to 16th October 2020; and,
- 26th October to 27th October 2020.

12.2.22 Noise measurements were made using Class 1, integrating sound level meters. Microphones were positioned vertically on a tripod at least 1.5m above the ground and at least 3.5m from any other reflecting surfaces. Sound level meters were calibrated to a reference level of 94 dB at 1kHz both prior to, and on completion of, the noise survey. No significant drift in calibration was noted during the survey (≤ 0.5 dB).

12.2.23 All noise monitoring took place during conducive weather conditions, with wind speeds less than 5ms^{-1} and no significant precipitation.

12.2.24 For the purposes of this assessment, in accordance with current guidance, daytime hours are taken to be 0700 to 2300 hours and night-time hours to be 2300 to 0700 hours

12.2.25 Noise monitoring was undertaken at 9 Monitoring Locations (MLs) considered to be representative of the noise environment at, and in the vicinity of, the Proposed Development. Noise monitoring locations are shown on **Figure 12.1**, and summarised in **Table 12.1** below.

Table 12.1 – Monitoring Location Summary

Monitoring Location	Description	Monitoring Period
ML1	Adjacent to the northern site boundary of the Wider OPA, within Quobleigh Ecological Area. This location was selected to establish existing noise levels in the northern part of the site, with respect to Quobleigh Ecological Area, nearby existing residential receptors and proposed sensitive areas in the northern part of the Site.	1315 on 02/11/18, to 1050 on 05/11/18
ML2	To the north east of the Wider OPA Site, adjacent to Allington Lane. This location was selected in order to characterise road traffic noise from Allington Lane.	1213 to 1513 on 14/11/19
ML3	Adjacent to the eastern site boundary. This location was selected to establish existing noise levels in the eastern part of the site, with respect to nearby existing residential receptors and proposed sensitive areas in the eastern part of the Site.	1210 on 02/11/18, to 1130 on 05/11/18
ML4	To the west of the Wider OPA Site, located approximately 10m from the London to Portsmouth via Basingstoke rail line.	1400 on 26/10/20 to

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	This location was selected to characterise rail noise associated with this line.	1400 on 27/10/20
ML5	In the southern part of the Wider OPA Site, in the northern part of the FRP. This location was selected to establish background noise levels at the site, with respect to potential impacts from Chalcroft Business Park.	1645 on 14/10/20 to 0845 on 16/10/20
ML6	To the south of the Wider OPA Site, adjacent to in the northern part Chalcroft Business Park. This location was selected to establish specific and background noise levels associated with industrial activity at nearby units within the Business Park.	0930 on 15/10/20 to 0815 on 16/10/20
ML7	Adjacent to the southern Wider OPA Site boundary with, Chalcroft Business Park. This location was selected to establish ambient, specific and background noise levels associated with industrial activity at nearby units within the Business Park.	1240 on 02/11/18 to 1035 on 05/11/18
ML8	Adjacent to the Wider OPA Site south eastern boundary with Burnetts Lane. This location was selected in order to characterise road traffic noise from Allington Lane.	1230 on 14/11/19 to 1530 on 14/11/19
ML9	In the southern part of the Wider OPA Site and the OPA Phase 1 Site, in the vicinity of Chalcroft Business Park and the proposed Site access off Burnetts Lane. This location was selected to establish ambient noise in the southern part of the Wider OPA Site and the OPA Phase 1 Site, together with specific and background noise levels associated with the Business Park.	1715 on 14/10/20 to 0900 on 15/10/20

12.2.26 Together with discussions undertaken with Chalcroft Business Park, observations undertaken during setup and dismantling of each ML allow an evaluation of the prevailing noise environment at the Site.

12.2.27 Monitoring undertaken at ML5, ML6 and ML9 were also supplemented with audio recordings to allow retrospective analysis of the acoustic environment, during periods which were unattended.

Assessment Methodology

Construction Phase

Noise at Residential Receptors

12.2.28 The generic construction sequence of works which are considered to be the most likely to give rise to significant noise effects can be divided into three specific activities:



- Enabling Works;
- Piling;
- Building Construction; and,
- Landscaping and External Infrastructure Works.

12.2.29 The likely significant effects of noise from construction and demolition works have been assessed in accordance with the 'ABC Method' of BS5228-1.

12.2.30 This method defines category threshold values which are determined by the time of day and existing monitored ambient noise levels in the vicinity of ESRs (rounded to the nearest 5dB). Noise likely to be generated by construction and demolition activities, known as the 'total noise level', is then compared with the 'threshold value'. If the total noise level exceeds the 'threshold value', a significant effect is deemed likely to occur.

12.2.31 **Table 12.2** summarises the significance effect threshold values at receptors, recommended by BS5228-1.

Table 12.2: Thresholds of Significant Effect at Residential Receptors in Accordance with the ABC Method of BS5228-1

Assessment Category Threshold Value Period	Threshold Value, dB		
	Category A *1	Category B *2	Category C *3
Weekday Daytime (07:00 to 19:00) and Saturdays (07:00 to 10:00)	65	70	75
*1 Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than this value. *2 Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values. *3 Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are more than this value.			

Vibration at Residential Receptors

12.2.32 Damage to buildings associated solely with groundborne vibration is uncommon, and although vibration may be noticeable, there is little evidence to suggest that cosmetic damage can occur, such as a crack in plaster, unless the magnitude of the vibration is extremely high. The most likely impact, where elevated levels of vibration do occur during the demolition and construction phases of development, is associated with perceptibility.



12.2.33 Where groundborne vibration is of a relatively continuous nature, there is a greater likelihood of structural damage occurring, compared to transient vibration; for example, that caused by transiting vehicles or piling. The only current national guidance document which provides a methodology for predicting levels of vibration from construction activities is BS5228- 2. The prediction method provided relates specifically to percussive, or vibratory, rolling and piling only.

12.2.34 Therefore, it is not possible to accurately predict levels of vibration during the Site preparation and the construction phase of development. However, vibration impacts during Site activities other than piling are uncommon. As such, to control the impact of vibration during Site preparation and construction of a development, limits relating to the perceptibility of vibration are typically set.

12.2.35 Piling is likely to be required during the construction of the Proposed Development. Therefore, a prediction of vibration associated with potential piling at nearby ESRs has been included within this assessment.

12.2.36 As stated in BS5228-2 and as generally accepted, the threshold of vibration perception for humans is typically in the Peak Particle Velocity (PPV) range of 0.14 mms⁻¹ to 0.3mm/s, which forms the basis of the recommend maximum permitted vibration levels of 1 mms⁻¹ PPV within occupied residential dwellings.

12.2.37 BS5228-2 also sets out the distances (based on historical field measurements) at which certain activities could give rise to a just perceptible level of vibration. These distances are presented in **Table 12.3**.

Table 12.3: Typical Distances at which Vibration May Just Be Perceptible

Construction Activity	Distance, m
Excavation	10-15
Heavy Vehicles (e.g. dump trucks)	5-10
Hydraulic Breaker	15-20
Rotary Bored Piling	20-30

Noise at Bird Habitats

12.2.38 IECS Guidance sets out a disturbance level framework based upon the typical response of waterfowl to construction noise. The report highlights that level of disturbance often varies



depending on magnitude, frequency and duration of sound, and species, age, season and previous exposure.

12.2.39 The report highlights that the disturbance level is related to both visual and aural stimuli, and that noise in isolation is not necessarily a cause for disturbance, without any visual disruption.

12.2.40 The effect on bird population is quantified based on observations of flight response and behavioural changes. Threshold noise levels provided by IECS are summarised in the table below.

Table 12.4 – Bird Response and Impact Thresholds

Noise Level, dB(A)	Level of Magnitude	Type of Noise
< 50	Low	Regular construction noise
< 70	Low	Piling noise (impulsive)
50 to 70	Medium	Regular construction noise
>70	Medium - High	Piling noise (impulsive)
>85	High	Not defined

12.2.41 No indication of response associated with regular piling noise above 70 dB, or definition of regular piling noise, is provided within IECS guidance. However, noise levels of 70 dB L_{AFmax} is considered to represent the threshold of behavioural response but not necessarily be an indication of flight responses.

Noise and Vibration at Fish Habitats and Migration Routes

12.2.42 Fish behaviour responses from exposure to underwater sound relate directly to the species-specific hearing sensitivity. Variations in anatomy and physiology fish hearing mechanisms is extensive, therefore the way in which different species detect sound can vary drastically. Figure 12.1 provides hearing threshold contours for Dab, Herring, Salmon and Trout fish species.

12.2.43 various studies have been carried out regarding the potential impact of noise and vibration on fish. However, '*Measurement and Interpretation of Underwater Noise During Construction and Operation of Offshore Wind Farms*' published in 2007 provides an assessment criteria framework based on the predicted level above the species-specific hearing threshold, dB_{ht} . Table 12.5 below provides a summary of impact thresholds and corresponding effect levels.

Table 12.5 – Fish Response and Impact Thresholds

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Noise Level, dB _{ht}	Level of Magnitude	Type of Noise
0 – 50	Negligible	Low likelihood of Disturbance
50 – 75	Low	Some avoidance reaction by the majority of individuals but habituation or context may limit effect
75 – 90	Medium	Significant avoidance reaction by the majority of individuals but habituation or context may limit effect
>90	High	Strong avoidance reaction by virtually all individuals
>130	Very High	Possibility of traumatic hearing damage from single event



Operational Phase

Development-Generated Road Traffic

12.2.44 DMRB provides guidance on defining the magnitude of noise impacts associated with changes in road traffic flows, related to the Proposed Development.

12.2.45 The magnitude of effect can be determined on the basis of a change in road traffic noise level, in terms of $L_{Aeq, 18\text{hour}}$, as detailed in Table 12.6. However, it is considered that the absolute level of road traffic noise is also relevant in the determining of noise impacts.

Table 12.6 – Short-Term and Long-Term Magnitude of Change in Road Traffic Noise, according to DMRB

Level of Magnitude	Short Term Change in Noise Level $L_{10,18\text{hour}}$ dB(A)	Long Term Change in Noise Level $L_{10,18\text{hour}}$ dB(A)	Significance of Impact – as described in DMRB
High	≥ 5.0	≥ 10.0	Major
Medium	3.0-4.9	5.0-9.9	Moderate
Low	1.0-2.9	3.0-4.9	Minor
Negligible	0.1-0.9	0.1-2.9	Negligible
	0.0	0.0	No Change

Noise from Proposed Ancillary Equipment

12.2.46 Noise levels from proposed ancillary equipment associated with the Proposed Development, for example building services and fixed plant at proposed employment, commercial and education uses, would need to be controlled to ensure that it would not have an adverse effect on Proposed Sensitive Receptors (PSRs) and Existing Sensitive Receptors (ESRs), relative to the background noise level. Criteria for the assessment are set in accordance with BS 4142:2014. Using the baseline noise levels recorded at, and in the vicinity of, the Site, noise limits for ancillary equipment have been calculated to ensure the requirements are met.

Significance of Effect

Magnitude of Effect

12.2.47 Table 12.7 describes the magnitude of noise and vibration impact effects. These magnitude descriptors are based upon IEMA Guidelines for Environmental Noise Impact Assessment, and the descriptions based on the Noise Exposure Hierarchy in PPG-Noise.

Table 12.7 – Magnitude of Impact



Descriptor	Description
High	Impact resulting in a considerable change in baseline environmental conditions predicted either to cause statutory objectives to be significantly exceeded or to result in severe undesirable/desirable consequences on the receiving environment.
Medium	Impact resulting in a discernible change in baseline environmental conditions predicted either to cause statutory objectives to be marginally exceeded or to result in undesirable/desirable consequences on the receiving environment.
Low	Impact resulting in a change in baseline environmental conditions with undesirable/desirable conditions that can be tolerated.
Negligible	No discernible change in baseline environmental conditions.

Sensitivity of Receptor

12.2.48 Table 12.8 describes the sensitivity of receptors.

Table 12.8 – Sensitivity of Receptor

Descriptor	Description
High	Receptor/resource has little ability to absorb change without fundamentally altering its present character, or of international or national importance. For example, hospitals, residential care homes, and internationally and nationally designated nature conservation sites which are also known to contain noise sensitive species (i.e. noise may change breeding habits or threaten species in some other way).
Medium	Receptor/resource has moderate capacity to absorb change without significantly altering its present character. For example, residential dwellings, offices, schools, and play areas. Locally designated nature conservation sites which are also known to contain noise sensitive species (i.e. noise may change breeding habits or threaten species in some other way).
Low	Receptor/resources is tolerant of change without detriment to its character or is of low or local importance. For example, industrial estates.
Negligible	Receptor/resource is not sensitive to noise.

Significance of Effect

12.2.49 The significance of effect is determined by the interaction between magnitude of impact (Table 12.7) and sensitivity of receptor (Table 12.8). Magnitude descriptors are based upon IEMA Guidelines for Environmental Noise Impact Assessment, and the descriptions based on the Noise Exposure Hierarchy in PPG-Noise.

Table 12.9 – Significance of Effect Matrix, according to IEMA Guidelines

Magnitude of Effect	Sensitivity of Receptors
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	High	Medium	Low	Negligible
High	Substantial	Major	Moderate	Minor
Medium	Major	Major	Moderate	Neutral
Low	Moderate	Moderate	Minor	Neutral
Negligible	Minor	Neutral	Neutral	Neutral

12.2.50 In terms of significant of effect (in EIA terms), the threshold between insignificant and significant lies between 'Moderate' and 'Major' as identified within Table 12.9. Moderate impacts may be noticeable and intrusive but may cause a small change in behaviour. Whereas Substantial impacts are likely to be noticeable and disruptive, and might cause a material change in behaviour or attitude.

Geographical Scope

12.2.51 The geographical scope of this assessment includes the Proposed Development and ESRs in the vicinity of the adjacent local road network. In addition, pertinent areas located a considerable distance from the Proposed Development are considered, including ESRs in the vicinity of Eastleigh Town Centre, West End and Chartwell Green.

Temporal Scope

12.2.52 This assessment considers potential impacts and effects over a 10-year period, including the following assessment years:

- Baseline 2020;
- OPA Phase 1 Opening Year 2023; and,
- Operational Future Year 2030.

Assumptions & Limitations

12.2.53 To reduce the level of uncertainty within the assessment the following steps have been taken:

- Road traffic noise at existing and proposed receptors have been predicted using SoundPlan, taking into account 1st order reflections from buildings and other large surfaces;
- All noise sources measured during the survey are considered to be typical of the surrounding noise environment;



- The noise measurement locations were selected to be representative of the noise levels at the closest point of proposed receptors;
- The distance between the source and nearest receptors has been measured from scale plans;
- Noise measurements were undertaken during suitable weather conditions; and,
- Noise measurements were made using Class 1, integrating sound level meters, which are accurate to 0.1dB.

12.3 CONSULTATION

- 12.3.1 Hydrock provided a noise survey and assessment methodology overview email to Eastleigh Borough Council (EBC) in August 2020 via email. The email set out a review of current guidance to be used for this assessment, together with justification for the validity of noise survey data captured in November 2018, and November 2019 in the vicinity of the site.
- 12.3.2 Given the majority of 2020 has been subject to Covid-19 restrictions, or associated effects on transportation, survey data collected in 2018/2019 is considered to provide a robust representation of the typical baseline conditions.
- 12.3.3 In response to the aforementioned email, telephone discussions were held with Stuart Wedgebury, Environmental Health Consultant at EBC, and subsequent email on the 10th December 2020. In the email it was confirmed that the noise data collected in November 2018 and November 2019 is likely to be representative of 2020 conditions.
- 12.3.4 In addition, the response provided a reiteration of points raised within the Scoping Opinion, and also highlighted the importance of the 'agent of change' principal to the Proposed Development, outlined within the NPPF. Stuart Wedgebury also highlighted that a review of extant permissions of individual businesses at Chalcroft Business park could be carried out, to provide additional context to the impact assessment.
- 12.3.5 Further information was provided by Dawn Errington, on the 16th December 2020, relating to permitted operations at Chalcroft Business Park under extant planning permission, indicating that some of the businesses have no restrictions on night-time HGV movements. It was highlighted that noise from HGV movements associated with current operations are somewhat of a sensitive issue locally, and have given rise to complaints.



- 12.3.6 In addition, Dawn Errington provided access to a noise impact assessment carried out in support of the planning application for the relocation of Owtons Butchers, to be located in a new industrial unit at Chalcroft Business Park (application ref: F/18/83945). The noise impact assessment concludes that no adverse impacts are predicted to occur, with appropriate mitigation measures in place, when considering proposed residential receptors at the Wider OPA Site (inclusive of the OPA Phase 1 Site) with partially open windows.
- 12.3.7 Consultation was carried out with representatives of Chalcroft Business Park prior to and during the 2020 noise survey, including the overall site manager and individual business operators, in order to understand typical operations. Appendix 12.1 provides a summary of information obtained pertinent to this assessment.

12.4 BASELINE ENVIRONMENT

- 12.4.1 Observations made at the Wider OPA Site during the surveys allowed any significant existing noise sources which contribute the measured levels, to be identified. In addition, measurements undertaken at ML5, ML6 and ML9 included constant audio recording to allow retrospective analysis of the existing noise environment. The following noise sources were identified:

Road Traffic Noise: Noise from the adjacent road network was dominant for the majority of the daytime and night time periods, across the Wider OPA Site (at all MLs). Prevailing sources include Allington Lane, Burnetts Lane, B3354 and B3342.

Rail Noise: Noise from rail movements on the London to Portsmouth via Basingstoke rail line, was regularly audible, and occasionally dominant during the daytime and night time periods, in the south western part of the site (ML4, ML6, ML7 and ML9);

Industrial Noise: Industrial noise associated with Chalcroft Business Park was regularly audible, and occasionally dominant for short periods at ML6 during the daytime period, and was inaudible during the night-time period. HGV movements along the access road off Burnetts Lane, associated with the existing Owtons Butchers was regularly dominant at ML5 during the daytime and night-time period; and,

Other: Bird song and other wildlife noises were occasionally audible during the daytime and night time period. Noise from distant aircraft was occasionally audible.

- 12.4.2 Measured noise levels at each ML have been separated into daytime (0700 to 2300 hours) and night-time (2300 to 0700 hours) categories, as appropriate.



12.4.3 Monitoring at ML1, ML3 and ML7 was undertaken between the 2nd and 5th November 2018, covering both weekday and weekend periods. Weekday and weekend daytime periods were found to be relatively similar in level over the survey period. However, the measured Sunday night-time periods were found to be comparably less than the measured Friday and Saturday night-time periods. In order to provide a robust assessment of ambient noise levels at the Wider OPA Site, Sunday night-time levels have been omitted.

12.4.4 Where possible, 16-hour daytime and 8-hour night-time periods were measured in full.

12.4.5 At ML4, daytime levels were measured between 1400 to 2300 on the 26th November and 0700 to 1400 on the 27th November 2020. The respective $L_{Aeq, 9hour}$ and $L_{Aeq, 7hour}$ levels have been logarithmically averaged to provide a representative daytime $L_{Aeq, 16hour}$ level.

12.4.6 At ML6, a daytime $L_{Aeq, 15hour}$ level was measured, between the 15th and 16th October 2020. Similarly, at ML9, a daytime $L_{Aeq, 8hour}$ level was measured, between the 14th and 15th October 2020. Daytime levels measured at ML6 and ML9 included peak transportation periods, therefore the arithmetic average of the measured $L_{Aeq, 1hour}$ values are considered to represent the typical $L_{Aeq, 16hour}$ daytime level at each location, in order to provide a robust assessment.

12.4.7 Measurements at ML2 and ML8 were carried out for 3 consecutive hours, during the quiet daytime period (1000 to 1700), in accordance with the shortened measurement methodology outlined within CRTN, in order to characterise noise from Allington Lane and Burnetts Lane, respectively. Daytime $L_{Aeq, 16hour}$ and night-time $L_{Aeq, 8hour}$ values have been derived from the measured $L_{A10, 3hour}$ using the methodologies outlined by CRTN and TRL, and presented in Table 12.10.

12.4.8 Table 12.10 presents the typical daytime and night-time values at each ML, used for the purposes of this assessment.

Table 12.10 – Average Measured Daytime and Night-time Noise Levels

Monitoring Location	Time Period	Measured Noise Level, $L_{Aeq,T}$ dB
ML1	0700 - 2300	47
	2300 - 0700	37
ML2	0700 - 2300	74
	2300 - 0700	65
ML3	0700 - 2300	50
	2300 - 0700	42



ML4	0700 - 2300 2300 – 0700	62 54
ML5	0700 - 2300 2300 – 0700	57 56
ML6	0700 - 2300 2300 – 0700	42 35
ML7	0700 - 2300 2300 – 0700	50 41
ML8	0700 - 2300 2300 - 0700	63 55
ML9	0700 - 2300 2300 - 0700	44 36

12.4.9 The typical measured night-time L_{AFmax} noise levels measured during the survey are summarised in Table 12.11. Measured night time maxima which are not considered representative of the typical noise environment have been eliminated from this assessment.

12.4.10 Typical measured daytime L_{AFmax} noise levels at ML2 and ML8 are also presented for completeness.

Table 12.11: Summary of Typical Maximum Night-time Noise Levels

Monitoring Location	Typical Night-time L_{AFmax} dB
ML1	73
ML2	88
ML3	46
ML4	82
ML5	84
ML6	50
ML7	60
ML8	85
ML9	52

12.4.11 A summary of noise survey results is presented in Appendix 12.2.

12.5 INHERENT DESIGN MITIGATION

12.5.1 A Construction Environmental Management Plan (CEMP) will be undertaken for the Proposed Development, which will include a methodology of noise and vibration best practice and, where



required, mitigation with respect to the thresholds outlined within this assessment, as appropriate.

- 12.5.2 An assessment of road traffic noise associated with the proposed Bubb Lane & Burnetts Lane Link Road was carried out by Hydrock, in order to discharge Condition 32 attached to the planning permission (ref: DC/19/87026). The assessment outlined a mitigation scheme to be implemented as part of that link road. The mitigation scheme comprises a landscaped earth, in combination with a 2m acoustic barrier, as detailed in the addendum report, dated 2nd July 2020. The link road and associated mitigation scheme has been included for all future year road traffic scenarios, as the link road is expected to become operational in 2021.

12.6 POTENTIAL ENVIRONMENTAL IMPACTS & EFFECTS

Construction Impacts and Effects

OPA Phase 1

- 12.6.1 The activities associated with the construction phase of the OPA Phase 1 have the potential to generate noise and vibration that propagates beyond the site boundary. Off-site impacts associated with the OPA Phase 1 are covered within the Wider OPA section.

The Wider OPA

Noise at Existing Residential Receptors

- 12.6.2 The activities associated with the construction phase of the Wider OPA have the potential to generate noise that propagates beyond the site boundary. In addition, noise associated with the construction phase has the potential to impact preceding phases of the development itself. For example, Phase 1 may be impacted by later construction phases when it becomes occupied prior to completion of the overall development.
- 12.6.3 At this stage, detailed information regarding the nature and timescales of activities likely to take place during the construction phase of the Wider OPA are not known. Activities which could give rise to significant impacts during construction include, but are not limited to, the following:
- Site preparation i.e. ground excavation, levelling of ground, trenching, trench filling, unloading and levelling of hardcore and compacting filling; and,



- Construction of the Proposed Development, including piling, construction of access roads, fabrication processes e.g. planning, sanding, routing, cutting, drilling and laying foundations.

12.6.4 The contractor undertaking the enabling and construction works has not yet been appointed, therefore, for the purposes of this assessment it is assumed that the enabling and construction works will be restricted to daytime hours (i.e. between 08:00 and 18:00 hours Monday to Friday and 08:00 to 13:00 hours on a Saturday, with no work on Sunday and Bank Holidays).

12.6.5 Based upon the measured ambient noise levels in the vicinity of the Phase 1 Site and ESRs, during the daytime period, the appropriate category value has been determined, as detailed in Table 12.12.

Table 12.12: Appropriate Category Value for Existing Sensitive Receptors

Description of Receptor	Representative Monitoring Location	Average Measured Daytime Level, dB $L_{Aeq, T}$	Rounded Daytime Level to the Nearest 5 dB(A)	Appropriate Category Value, according to BS5228-1	Significant Noise Impact Threshold,
Residential dwellings in the northern part of Phase 1	ML5	57	55	A	65
Residential dwellings in the eastern part of Phase 1	ML8	56*	55	A	65
Residential dwellings in the southern part of Phase 1	ML9	44	45	A	65
Existing residential dwellings in the vicinity of the eastern Site boundary	ML3	50	50	A	65
Existing residential dwellings in the vicinity of the northern Site boundary	ML1	47	45	A	65
Existing residential dwellings in the vicinity of the western Site boundary.	ML2	67*	65	B	70
*Denotes road traffic noise levels which have been distance corrected to 10m from the carriageway, in order to represent ambient levels in the vicinity of ESRs.					

12.6.6 Construction Phase activities have the potential to generate short-term increases in noise levels. The levels of noise received at the receptors closest to Phase 1 and the overall Proposed Development, would depend on the sound power levels of equipment used, the distance to the



properties, the presence of screening or reflective surfaces and the ability of the intervening ground to absorb propagating noise.

12.6.7 Furthermore, the nearest noise sensitive receptors to the construction activity will vary over the course of the construction period, depending on where activities are taking place within the Site. Given the potentially small distances between activities and existing residential dwellings, noise levels at the receptors may occur above the threshold values determined by BS5228, as detailed in Table 12.12, when in the immediate vicinity.

12.6.8 The noise impact of the construction phase on existing and proposed residential properties is likely to be **minor**, however there is potential for short-term **moderate** impacts when construction takes place in the immediate vicinity of sensitive receptors.

12.6.9 Therefore, it is recommended that mitigation measures be put in to place in order to avoid and/or reduce potential impacts where possible. Further, detail is provided in the Mitigation Section of this Chapter.

Vibration at Existing Residential Receptors

12.6.10 The nearest sensitive receptors to the proposed construction works would vary depending upon the part of the Development under construction. As a worst-case scenario, construction works may potentially take place at a distance less than 10m from existing residential properties and occupied dwellings within Phase 1. At this distance, it is considered possible that vibration due to the operation of construction machinery may be above the threshold of complaint. However, this would be transient only and for very limited periods during the works.

12.6.11 It is considered that piling may be required given the nature of the Proposed Development. At this time, the type(s) of piling to be used during the construction phase is not known and it is likely that the contractor responsible for undertaking construction works at the Site would decide the appropriate method of piling required.

12.6.12 BS5228-2 recognises that the most common form of vibration associated with piling is the intermittent type derived from conventional driven piling. The intensity of vibration disturbance, which may be registered at a receptor, would be a function of many factors. These are set out in BS5228-2 and include:

- Energy per blow or cycle;
- Distance between source and receptor;



- Soil structure interaction (i.e. nature of connection between soil and structure being monitored); and,
- Construction of structure and location of measuring points (e.g. soil surface, building foundation and internal structural element).

12.6.13 As the responsible contractor has not yet been appointed, detailed information regarding the above is not known. However, elements of proposed roads are considered to potentially be constructed using piling techniques.

12.6.14 Typically, modern construction methods would implement either Continuous Flight Auger (CFA) piling or rotary bored piling techniques. These methods use trawler mounted drill rigs to insert the pile in to the ground, and do not use vibratory hammers. These methods therefore don't emit high intensity transient vibration and generally emit low level constant vibration.

12.6.15 It is considered likely that either CFA or rotary bored piling methods will be used during the construction of the Development. However, a 'worst case' prediction of vibration impact, as a result of vibratory driven piles being used, has been carried out at the nearest existing residential receptor, using the methodology outlined within Annex E of BS5228-2.

12.6.16 The prediction assumes the following:

- 33% probability that predicted PPV will be exceeded. $K_v = 126$;
- The piling rig is located in at 50m from sensitive receptors. $x=50$; and,
- 'All operations' criterion is used from BS5228-2. $\Delta=1.3$. Less impact is likely during 'start up' and 'run down' situations. More impact is likely during steady state operation.

12.6.17 The predicted worst case PPV at receptors located 50m from piling activity is 0.7 mms^{-1} . In accordance with BS5228-2, this indicates that vibration might just be perceptible at this ESR. Furthermore, this predicted level is significantly less than the guideline value for the threshold of building damage, outlined within BS7385-2.

12.6.18 The vibration level of the construction works is likely to result in an impact between **moderate** and **neutral**, at existing and proposed residential dwellings.

Noise & Vibration at Ecological Receptors



12.6.19 The following potentially Sensitive Ecological Areas (SEAs) have been identified to be located within 50m proposed major roads within the Proposed Development, as shown on 'OHH Sensitive Ecological Areas – Noise' drawing, provided by Johns Associates:

- Quobleigh Ecological Area; and,
- Quobleigh Central Stream Corridor; and,
- Chalcroft Tolls Ecology Area.

12.6.20 In addition, Johns Associates highlighted the presence of 3 badger sets located in and around the Quobleigh Ecological Area and stream corridor. However, badger set locations are at least 100m from any proposed major road construction areas, and impacts therefore have the potential to be **minor** on occasion, but likely to be **neutral** for the majority of the time, depending on the specific area in which construction activity occurs.

Bird Habitats

12.6.21 Bird habitats are generally considered to be of medium sensitivity, as birds have some ability to absorb/avoid short term impacts by relocating to nearby habitats. However, during particularly sensitive periods, such as breeding seasons, bird habitats are considered to be of high sensitivity.

12.6.22 Noise impact thresholds for construction noise are provided within IECS guidance, as detailed in Table 12.4. The distance between bird habitats, within the identified SEAs identified, will vary over the course of the construction period, depending on where activities are taking place within the Site.

12.6.23 IECS guidance provides general guidance that a 100m buffer zone between construction activities and bird habitats should remove the potential for noise impacts. Given the potentially small distances between construction activities and bird habitats within the SEAs, a 100m buffer zone would not be practical.

12.6.24 When construction is due to take place within close proximity to the SEAs, the appropriate threshold values should be adopted, and construction noise should be controlled to an average level of less than 70dB(A), with individual events being controlled to below 85dB(A) at nearby habitats. This would ensure no significant impacts occur, in accordance with IECS guidance.



12.6.25 The noise impact of the construction phase on bird habitats is likely to be **minor** to **neutral** for the majority of the time, however there is potential for short-term **moderate** impacts when construction takes place in the immediate vicinity of SEAs.

12.6.26 Therefore, it is recommended that mitigation measures be put in to place in order to avoid and/or reduce potential impacts where possible. Further, detail is provided in the Mitigation Section of this Chapter.

Fish Habitats

12.6.27 Quobleigh Stream has been identified as a potential habitat for migratory salmonid species. Generally, fish habitats are generally considered to be of low sensitivity, as fish have some ability to absorb/avoid impacts by relocating to nearby habitats. However, during particularly sensitive periods, such as breeding/migration seasons, the migration paths themselves are considered to be of high sensitivity.

12.6.28 When construction is due to take place within close proximity to Quobleigh Stream, the appropriate threshold values should be adopted, and construction noise and re-radiated noise from construction vibration should be controlled to an average level of less than 75dB_{ht}. This would ensure no significant impacts occur, in accordance with current guidance.

12.6.29 The dB_{ht} criteria refers to the specific underwater hearing threshold of individual fish species. Guidance within '*Measurement and Interpretation of Underwater Noise During Construction and Operation of Offshore Wind Farms*' provides example hearing thresholds for Salmon and Trout salmonid species, of approximately 115 dB and 95 dB (re. 1 µPa), respectively, at their most sensitive frequency band. Any exceedance of these hearing threshold values would subsequently be defined as dB above hearing threshold, dB_{ht}.

12.6.30 Underwater sound is measured in dB with a reference pressure of 1 µPa, whereas airborne sound is measured in dB with a reference pressure of 20 µPa. Based on the change in reference pressures, the change in sound pressure level from air to underwater is +26dB i.e. underwater sound is 26dB higher than airborne sound.

12.6.31 Therefore, based on the hearing thresholds of Salmon and Trout, an airborne noise level of 89dB and 69dB, respectively, would be at the threshold of hearing for each species. Furthermore, respective airborne levels greater than 139dB and 119dB for Salmon and Trout would be required to be present at the water surface to invoke an avoidance reaction, i.e. low magnitude of impact.



12.6.32 As an example, according BS5228-1, typical noise levels from pre-cast concrete hydraulic hammer driven piling activity are 89dB at 10m, and 109dB at 1m from source. This indicates that impacts associated with airborne sound from construction activity at Quobleigh Stream are likely to result in a **neutral** effect.

12.6.33 Re-radiated noise level can be derived from a Peak Particle Velocity (PPV) vibration value. The *'Association of Noise Consultants measurement and assessment of groundborne noise and vibration, 2020'* presents a methodology for converting dB vibration velocity level in to dB re-radiated sound pressure level, shown below:

$$L_p = L_v - 27 \text{ dB}$$

Where: L_v is the RMS vibration velocity level, re. 1×10^{-9} , and L_p is the RMS noise level.

12.6.34 The above formula has since been updated to better suit the prediction of re-radiated noise in rooms specifically for rail applications, based on empirical measurements from London Underground Central Line. However, this assessment is not related to re-radiated rail noise level within rooms, therefore the preceding formula has been adopted, as above.

12.6.35 PPV is converted to vibration velocity level, L_v , using a reference vibration velocity level of 1×10^{-9} , with the following formula:

$$L_v = 20 \log \left(\frac{PPV \times 0.707}{1 \times 10^{-9}} \right) \text{ dB}$$

12.6.36 While the above formulae are generally used for re-radiated noise within buildings, it has been adopted to form a crude prediction methodology for this assessment, in the absence of a more specific methodology.

12.6.37 Table 12.13 presents some example PPV values from construction activities at the bank of Quobleigh Stream and the corresponding predicted re-radiated underwater noise levels, including a +26dB underwater correction as outlined previously.

Table 12.13 – Predicted Re-Radiated Underwater Noise from Example PPV Values

PPV, mm/s	Re-Radiated Noise Level, dB	Low Impact Threshold, Salmon/Trout, dB (50dB _{ht})	Medium Impact Threshold, Salmon/Trout, dB (75dB _{ht})	High Impact Threshold, Salmon/Trout, dB (90dB _{ht})
0.1	156	165/145	190/170	205/185



0.2	162			
0.5	170			
1	176			
2	182			
5	190			

12.6.38 Table 12.3 indicates that PPV value of 0.5mm/s measured at the bank of Quobleigh Stream would exceed the low impact threshold, but not exceed medium impact thresholds for Salmon and Trout. Furthermore, PPV of up to approximately 2mm/s at the Quobleigh Stream would result in a medium impact for Salmon and Trout, and not exceed the high impact threshold value.

12.6.39 It is considered that vibration levels from construction activity should not exceed 0.5mm/s PPV, where possible, and vibration of 2mm/s PPV should be prevented, at the bank of Quobleigh Stream. This would ensure potential vibration impacts, associated with re-radiated noise, are between **minor** and **moderate** at Quobleigh Stream.

12.6.40 It is recommended that mitigation measures be put in to place in order to avoid and/or reduce potential impacts where possible. Further, detail is provided in the Mitigation Section of this Chapter.

Occupation Impacts and Effects

OPA Phase 1

Development Generated Road Traffic at Existing Sensitive Receptors

12.6.41 Noise modelling has been carried out in accordance with CRTN to assess potential changes in road traffic noise at ESRs associated with the OPA Phase 1 Site. This includes nearby ESRs, together with ESRs in the vicinity of Eastleigh Town centre to the north west, and West End to the south west of the Wider OPA Site. A total of 54 ESRs have been identified as presented in Appendix 12.3, and shown on Figure 12.2 and Figure 12.3.

12.6.42 Predictions have been carried out for a future 'opening year' of 2023, including committed developments, which relates specifically to the first occupation of OPA Phase 1 Site. In order to provide a robust assessment, it is assumed that the OPA Phase 1 would be fully occupied in 2023.



12.6.43 18 Hour Annual Average Weekday Traffic (AAWT) data used for the purposes of this assessment has been provided by Paul Basham Associates, based on data submitted as part of the Site's extant planning permission for the Baseline 2020 + Committed Development, with the addition of predicted committed development traffic included within the transport assessment. A summary of traffic data used for this assessment is provided in Appendix 12.4.

12.6.44 Paul Basham Associates also provided the following information relating to the methodology in establishing traffic data:

- TEMPro Growth factors have been applied to the daily 2020 data to establish 2023, using the 'Eastleigh Ward' – as agreed for the highway assessment.
- 24-hour flows have been converted to 18-hours using the results of three nearby ATC surveys (Burnetts Lane, Allington Lane and Bishopstoke Road) to understand the percentage of vehicles in the 18 hour category, which confirmed an average of 97.3% across the three surveys.
- Committed developments considered include Pembers Hill Farm (O/15/77190), Land North West of Boorley Green (P/15/75953), Land West of Woodhouse Lane (O/18/83634) and Land North of Winchester Street (O/18/83698).

12.6.45 Predicted noise levels are based on speed limits for each road link in the absence of average speed data. Furthermore, in the absence of specific HGV percentages, 10% HGVs have been assumed on each road link to provide a robust assessment, as recommended by Paul Basham Associates.

12.6.46 A summary of noise modelling assumptions is provided in Appendix 12.5.

12.6.47 Noise impacts associated with the OPA Phase 1 at each ESR have been assessed in accordance with DMRB, by comparing the predicted road traffic noise levels for the following scenarios:

- Scenario 1: 2020 Baseline Year;
- Scenario 2: 2023 Opening year, without development (inc. committed developments); and,
- Scenario 3: 2023 Opening year, with development (inc. committed developments).



12.6.48 Predicted levels at each ESR are detailed in full in Appendix 12.6. ESRs with the most significant changes in noise levels, associated with the OPA Phase 1, have been identified and summarised in Table 12.14 below.

Table 12.14 – Summary of Predicted Road Traffic Noise Levels for Assessment Scenarios.

ESR	Floor Level	Predicted L _{10, 18hour} noise level at Existing Sensitive Receptors				
		Scenario 1: 2020 Baseline	Scenario 2: 2030 Opening Year, Without Development	Scenario 3: 2030 Opening Year, With Development	Predicted Change: Scenario 1 to Scenario 3 (Figure 12.4)	Predicted Change: Scenario 2 to Scenario 3 (Figure 12.5)
ESR9	GF	68	68	69	+1	+1
	F1	68	69	69	+1	0
ESR12	GF	66	66	67	+1	+1
	F1	67	68	68	+1	0
ESR26	GF	61	59	59	-2	0
	F1	62	60	60	-2	0
ESR27	GF	60	62	62	+2	0
	F1	61	63	63	+2	0
ESR44	GF	63	59	59	-4	0
	F1	65	61	61	-4	0

12.6.49 The predicted changes in noise levels attributed to development generated road traffic from the OPA Phase 1 Site have been assessed in accordance with the DMRB magnitude criteria set out in Table 12.6, together with sensitivity criteria set out in Table 12.8. Existing residential dwellings and healthcare receptors are considered to be of medium sensitivity as described.

12.6.50 When assessing the cumulative change in noise levels i.e. comparing 'baseline 2020' conditions to the '2023 opening year, with development', the highest increase in noise level is predicted to be approximately 2dB, at ESR27, an existing residence off Burnetts Lane. When considered over the 3-year period between assessment scenarios, this is considered to represent a minor impact in the short-term, in accordance with the significance criteria set-out in this Chapter. This indicates that **moderate** effects would occur at this ESR.

12.6.51 All other cumulative short-term impacts are predicted to be lower than found at ESR27, and therefore comprise negligible impacts, and **neutral** effects. With the exception of ESR44, where a reduction in development-generated road traffic noise levels is predicted, resulting in a **moderate beneficial** effect



12.6.52 The cumulative change in noise levels between 2020 baseline and 2023 opening year for the OPA Phase 1, with development, scenarios are presented on Figure 12.5.

12.6.53 When assessing the Proposed Development in isolation i.e. comparing '2023 opening year, without development' conditions to the '2023 opening year, with development', the highest increase in noise level is predicted to be approximately 1dB, as shown in Table 12.14. This indicates that the change in noise level at ESRs, associated with the OPA Phase 1 Site will be less than, or equal to 1dB, which is at the threshold between low and negligible impact, in the short-term, in accordance with DMRB.

12.6.54 This indicates that **moderate** to **neutral** effects are predicted to occur at ESRs, in attributed to the OPA Phase 1 Site only.

12.6.55 The change in noise levels between 2023 opening year, without development and with development scenarios are presented on Figure 12.6.

12.6.56 No specific mitigation is required with regards to development-generated road traffic noise.

Noise Levels at Proposed Residential Dwellings

12.6.57 Free field and façade noise levels have been predicted at the OPA Phase 1 Site based on the site Site Layout Plans, Building Heights and Plot Type drawings provided by Clague Architects (dated: November 2020).

12.6.58 In order to provide an appropriate assessment of future operational conditions, road traffic noise associated with the 2030 operational year, with the Wider OPA and committed developments has been considered.

Outdoor Living Areas

12.6.59 Plans indicate that proposed gardens will include 2m high garden wall/fencing along the boundaries of gardens located closest to Burnetts Road and the proposed north-south link road. Proposed garden wall/fencing has been incorporated in to noise level predictions, and is assumed to have a surface density of at least 10kg/m², with no perforations.

12.6.60 Figure 12.7 illustrates predicted daytime external noise levels across the OPA Phase 1 Site. This figure includes a 55dB limit line, which corresponds to the recommended requirements for outdoor living areas, in accordance with BS8233 and who guidance.



12.6.61 Figure 12.7 indicates that noise levels in proposed gardens achieve 55dB $L_{Aeq, T}$ within proposed gardens across the Proposed Development. Furthermore, the majority of gardens achieve the 'desirable' level of 50dB $L_{Aeq, T}$ outlined by BS8233.

12.6.62 With the inclusion of 2m high garden fences, forming part of the proposals for the OPA Phase 1 Site, noise levels in proposed gardens result in **neutral** effects. Therefore, no additional mitigation is required.

Internal Noise Levels in Proposed Dwellings

12.6.63 Façade noise levels at each plot within the OPA Phase 1 have been predicted. The highest façade levels, predicted at each floor of each building, are presented in the following figures:

- Figure 12.8 illustrates predicted average daytime facade noise levels and corresponding noise exposure category values across the OPA Phase 1 Site, $L_{Aeq, 16h}$.
- Figure 12.9 illustrates predicted average night-time facade noise levels and corresponding noise exposure category values across the OPA Phase 1 Site, $L_{Aeq, 8h}$.
- Figure 12.10 illustrates predicted maximum night-time facade noise levels and corresponding noise exposure category values across the OPA Phase 1 Site, L_{AFmax} .

12.6.64 Depending on the predicted noise levels, and subsequent magnitude of impact at each proposed facade, facades are categorised in to noise exposure categories, outlined in Table 12.15, as reflected in the above figures.

Table 12.15: Façade Noise Exposure Categories

Façade Noise Exposure Category	Description
High	Acoustically enhanced glazing and ventilation configurations
Moderate	Standard glazing and ventilation configurations
Low	No specific mitigation requirements



12.6.65 The category value for each façade has been determined based on detailed noise break-in calculations for each house type, habitable room type, and measured octave band noise levels associated with the surrounding local road network. Measured octave band levels of nearby roads have been proportionately scaled to be representative the predicted levels in the 2030 future year scenario, as appropriate.

12.6.66 Without the inclusion of any specific mitigation, dwellings with facades subjected to the moderate and high noise exposure categories would be subjected to **major** to **substantial** effects, respectively.

12.6.67 Specific details on glazing and ventilation requirements are provided in the Mitigation section of this Chapter.

Noise Associated with Chalcroft Business Park

12.6.68 Consultation with businesses at Chalcroft Business Park was carried out in order to identify typical operations and noise sources with the potential to impact the Proposed Development. In summary, existing businesses comprise a mixture of warehousing and logistics uses, in addition

12.6.69 Noise levels were measured at ML9, to the south west of the OPA Phase 1 Site, closest to Chalcroft Business Park. No industrial type noise was observed to be audible during the daytime or night-time period at this location.

12.6.70 Therefore, in accordance with BS4142, no specific assessment is required at the OPA Phase 1 site.

Noise from Proposed Ancillary Equipment

12.6.71 The OPA Phase 1 does not include any industrial/commercial uses, however there is potential that some fixed plant/ancillary equipment would be required in order to service apartment buildings. The details of which would be developed during technical design stages.

12.6.72 At this stage, detailed information relating to proposed fixed plant and/or building services associated with the OPA Phase 1 is unavailable. Therefore, guideline noise limits have been formulated based on the existing background noise environment, in accordance with current guidance.

12.6.73 Atmospheric noise emissions limits have been determined for any proposed fixed building services plant (with the exception of emergency plant i.e. back-up generators).



12.6.74 Where possible, noise associated with the ancillary equipment at the OPA Phase 1 Site should be controlled to the levels outlined in Table 12.16 when assessed in accordance with BS4142 at the nearest noise sensitive receptor. The recommended limits correspond to noise levels which are 5dB below the average background noise levels.

Table 12.16 – Atmospheric Plant Noise Emission Limits

Monitoring Location	Time Period	Measured Background Noise Level, LA90, dB	Recommended Noise Level Limit, LA90 dB
Proposed sensitive receptors in the OPA Phase 1 Site. ML9	0700 - 2300	38	33
	2300 – 0700	31	26

12.6.75 The above recommended noise limits are intended to provide conservative a guideline at this stage, in the absence of detailed information. A full assessment is likely to be required once detailed information becomes available, in accordance with BS4142.

12.6.76 The responsibility to achieve the above would fall to those undertaking the building works. Proposals should be reviewed by Hydrock during technical design.

12.6.77 As detailed information relating to fixed plant is unknown, Hydrock highlight that provisions for the selection of low noise equipment, silencers, enclosures, screens and other acoustic attenuation measures should be made where necessary.

The Wider OPA

Development Generated Road Traffic at Existing Sensitive Receptors

12.6.78 Noise modelling has been carried out in accordance with CRTN to assess potential changes in road traffic noise, associated with The Wider OPA, at ESRs. This includes ESRs in the vicinity of the Wider OPA Site, together with ESRs in the vicinity of Eastleigh Town centre to the north west, and West End to the south west of the Wider OPA Site. A total of 54 ESRs have been identified as presented in Appendix 12.3, and shown on Figure 12.2 and Figure 12.3.

12.6.79 Predictions have been carried out for a future 'operational year' of 2030, including committed developments. In order to provide a robust assessment, it is assumed that The Wider OPA would be fully occupied in 2030.



12.6.80 18 Hour Annual Average Weekday Traffic (AAWT) data used for the purposes of this assessment has been provided by Paul Basham Associates, based on data submitted as part of the Site's extant planning permission for the Baseline 2020 + Committed Development, with the addition of predicted committed development traffic included within the transport assessment. A summary of traffic data used for this assessment is provided in Appendix 12.4.

12.6.81 Paul Basham Associates also provided the following information relating to the methodology in establishing traffic data:

- TEMPro Growth factors have been applied to the daily 2020 data to establish 2030, using the 'Eastleigh Ward' – as agreed for the highway assessment.
- 24-hour flows have been converted to 18-hours using the results of three nearby ATC surveys (Burnetts Lane, Allington Lane and Bishopstoke Road) to understand the percentage of vehicles in the 18 hour category, which confirmed an average of 97.3% across the three surveys.
- Committed developments considered include Pembers Hill Farm (O/15/77190), Land North West of Boorley Green (P/15/75953), Land West of Woodhouse Lane (O/18/83634) and Land North of Winchester Street (O/18/83698).

12.6.82 Predicted noise levels are based on speed limits for each road link in the absence of average speed data. Furthermore, in the absence of specific HGV percentages, 10% HGVs have been assumed on each road link to provide a robust assessment, as recommended by Paul Basham Associates.

12.6.83 A summary of noise modelling assumptions is provided in Appendix 12.5.

12.6.84 Noise impacts at each ESR have been assessed in accordance with DMRB, by comparing the predicted road traffic noise levels for the following scenarios:

- Scenario 1: 2020 Baseline Year;
- Scenario 4: 2030 Opening year, without development (inc. committed developments); and,
- Scenario 5: 2030 Opening year, with development (inc. committed developments).

12.6.85 Predicted levels for each ESR are detailed in full in Appendix 12.6. ESRs with the most significant changes in noise levels have been identified and summarised in Table 12.17 below.



Table 12.17 – Summary of Predicted Road Traffic Noise Levels for Assessment Scenarios.

ESR	Floor Level	Predicted L _{10, 18hour} noise level at Existing Sensitive Receptors				
		Scenario 1: 2020 Baseline	Scenario 2: 2030 Opening Year, Without Development	Scenario 3: 2030 Opening Year, With Development	Predicted Change: Scenario 1 to Scenario 3 (Figure 12.4)	Predicted Change: Scenario 2 to Scenario 3 (Figure 12.5)
ESR9	GF	68	69	69	+1	0
	F1	68	69	70	+2	+1
ESR17	GF	73	74	74	+1	0
	F1	72	73	74	+2	+1
ESR18	GF	66	66	68	+2	+2
	F1	66	67	68	+2	+1
ESR27	GF	60	62	62	+2	0
	F1	61	63	64	+3	+1
ESR41	GF	62	63	66	+4	+3
	F1	63	64	67	+4	+3
ESR43	GF	69	69	70	+1	+1
	F1	69	70	71	+2	+1
ESR44	GF	63	60	60	-3	0
	F1	65	61	62	-3	+1
ESR45	GF	63	60	60	+1	+1
	F1	65	61	62	+2	+1
ESR46	GF	60	60	61	+2	+1
	F1	61	62	63	+1	+1

12.6.86 The predicted changes in noise levels associated with the Wider OPA development-generated road traffic have been assessed in accordance with the DMRB magnitude criteria set out in Table 12.6, together with sensitivity criteria set out in Table 12.8. Existing residential dwellings and healthcare receptors are considered to be of medium sensitivity as described.

12.6.87 When assessing the cumulative change in noise levels i.e. comparing 'baseline 2020' conditions to the '2030 opening year, with development', the highest increase in noise level is predicted to be approximately 4dB, at ESR41, an existing residence off Fir Tree Lane. When considered over the 10-year period between assessment scenarios, this is considered to represent a low impact in the long-term, and therefore a **minor** effect, in accordance with the significance criteria set-out in this Chapter.



12.6.88 All other cumulative impacts are predicted to be lower than found at ESR41, and are therefore considered to have a **neutral** effect. With the exception of ESR44, where a reduction in overall road traffic noise is predicted, resulting in a **moderate beneficial** effect.

12.6.89 The cumulative change in noise levels between 2020 baseline and 2030 opening year, with development, scenarios are presented on Figure 12.11.

12.6.90 When assessing the Wider OPA Site in isolation i.e. comparing '2030 opening year, without development' conditions to the '2030 opening year, with development', the highest increase in noise level is predicted to be approximately 3dB, at ESR41. This indicates that the change in noise level at ESR41, associated with Wider OPA development-generated road traffic will be less than, or equal to 3dB, which represents a low impact in the-long term, in accordance with DMRB.

12.6.91 This assessment assumes the Proposed Development is fully occupied in the 2030 'opening year' scenario, in order to provide a robust assessment and additional margin of safety. Therefore, when assessing impacts associated with the Wider OPA in isolation, the resultant effects are predicted to be **minor to neutral**.

12.6.92 The change in noise levels between 2030 opening year, without development and with development scenarios are presented on Figure 12.12.

12.6.93 No specific mitigation is required with regards to development-generated road traffic noise from the Wider OPA.

Noise at Proposed Sensitive Areas

12.6.94 Noise modelling has been carried out to determine the predicted future ambient noise levels at proposed sensitive areas of the Wider OPA Site. Predicted ambient noise levels in the 2030 opening year, with the development are presented in the following figures:

- Figure 12.13 – Daytime Noise Levels, $L_{Aeq, 16hour}$ dB;
- Figure 12.9 – Night-time Noise Levels, $L_{Aeq, 8hour}$ dB; and,
- Figure 12.10 – Night-time Maximum Noise Levels dB, L_{AFmax} .

12.6.95 The Proposed Parameter Plan (Ref. CMP 01) shows the general location of proposed sensitive areas across the Proposed Development. For the purposes of this assessment, Proposed

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Sensitive Receptor (PSR) locations have been selected, based on the Parameter Plan, with respect to existing and proposed noise sources.

12.6.96 PSRs are considered to be representative of proposed sensitive areas likely to be affected by noise. Daytime noise levels are calculated at ground level (1.5m height) and night-time noise levels are calculated at 1st floor height (4.5m height). Predicted noise levels at PSRs are presented in Table 12.18 below.

Table 12.18 – Predicted External Noise Levels at Proposed Sensitive Receptors

Receptor Description	Predicted Average Daytime Noise Levels, $L_{Aeq, 16\text{hour}}$ dB	Predicted Average Night-time Noise Levels, $L_{Aeq, 8\text{hour}}$ dB	Predicted Maximum Night-time Noise Levels, L_{AFmax} dB
PSR1. Proposed residential dwellings in the north western part of the Wider OPA Site, closest to the proposed site access off Allington Lane.	61	55	70
PSR2. Proposed residential dwellings in the western part of the Wider OPA Site, closest to Allington Lane.	57	51	56
PSR3. Proposed residential dwellings in the south western part of the Wider OPA Site, closest to Allington Lane and the rail line.	50	45	53
PSR4. Proposed residential dwellings in the north eastern part of the Wider OPA Site, closest to existing dwellings west of Burnetts Lane.	50	45	52
PSR5. Proposed residential dwellings in the central part of the Wider OPA Site, closest to Fir Tree Lane.	64	57	75
PSR6. Proposed residential dwellings in the central part of the Wider OPA Site, closest to the proposed central link road.	62	55	72
PSR7. Proposed residential dwellings in the south eastern part of the Wider OPA Site, closest to Burnetts Lane.	61	54	79
PSR8. Proposed residential dwellings in the southern part of the Wider OPA Site, closest to the proposed access roundabout, off Burnetts Lane.	61	55	79
PSR9. Proposed residential dwellings in the southern part of the Wider OPA Site, closest to the proposed central link road.	62	55	72



PSR10. Proposed school in the eastern part of the Wider OPA Site	50	44	54
PSR11. Proposed employment area in the central part of the Wider OPA Site, closest to Fir Tree Lane.	65	57	75
PSR11. Proposed employment area in the southern part of the Wider OPA Site, closest the proposed central link road and access roundabout.	62	56	72

12.6.97 The predicted noise levels at PSRs, as presented in Table 12.18, have been used to calculate the appropriate level of required sound attenuation to achieve internal and external guideline noise levels.

Daytime Noise Levels in External Living Areas

12.6.98 Noise levels in are assessed in external living areas of the Proposed Development in accordance with the following guideline criteria, as recommended by BS8233 and WHO guidance:

- 55dB $L_{Aeq,T}$ should be considered as the upper guideline value for external living areas; and,
- 50dB $L_{Aeq,T}$ should be considered as a 'desirable' guideline value for external living areas.

12.6.99 Table 12.19 provides a summary of predicted noise levels and attenuation required to achieve guideline values in residential gardens, in accordance with BS8233 and WHO guidance.

Table 12.19 – Predicted External Noise Levels and Attenuation Requirements for Proposed Gardens

Receptor Description	Predicted Average Daytime Noise Levels, $L_{Aeq, 16\text{hour}}$ dB	Attenuation Required to Achieve 55dB(A) in Gardens
PSR1. Proposed residential dwellings in the north western part of the Wider OPA Site, closest to the proposed site access off Allington Lane.	61	6
PSR2. Proposed residential dwellings in the western part of the site, closest to Allington Lane.	57	2

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PSR3. Proposed residential dwellings in the south western part of the Wider OPA Site, closest to Allington Lane and the rail line.	50	0
PSR4. Proposed residential dwellings in the north eastern part of the Wider OPA Site, closest to existing dwellings west of Burnetts Lane.	50	0
PSR5. Proposed residential dwellings in the central part of the Wider OPA Site, closest to Fir Tree Lane.	64	9
PSR6. Proposed residential dwellings in the central part of the Wider OPA Site, closest to the proposed central link road.	62	7
PSR7. Proposed residential dwellings in the south eastern part of the Wider OPA Site, closest to Burnetts Lane.	61	6
PSR8. Proposed residential dwellings in the southern part of the Wider OPA Site, closest to the proposed access roundabout, off Burnetts Lane.	61	6
PSR9. Proposed residential dwellings in the southern part of the Wider OPA Site, closest to the proposed central link road.	62	7

12.6.100 The results presented in Table 12.19 indicate mitigation are required in order to achieve guideline noise levels in outdoor living areas located closest to the existing and proposed transport network.

12.6.101 Without the inclusion of mitigation, noise levels in proposed gardens would result in **moderate** to **major** effects. Outline details of required mitigation measures are provided in the Mitigation section of this Chapter.

Daytime Internal Noise Levels in Proposed Dwellings

12.6.102 Internal noise levels are assessed within proposed dwellings according to the following guideline criterion, as recommended by BS8233 and WHO guidance:

- 35dB $L_{Aeq,T}$ in living rooms and bedrooms, during the daytime period.

12.6.103 The predicted daytime noise levels have been used to determine the noise levels likely at the facades of the properties in the vicinity of the proposed noise sensitive parts of the proposed development, during the daytime period.



12.6.104 Before internal noise levels can be calculated 3dB(A) must be added to the free-field measured levels to allow for the reflection of noise from the proposed housing facades when the buildings are in place.

12.6.105 Table 12.20 provides a summary of predicted façade noise levels and attenuation required to achieve 35dB $L_{Aeq, T}$ in proposed living rooms and bedrooms, in accordance with BS8233.

Table 12.20 – Predicted Facade Noise Levels and Required Attenuation in Habitable Rooms, During the Daytime

Receptor Description	Predicted Average Daytime Noise Levels, $L_{Aeq, 16hour}$ dB	Attenuation Required to Achieve 35dB(A) Internally
PSR1. Proposed residential dwellings in the north western part of the site, closest to the proposed site access off Allington Lane.	64	29
PSR2. Proposed residential dwellings in the western part of the site, closest to Allington Lane.	60	25
PSR3. Proposed residential dwellings in the south western part of the site, closest to Allington Lane and the rail line.	53	18
PSR4. Proposed residential dwellings in the north eastern part of the site, closest to existing dwellings west of Burnetts Lane.	53	18
PSR5. Proposed residential dwellings in the central part of the site, closest to Fir Tree Lane.	67	32
PSR6. Proposed residential dwellings in the central part of the site, closest to the proposed central link road.	65	30
PSR7. Proposed residential dwellings in the south eastern part of the site, closest to Burnetts Lane.	64	29
PSR8. Proposed residential dwellings in the southern part of the site, closest to the proposed access roundabout, off Burnetts Lane.	64	29
PSR9. Proposed residential dwellings in the southern part of the site, closest to the proposed central link road.	65	30



12.6.106 The results presented in Table 12.20 indicate mitigation is required in order to achieve daytime guideline noise levels in habitable rooms located closest to the existing and proposed transport network.

12.6.107 The facades of dwellings facing into the site will be protected by the buildings themselves and/or screened by other buildings and topography. It is considered that the noise levels at these facades and therefore the level of attenuation the facades would need to attenuate to achieve 35dB $L_{Aeq, T}$ in the living rooms and bedrooms will be less than those detailed in Table 12.20.

12.6.108 Without the inclusion of mitigation, noise levels in proposed habitable rooms would result in **moderate** to **major** effects. Outline details of required mitigation measures are provided in the Mitigation section of this Chapter.

12.6.109 Outline details of required mitigation measures are provided in the Mitigation section of this Chapter.

Night-time Internal Noise Levels in Proposed Dwellings

12.6.110 Internal noise levels are assessed within proposed dwellings according to the following guideline criterion, as recommended by BS8233 and WHO guidance:

- 30dB $L_{Aeq, T}$ wherever possible in bedrooms, during the night-time period; and,
- Individual noise events should not normally exceed 45dB L_{AFmax} in bedrooms, during the night-time period.

12.6.111 The predicted night-time noise levels, as shown in Figure 12.7 and Figure 12.8, have been used to determine the noise levels likely at the facades of the properties in the vicinity of the proposed noise sensitive parts of the proposed development, during the daytime period.

12.6.112 Before internal noise levels can be calculated 3dB(A) must be added to the free-field measured levels to allow for the reflection of noise from the proposed housing facades when the buildings are in place.

12.6.113 Table 12.21 provides a summary of predicted façade noise levels and attenuation required to achieve 30dB $L_{Aeq, T}$ and 45dB L_{AFmax} in proposed bedrooms, in accordance with BS8233.



Table 12.21 – Predicted Facade Noise Levels and Required Attenuation in Habitable Rooms, During the Night-time

Receptor Description	Predicted Average Night-time Noise Levels, $L_{Aeq, 8\text{hour}}$ dB	Predicted Maximum Night-time Noise Levels, L_{AFmax} dB	Attenuation Required to Achieve 30dB Average and 45dB Maximum Internally
PSR1. Proposed residential dwellings in the north western part of the site, closest to the proposed site access off Allington Lane.	58	73	28
PSR2. Proposed residential dwellings in the western part of the site, closest to Allington Lane.	54	59	24
PSR3. Proposed residential dwellings in the south western part of the site, closest to Allington Lane and the rail line.	48	56	18
PSR4. Proposed residential dwellings in the north eastern part of the site, closest to existing dwellings west of Burnetts Lane.	48	55	18
PSR5. Proposed residential dwellings in the central part of the site, closest to Fir Tree Lane.	60	78	33
PSR6. Proposed residential dwellings in the central part of the site, closest to the proposed central link road.	58	75	30
PSR7. Proposed residential dwellings in the south eastern part of the site, closest to Burnetts Lane.	60	82	37
PSR8. Proposed residential dwellings in the southern part of the site, closest to the proposed access roundabout, off Burnetts Lane.	58	82	37
PSR9. Proposed residential dwellings in the southern part of the site, closest to the proposed central link road.	58	75	30

12.6.114 The results presented in Table 12.21 indicate mitigation measures are required in order to achieve night time guideline noise levels in bedrooms located closest to the existing and proposed transport network.

12.6.115 The facades of dwellings facing into the site will be protected by the buildings themselves and/or screened by other buildings and topography. It is considered that the noise levels at these facades and therefore the level of attenuation the facades would need to



attenuate to achieve 30dB $L_{Aeq, T}$ and 45dB L_{AFmax} in bedrooms will be less than those detailed in Table 12.21.

12.6.116 Without the inclusion of mitigation, noise levels in proposed bedrooms would result in **moderate** to **major** effects. Outline details of required mitigation measures are provided in the Mitigation section of this Chapter.

Noise at Proposed School

12.6.117 The Concept Master Plan (ref CMP 01) indicates that the Proposed Development will include a School, located in eastern part of the site (PSR10).

12.6.118 In accordance with the requirements of BB93, the following daytime noise levels should be achieved:

- An upper limit of 60 dB $L_{Aeq, 30 \text{ minutes}}$ at the boundary of external premises used for teaching and recreation; and,
- Indoor ambient noise limits in schools of between 30 and 40 dB $L_{Aeq, 30 \text{ minutes}}$ depending on the use of the room.

12.6.119 The predicted external daytime noise levels, as shown in Table 12.18 and on Figure 12.6, are below 50dB $L_{Aeq, 16\text{-hour}}$. This indicates that no specific mitigation measures are required at the proposed school, to ensure the required external and internal noise levels are achieved during the daytime.

12.6.120 Without the inclusion of mitigation, noise levels in the vicinity of the proposed school would result in **minor** to **neutral** effects.

Noise at Proposed Employment

12.6.121 Internal noise levels are assessed with respect to the most sensitive areas of proposed employment uses, according to the following guideline criterion, as recommended by BS8233:

- 35 to 45dB $L_{Aeq, T}$ in staff/meeting rooms, training rooms; and,
- 35 to 40dB $L_{Aeq, T}$ in executive office.

12.6.122 The predicted daytime noise levels have been used to determine the noise levels likely at the facades of proposed employment buildings at the Site, during the daytime period.



12.6.123 Before internal noise levels can be calculated 3dB(A) must be added to the free-field levels to allow for the reflection of noise from the proposed building facades when the buildings are in place.

12.6.124 Table 12.22 provides a summary of predicted façade noise levels and attenuation required to achieve guideline internal levels within employment buildings, in accordance with BS8233.

Table 12.22 – Predicted Facade Noise Levels and Required Attenuation in Employment Buildings

Receptor Description	Predicted Average Daytime Noise Levels, $L_{Aeq, 16\text{hour}}$ dB	Attenuation Required to Achieve 35dB(A) Internally
PSR11. Proposed employment area in the central part of the site, closest to Fir Tree Lane.	65	25 - 35
PSR11. Proposed employment area in the southern part of the site, closest the proposed central link road and access roundabout.	62	22 - 32

12.6.125 The results presented in Table 12.22 indicate mitigation measures are required in order to achieve guideline noise levels in employment buildings located closest to the existing and proposed transport network.

12.6.126 The facades of employment buildings facing into the site will be protected by the buildings themselves and/or screened by other buildings and topography. It is considered that the noise levels at these facades and therefore the level of attenuation the facades would need to attenuate to achieve 35 - 45dB $L_{Aeq, T}$ in sensitive rooms will be less than those detailed in Table 12.19.

12.6.127 Without the inclusion of mitigation, noise levels in proposed employment buildings have the potential to result in **moderate** to **major** effects. Outline details of required mitigation measures are provided in the Mitigation section of this Chapter.

Noise Associated with Chalcroft Business Park

12.6.128 Consultation with businesses at Chalcroft Business Park was carried out in order to identify typical operations and noise sources with the potential to impact the Proposed Development. In summary, existing businesses comprise a mixture of warehousing and logistics uses, in addition to general offices and small businesses.



12.6.129 According to representatives of Chalcroft Business Park, no manufacturing takes place at any of the units onsite. Deliveries to the businesses are predominantly made during the daytime, with only 1 or 2 night-time deliveries that are not unloaded until the following day.

12.6.130 During the survey, a new industrial unit was under construction at Chalcroft Business Park, adjacent to Unit 15 to the east. Discussions with the Business Park management highlighted that the new Unit was to accommodate Owtons Butchers which would need to relocate as a result of the Proposed Development, currently located within the Wider OPA Site, to the north of the Business Park.

12.6.131 A full summary of information provided by existing business is provided in Appendix 12.1.

12.6.132 Observations made during the noise survey, a review of audio recordings, in combination with consultation with local businesses highlighted the following significant noise sources:

- HGV reversing in to loading area of Unit 14, including engine noise and reverse alert system. Measured at approximately 60m during the Daytime;
- Forklift manoeuvring/unloading at Unit 14 within service yard of Unit 14, Measured at approximately 60m during the daytime; and,
- Break-out noise from Unit 9 during the night-time, measured at approximately 35m.

12.6.133 For the purposes of this assessment, potential industrial noise impacts are calculated at the nearest proposed noise sensitive receptors to Chalcroft Business Park, in the southern part of the Wider OPA Site.

Identification of Specific Noise Levels

12.6.134 The specific noise level is the level of industrial noise when unaffected by noise from other sources. In order to obtain the specific noise level of each industrial source, the measured residual noise level at a given ML must be logarithmically subtracted from the measured ambient level at that same location.



12.6.135 Details of the specific noise levels associated with each industrial source is set out in Table 12.20, including measured ambient and residual noise levels, and standardised specific noise levels derived for each source.

12.6.136 HGV movements along the central spine road of Chalcroft Business Park were not observed to be dominant at the monitoring locations during the daytime and night-time period. However, break-out noise from Unit 9 was observed to be dominant intermittently throughout the night-time period at ML6, as included in Table 12.23.

Table 12.23: Summary of Specific Noise Levels Associated with Chalcroft Business Park

Description of Receptor	Ambient Level, dB(A)	Residual Level, dB(A)	Specific Level at Monitoring Location, dB(A)	Reference Distance, m	Specific Level at 1m from Source, dB(A)
HGV Reversing	54	45	53	60	89
Forklift manoeuvring/unloading	52	45	51	60	87
Break-out Noise	35	29	34	35	65

Identification of Background Noise Level

12.6.137 Noise levels measured at ML9, in the south eastern part of the Wider OPA Site, adjacent to the OPA Phase 1 Site, do not contain any noise from industrial sources. Therefore, appropriate daytime and night-time background noise levels have been established at this location, for the purposes of this assessment.

12.6.138 BS4142 recognises that there is no 'single' background sound level, and that it is a fluctuating parameter. An appropriate background level, which corresponds to the time period when each industrial noise source is present at the site must therefore be selected. Subsequently, an assessment of industrial noise impacts is required for the daytime and night-time periods.

12.6.139 For the purposes of this assessment, and to provide a robust assessment of potential impacts, the assessment periods are categorised as follows:



- Daytime – 1000 to 1800, based on typical working hours; and
- Night-time – 2300 to 0700, based on occasional night time HGV movements.

12.6.140 The arithmetic average of measured $L_{A90, 1\text{hour}}$ values during the daytime period, and $L_{A90, 15\text{min}}$ values during the night-time period, are considered to represent the typical background levels at the closest receptors, for the purposes of this assessment. Table 12.24 presents a summary of background levels.

Table 12.24 – Summary of Background Noise Levels

Assessment Period	Background Noise Level Range (dBA)	Typical Background Level (dBA)
Daytime	32-41	38
Night-time	27-40	31

Application of Acoustic Feature Corrections

12.6.141 The specific noise of HGV reversing at Unit 14, was found to be dominant at the monitoring location on one occasion throughout the survey period, for approximately 2 minutes. Noise comprised some engine noise and a reversing alert system, including the speech “vehicle reversing” and an accompanying ‘beep’.

12.6.142 This indicates that the specific noise from HGV reversing is intermittent and contains tonal characteristics. A +3dB penalty has been applied with respect to intermittency. The tonal component of the reverse alert system was highly perceptible above the residual environment, therefore a penalty of +6dB has been applied.

12.6.143 Noise from HGV reversing at Unit 14 was found to be dominant for a total of 2 minutes. An appropriate correction has been applied assuming a 5 minute on-time with respect to the 1-hour daytime assessment period. This equates to a correction of -11dB.

12.6.144 Forklift loading/unloading activity at Unit 14 is impulsive in nature, therefore a +6dB penalty has been applied to the specific level. In addition, loading/unloading was observed to be audible at ML6 for approximately 25 minutes during the daytime period. When considered over a 1-hour assessment period, an on-time correction of -4dB must be applied in accordance with BS4142.



12.6.145 Noise break-out from Unit 9 was intermittently dominant at ML6 during the night-time, therefore a +3dB intermittency correction must be applied to the specific level. Break-out noise was not found to have any tonal or impulsive characteristics.

12.6.146 As highlighted during discussions with representatives of Chalcroft Business park, HGV movements have the potential to take place during the night-time within Chalcroft Business Park. However, no associated noise was found to be audible at MLs during the survey.

BS4142 Comparison of Rating and Background Levels - Daytime

12.6.147 The Concept Masterplan (ref: CMP01 Rev 10), indicates that closest proposed residential areas of the Development are at least 100m from the closest potential activities at Chalcroft Business Park. The potential impact of industrial noise has been assessed at this distance in order to evaluate the worst-case impacts. Appropriate distance corrections are factored in to the assessment.

12.6.148 HGV movements on the central spine road were present during the daytime at Chalcroft Business Park, however associated noise was not observed to be dominant to the north of the Business Park during the daytime. Therefore, associated potential impacts are assessed only during the night-time period.

12.6.149 The comparison of noise rating levels corresponding to daytime background levels, for industrial noise associated with Chalcroft Business Park is shown in Table 12.25 below.

Table 12.25 – BS4142 Comparison of Daytime Rating and Background Noise Levels

Description	Noise Levels, dB(A)	
	HGV Reversing	Loading/Unloading
Specific Noise Level, at 1m	89	87
Distance Attenuation	-40	-40
Feature Correction	+9	+6
On-Time Correction	-11	-4
Rating Level	47	49
Background Level	38	38
Excess of Rating over Background	+9	+11

12.6.150 Table 12.25 indicates that noise rating levels at the closest proposed receptors to Chalcroft Business Park are significantly greater than the typical daytime background levels.



This provides an indication that 'Significant Adverse' impacts are likely to occur during these periods, in accordance with BS4142, depending on context.

BS4142 Comparison of Rating and Background Levels – Night-time

12.6.151 The Concept Masterplan (ref: CMP01 Rev 10), indicates that closest proposed residential areas of the Development are at least 100m from any existing industrial Units at Chalcroft Business Park. The potential impact of industrial noise during the night-time period has been assessed at this distance in order to evaluate the worst-case impacts. Appropriate distance corrections are factored in to the assessment.

12.6.152 The comparison of noise rating levels corresponding to night-time background levels, for industrial noise associated with Chalcroft Business Park is shown in Table 12.26 below.

Table 12.26 – BS4142 Comparison of Night-time Rating and Background Noise Levels

Description	Noise Levels, dB(A)
	Unit 9 Break-out Noise
Specific Noise Level, at 1m	65
Distance Attenuation	-40
Feature Correction	+3
Rating Level	28
Background Level	31
Excess of Rating over Background	-3

12.6.153 Table 12.26 indicates that noise rating levels at the closest proposed receptors to Chalcroft Business Park are 3dB lower than the typical night-time background levels. This provides an indication that 'Low' impacts are likely to occur during these periods, in accordance with BS4142, depending on context.

BS4142 Context Assessment

12.6.154 BS4142 states:

'The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound sources exceeds the background sound level and the context in which the sound occurs'



12.6.155 The first requirement of this statement has been determined within the preceding section. To determine the context in which the industrial sound occurs, three factors must be considered, these are:

- The absolute level of sound;
- The character and level of the residual sound compared to the character and level of the specific sounds; and,
- The sensitivity of the receptor.

Absolute Level of Sound

12.6.156 The impact of a given difference between rating level and background level depends upon whether the residual level is high or low, in accordance with BS4142.

Daytime

12.6.157 The specific level of sound from Chalcroft Business Park at the closest proposed residential dwellings, during the daytime period, when taking in to account distance attenuation, is 49dB. The daytime residual sound level is 45dB.

12.6.158 The specific level is 6dB lower than the upper guideline level of 55dB $L_{Aeq, T}$ recommended by BS8233 and WHO, for outdoor living spaces. These guidance documents are health-based, and provide absolute noise level recommendations based on the onset of adverse health effects.

12.6.159 Furthermore, when considering the attenuation provided by an open window of 15dB, daytime specific noise levels would be lower than the guideline 35dB value for habitable rooms, recommended by BS8233 and WHO.

12.6.160 It is therefore considered that the exceedance of rating level over background level is less significant during the daytime, with respect to the absolute level.

Night-time

12.6.161 The specific level of sound from Chalcroft Business Park at the closest proposed residential dwellings, during the night-time period, when taking in to account distance attenuation, is 28dB. The night-time residual sound level is 34dB.



12.6.162 The specific level is 2dB lower than the guideline internal level of 30dB $L_{Aeq, T}$ recommended by BS8233 and WHO, for bedrooms. Furthermore, when considering the attenuation provided by an open window of 15dB, the night-time specific noise levels would be 16dB lower than the guideline 30dB value for bedrooms, recommended by BS8233 and WHO.

12.6.163 These guidance documents are health-based, and provide absolute noise level recommendations based on the onset of adverse health effects.

12.6.164 It is therefore considered that the exceedance of rating level over background level is less significant during the night-time, with respect to the absolute level.

Character and Level of Residual and Specific Sound

12.6.165 The impact of a given difference between rating level and background level, depends upon whether the character and level of level specific sound is similar or different, when compared to the character and level of the residual acoustic environment, in accordance with BS4142.

Daytime

12.6.166 The daytime specific level from Chalcroft Business Park includes intermittent, impulsive and tonal characteristics, which contrasts the residual acoustic environment which comprises distant transportation noise. This contrast makes daytime specific noise more noticeable over the residual acoustic environment.

12.6.167 The daytime specific level is 49 dB at the nearest proposed dwellings, whereas the corresponding residual level is 45dB. This indicates that specific noise is 4dB higher, and dominant over the residual level, when present.

12.6.168 Due to the intermittent and transient nature of daytime specific sources, the specific level was found to be present for 30minutes during the daytime survey period. Considering a 1-hour daytime assessment period, this indicates that specific noise has the potential to exceed the residual level for 50% of the time.

12.6.169 It is therefore considered that the exceedance of rating level over background level is significant during the daytime, with respect to character and level.

Night-time



12.6.170 The night-time specific level from Chalcroft Business Park includes intermittent characteristics, which slightly contrasts the residual acoustic environment which comprises distant transportation noise, which is sometimes intermittent during the night time period. This contrast makes the night-time specific noise slightly more noticeable over the residual acoustic environment.

12.6.171 The night-time specific level is 25 dB at the nearest proposed dwellings, whereas the corresponding residual level is 34dB. This indicates that specific noise is 9dB lower, and likely to be inaudible at the closest dwellings, when present.

12.6.172 It is therefore considered that the exceedance of rating level over background level is less significant during the night-time, with respect to character and level.

Sensitivity of Receptors

12.6.173 The proposed receptors will have moderate to high sensitivity given their residential nature. However, BS4142 states that the initial estimate of the impact needs to be modified where:

'dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal/or outdoor acoustic conditions, such as:

- *Façade insulation treatment;*
- *Ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and,*
- *Acoustic screening'*

12.6.174 Furthermore, with regards to this, PPG states:

'consideration should also be given to whether adverse internal effects can be completely removed by closing all windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases a suitable alternative means of ventilation is likely to be necessary'.

12.6.175 Façade insulation, the glazing and ventilation scheme, and acoustic screening is explored in more detail in the Mitigation section of this report.

Summary of Industrial Noise Impacts



12.6.176 During the daytime, the absolute level of specific sound, at the closest proposed receptors to Chalcroft Business Park, is low. However, the character of specific noise contrasts the residual acoustic environment, making industrial type noise more noticeable. Furthermore, the level of specific noise exceeds the daytime level during the day time period, for up to 50% of the time.

12.6.177 However, the sensitivity of proposed receptors can be engineered appropriately, via a combination of façade insulation treatment, and acoustic screening to reduce industrial noise impacts within external living areas, and/or completely removed within proposed habitable rooms.

12.6.178 This indicates that, without the inclusion of mitigation, industrial noise is predicted to have a **major** effect at proposed dwellings, during the daytime.

12.6.179 Given that the absolute level of sound is low, it is considered that a 5dB exceedance of the rating level over the typical daytime background level would represent an acceptable impact, in accordance with BS4142; equivalent to the Lowest Observed Adverse Effect Level, defined by the NPSE^{12.1}, and be present and not intrusive in accordance with PPG^{12.2}.

12.6.180 This indicates that a 6dB reduction in industrial noise is required during the daytime period. Mitigation is explored in the corresponding section of this Chapter.

12.6.181 During the night-time, the absolute level of specific sound is low, and is significantly less than the residual level. The character of specific sound contrasts slightly with the residual environment; however, other contextual factors significantly reduce the potential impact.

12.6.182 This indicates that, night-time industrial noise is predicted to have a **neutral** effect at proposed dwellings. Therefore, no specific mitigation is required.

Noise Associated with Proposed Ancillary Equipment

12.6.183 The Wider OPA includes a number of non-specific employment areas which have the potential to comprise a number of commercial uses, with associated ancilliary equipment. However, at this stage, detailed information relating to proposed fixed plant and/or building

^{12.1} Noise Policy Statement for England xxxx

^{12.2} Planning Practice Guidance – Noise xxxx



services within the Wider OPA is unavailable. Therefore, guideline noise limits have been formulated based on the existing background noise environment, in accordance with current guidance.

12.6.184 Atmospheric noise emissions limits have been determined for any proposed fixed building services plant (with the exception of emergency plant i.e. back-up generators).

12.6.185 Where possible, noise associated with the development shall be controlled to the levels outlined in Table 12.27 when assessed in accordance with BS4142 at the nearest noise sensitive receptor. The recommended limits correspond to noise levels which are 5dB below the average background noise levels.

Table 12.27 – Atmospheric Plant Noise Emission Limits

Monitoring Location	Time Period	Measured Background Noise Level, LA90, dB	Recommended Noise Level Limit, LA90 dB
Proposed sensitive receptors in the northern part of the Wider OPA Site. ML1	0700 - 2300	41	36
	2300 - 0700	32	27
Proposed sensitive receptors in the central part of the Wider OPA Site. ML3	0700 - 2300	42	37
	2300 - 0700	32	27
Proposed sensitive receptors in the southern part of the Wider OPA Site. ML9	0700 - 2300	38	33
	2300 – 0700	31	26

12.6.186 The above noise limits are intended to provide conservative a guideline at this stage, in the absence of detailed information. A full assessment is likely to be required once detailed information becomes available, in accordance with BS4142.

12.6.187 The responsibility to achieve the above would fall to those undertaking the building works. Proposals should be reviewed by Hydrock during technical design.

12.6.188 As detailed information relating to fixed plant is unknown, Hydrock highlight that provisions for the selection of low noise equipment, silencers, enclosures, screens and other acoustic attenuation measures should be made where necessary.

12.7 ADDITIONAL MITIGATION, COMPENSATION & ENHANCEMENT MEASURES

Construction



OPA Phase 1

12.7.1 The activities associated with the construction phase of the OPA Phase 1 have the potential to generate noise and vibration that propagates beyond the site boundary. Off-site impacts associated with the OPA Phase 1 are covered within the Wider OPA section.

The Wider OPA

Noise at Existing Residential Receptors

12.7.2 In order to reduce the potential impact of noise generated by the construction phase of the proposed Development at ESRs, mitigation measures will be required. Methods of best working practice should be implemented.

12.7.3 The construction works would follow the guidelines in BS5228-1 and the guidance in BRE Controlling particles, vapour and noise pollution from construction sites, Parts 1 to 5, 2003. The following measures will be put in place to minimise noise emissions and implemented via a Construction Environmental Management Plan (CEMP):

- When works are taking place within close proximity to the sensitive receptors identified, the screening of noise sources via the erection of temporary screens will be employed;
- All machinery will be regularly maintained to control noise emissions, with particular emphasis on lubrication of bearings and the integrity of silencers;
- Site staff will be made aware that they are working adjacent to a sensitive area and avoid all unnecessary noise due to misuse of tools and equipment, unnecessary shouting and radios;
- As far as possible, the avoidance of two noisy operations occurring simultaneously in close proximity to the same sensitive receptor;
- Adherence to any time limits imposed on noisy works by the local authority;
- Implement set working hours during the week and at weekends;
- Ensure engines are turned off when possible; and
- Should demolition and construction activities need to be carried out during night-time hours, the local authority may include a planning condition that requests advance notice and details of any night working to be provided.



Vibration at Existing Residential Receptors

12.7.4 BS5228-2 recognises that the most common form of vibration associated with piling is the intermittent type derived from conventional driven piles. Whilst it is recognised that the piling process would need to be selected on the basis of the strata to be encountered, the loads to be supported and the economics of the system, careful consideration (by the appointed developer(s)) would be given to the type of piling to be used in order to minimise the potential for vibration impacts.

12.7.5 The receptors likely to be affected by piling would vary over the course of the Proposed Development under construction. Once the precise building locations and ground conditions for each location and type(s) of piling are confirmed, vibration levels would be estimated and recommendations for control made as appropriate.

12.7.6 To keep ground borne vibration to a minimum the following measures (as referred to in BS5228-2) would be put in place:

- Substitution: Where reasonably practicable, plant and or methods of work likely to cause significant levels of vibration at the receptors identified would be replaced by less intrusive plant/methods of working; and
- Isolation of plant at source: This may prove a viable option where the plant is stationary (e.g. a compressor, generator) and located close to a receptor.

12.7.7 There are a number of measures that can be implemented, depending upon the type of piling chosen (e.g. continuous flight auger (CFA) piling produces significantly less vibration than conventional driven piling and, therefore, fewer mitigation measures would be required if CFA piling were chosen as the preferred method). Additionally, the distance between the piling rig and the receptors has a significant bearing upon the likely impact. The vibration produced by piling is transient and only occurs in any one location for a limited period of time.

12.7.8 BS5228-2 indicates that mitigation might include the use of alternative methods, removal of obstructions, provision of cut-off trenches, reduction of energy input per blow, reduction of resistance to penetration. As the construction programme and methodologies become more defined, earthworks and construction vibration would be reviewed and a more detailed strategy for control would be devised and implemented via the CEMP.



12.7.9 Vibration mitigation is therefore likely to vary depending upon the type, location and duration of any piling undertaken.

Noise & Vibration at Ecological Receptors

12.7.10 In order to reduce the potential impact of noise and vibration generated by the construction phase of the proposed Development at SEAs, mitigation measures will be required. Methods of best working practice should be implemented throughout.

Bird Habitats

12.7.11 Where a 100m buffer zone between existing bird habitats and construction activities is impractical noise should be controlled to the appropriate threshold values, outlined by IECS guidance. and construction noise should be controlled to an average level of less than 70dB(A), with individual events being controlled to below 85dB(A) at nearby habitats. This would ensure no significant impacts occur, in accordance with IECS guidance.

12.7.12 Mitigation measures will be put in place to minimise noise emissions as described paragraph 12.7.4. and implemented via a Construction Environmental Management Plan (CEMP).

Fish Habitats

12.7.13 When construction is due to take place within close proximity to Quobleigh Stream, the appropriate threshold values should be adopted, and construction noise and re-radiated noise from construction vibration should be controlled to appropriate levels, as described in Table 12.13.

12.7.14 Mitigation measures will be put in place to minimise noise and vibration emissions as described paragraph 12.7.4 and 12.7.7 respectively, and implemented via a Construction Environmental Management Plan (CEMP).

Occupation

OPA Phase 1

Development Generated Road Traffic at Existing Receptors

12.7.15 No adverse effects are predicted to occur at ESRs when the OPA Phase 1 Site becomes operational, therefore no specific mitigation is required. The assessment indicates that effects would be between **moderate** and **neutral**.



Noise Levels at Proposed Residential Dwellings

Noise Within Habitable Rooms

12.7.16 Detailed noise break-in calculations for each house type and habitable room type have been carried out in order to determine glazing and ventilation requirements for dwellings within the OPA Phase 1.

12.7.17 At this stage of the project, detailed information has not yet been developed regarding façade construction, and ventilation strategy etc. The guidance contained herein is therefore subject to development during technical design, and should not be used for tender purposes.

12.7.18 The preliminary ventilation guidance outlined below is based on the assumption that the preferred approach, would be to include trickle ventilators and constant Mechanical Extract Ventilation (MEV) (Building Regulations Approved Document F - System 3).

12.7.19 When carrying out internal noise level break-in predictions, the following assumptions have been made:

- The calculation methodology was as per the 'rigorous' methodology outlined in BS8233;
- Windows are closed, but trickle ventilators are operational i.e. open;
- A reverberation time of 0.5 seconds in habitable rooms; and
- A single trickle ventilator (circa 2,500 mm²) per habitable room where trickle ventilators are feasible.

12.7.20 A suggested minimum sound insulation performance of the non-glazed elements of the building façade is outlined in Table 12.28 below.

Table 12.28 – Suggested Non-Glazed Façade Element Sound Insulation

Description	Sound Insulation Values (R, dB) per Octave Band (Hz)							Rw + Ctr
	63	125	250	500	1000	2000	4000	
Non-Glazed Façade Element	30	39	50	60	65	65	65	55



12.7.21 Figure 12.7, Figure 12.8 and Figure 12.9 illustrate the noise exposure category values for each facade across the OPA Phase 1 Site. Table 12.29 provides a summary of required glazing and ventilation configurations for proposed habitable rooms within each noise exposure category.

Table 12.29: Façade Noise Exposure Categories

Façade Noise Exposure Category	Description
High	16.8mm / 16mm argon / 16.8mm laminated acoustic double-glazed unit in suitable frame; and, - Passivent Fresh 80dB (2500equiv free) through wall vent.
Moderate	10mm / 6 – 12 mm argon / 6mm thermal double-glazed unit in suitable frame; and, - Passivent TVALdB 800 (2500equiv free) window frame vent.
Low	- No specific glazing requirements - Open windows.

12.7.22 Octave band sound insulation values for the specific glazing and ventilation configurations included in Table 12.29, are provided in Appendix 12.8.

12.7.23 The category value for each façade has been determined based on detailed noise break-in calculations for each house type, habitable room type, and measured octave band noise levels associated with the surrounding local road network. Measured octave band levels of nearby roads have been proportionately scaled to be representative the predicted levels in the 2030 future year scenario, as appropriate.

12.7.24 Glazing and ventilation configurations provided herein are subject to development during technical design, and should not be used for tender purposes.

Noise from Proposed Ancillary Equipment

12.7.25 Noise from proposed building services etc. can be controlled via the use of standard mitigation measures, such as acoustic attenuators, enclosures and louvres with sizing and performance established during the design phase.

12.7.26 It is recommended that noise emissions associated with any ancillary equipment should be limited to the values presented in Table 12.16, in order to ensure any commercial noise does not exceed the existing average background noise level at the site.



The Wider OPA

Development Generated Road Traffic at Existing Receptors

12.7.27 No adverse effects are predicted to occur at ESRs when the Wider OPA Site becomes operational, therefore no specific mitigation is required. The assessment indicates that effects would be between **moderate** and **neutral**.

Noise at Proposed Sensitive Areas

Outdoor Living Areas

12.7.28 Proposed outdoor living areas located closest to Fir Tree Lane, Burnetts Lane and the proposed central north-south link road the adjacent road network require mitigation in order to achieve 55dB $L_{Aeq, T}$, as outlined in Table 12.19.

12.7.29 It is recommended that these properties are orientated with gardens on the screened side of dwellings from nearby roads. This would ensure that recommended noise levels are achieved within proposed garden areas.

12.7.30 Alternatively, the inclusion of 2m high close boarded fencing between gardens and the aforementioned roads, together with a standoff of 15m from the carriageway, would ensure the guideline level of 55dB $L_{Aeq, T}$ is achieved within gardens.

Habitable Rooms

12.7.31 When assessing noise levels in noise sensitive rooms, the noise attenuation provided by the overall building façade requires consideration. To mitigate noise levels, the composition of the building façade would be designed to provide the level of attenuation required.

12.7.32 As glazing is generally the building element that attenuates noise the least, the proportion of glazing in a building façade is an important consideration when assessing overall noise attenuation. In the absence of design details for the building façades, it has been assumed that the glazing to buildings would comprise about 25% of the façade area (based on a standard housing type). To calculate the overall attenuation provided by this percentage of glazing in a brick or block façades, a non-uniform partition calculation can be used.

12.7.33 The calculation combines the different degrees of attenuation of the wall element and the window element. A façade comprising a solid brick or blockwork, would attenuate noise by 50-54dB whereas standard thermal double glazing would attenuate traffic noise by 26-29dB(A).



The overall noise attenuation provided by this combination is, therefore, between 32dB(A) and 35dB(A).

12.7.34 A number of types of glazing would be able to achieve between 26 and 29dB. For example, 6/12/6 thermal double glazing would achieve approximately 26dB(A) attenuation and 10/12/4 thermal double glazing would achieve approximately 29 dB(A) attenuation.

12.7.35 The noise attenuation requirements for noise sensitive rooms during the daytime and night time are summarised in Table 12.20 and Table 12.21. The requirements show that standard thermal double glazing would ensure that internal noise levels in proposed living rooms and bedrooms during the daytime and night time period, will achieve guideline noise levels, as recommended by BS8233 and WHO guidance, with windows closed.

12.7.36 However, with windows open the attenuation provided by the facades across the Site will fall to approximately 15dB(A). This would allow the recommended internal noise limits to be exceeded in some living room and bedrooms.

12.7.37 Therefore, some form of alternative ventilation will be required to achieve the required internal daytime noise levels for proposed dwellings, closest to off-site noise sources. This includes proposed dwellings in the following areas:

- Proposed dwellings closest to, and with a direct line of sight to, the proposed north-south link road;
- Proposed dwellings closest to, and with a direct line of sight to, the Fir Tree Lane;
- Proposed dwellings closest to, and with a direct line of sight to, Burnetts Lane; and,
- Proposed dwellings closest to, and with a direct line of sight to, Allington lane.

12.7.38 Proposed ventilation should, as a minimum, comply with Building Regulations Approved Document F1 Means of Ventilation and British Standard BS5925 1991: "Code of Practice for Ventilation Principles and Designing for Natural Ventilation".

12.7.39 Acoustic ventilation is recommended for living rooms and bedrooms only.

12.7.40 The facades of some of the properties further into the Site, without a direct line of sight to off-site noise sources, would be protected by the buildings themselves. Therefore, acoustic ventilation is unlikely to be required.



12.7.41 The requirement for acoustic ventilation can be confirmed on a plot by plot basis, during Reserved Matters.

Proposed Employment

12.7.42 The noise attenuation requirements for sensitive rooms with proposed employment buildings are provided in Table 12.22. The requirements show that standard thermal double glazing would ensure that internal noise levels in proposed living rooms and bedrooms during the daytime period achieve guideline noise levels, as recommended by BS8233 and WHO guidance, with windows closed.

12.7.43 However, with windows open the attenuation provided by the facades across the Site will fall to approximately 15dB(A). This would allow the recommended internal noise limits to be exceeded in some living room and bedrooms.

12.7.44 Therefore, some form of alternative ventilation will be required to achieve the required internal daytime noise levels for sensitive rooms within proposed employment buildings.

12.7.45 The facades of employment buildings further into the Site, without a direct line of sight to off-site noise sources, would be protected by the buildings themselves. Therefore, acoustic ventilation is unlikely to be required.

12.7.46 The requirement for acoustic ventilation can be confirmed on a plot by plot basis, during Reserved Matters.

Noise Associated with Chalcroft Business Park

12.7.47 The BS4142 assessment carried out at the location of the closest potential residences within the Wider OPA Site, indicates that mitigation is required with respect to noise impacts from activities at Chalcroft Business Park, during the daytime.

12.7.48 The comparison of noise rating level and typical background levels indicates a potential exceedance of 11dB during the daytime period. BS4142 states:

“A difference of around 5dB is likely to be an indication of adverse impact, depending on context”

12.7.49 Furthermore, when considering the daytime specific levels in context, the exceedance of rating level over residual acoustic environment becomes less significant, in this case. While the character of noise associated with daytime activities contrasts the residual acoustic



environment, the absolute level of sound in the vicinity of receptors is low, when compared to health based acoustic guideline levels, without the inclusion of any mitigation.

12.7.50 In this case, taking in to account the context, a 5dB exceedance of the rating level over the typical daytime background level represent the threshold of adverse impacts, in accordance with BS4142; the Lowest Observed Adverse Effect Level, defined by the NPSE, and be present and not intrusive in accordance with PPG.

12.7.51 Barrier attenuation predictions, carried out in accordance with the Maekawa 1/3 octave, using the measured specific noise level of corresponding sources, indicate that the inclusion of 2m high close boarded fence between gardens and Chalcroft Business Park, would provide 6dB reduction of industrial noise levels at receptors.

12.7.52 Alternatively, properties can be orientated with gardens on the screened side of dwellings from Chalcroft Business Park. This would provide sufficient attenuation of noise levels, reducing daytime rating levels below the existing typical background levels.

12.8 RESIDUAL ENVIRONMENTAL IMPACTS & EFFECTS

Construction

OPA Phase 1

Noise at Existing Residential Receptors

12.8.1 With the inclusion of mitigation measures, noise associated with construction of the OPA Phase 1 Site is likely result in **neutral** effects, however there is potential for short-term **moderate** effects when construction takes place in the immediate vicinity of sensitive receptors.

Vibration at Existing Residential Receptors

12.8.2 With the inclusion of mitigation measures, vibration associated with construction of the OPA Phase 1 Site is likely result in **neutral** effects.

The Wider OPA

Noise at Existing Residential Receptors

12.8.3 With the implementation of best working practices, mitigation measures and observation of noise limits outlined in this Chapter, noise associated with construction of the Wider OPA Site



is likely result in **neutral** effects, however there is potential for short-term **moderate** effects when construction takes place in the immediate vicinity of sensitive receptors.

Vibration at Existing Residential Receptors

12.8.4 With implementation of best working practices, , substitution of high risk processes, mitigation measures and observation of vibration limits outlined in this Chapter, vibration associated with construction of the OPA Phase 1 Site is likely result in **neutral** effects, however there is potential for short-term **moderate** effects when construction takes place in the immediate vicinity of sensitive receptors.

12.8.5 Should the requirement for piling be removed altogether, vibration associated with construction of the OPA Phase 1 Site is likely result in **neutral** effects.

Noise and Vibration at Ecological Receptors

12.8.6 With the implementation of best working practices, substitution of high risk processes, mitigation measures and observation of noise and vibration limits outlined in this Chapter, noise and vibration associated with construction of the Wider OPA Site is likely result in **neutral** effects, however there is potential for short-term **moderate** effects when construction takes place in the immediate vicinity of SEAs.

12.8.7 Should the requirement for piling be removed altogether, or alternatively construction take place outside of sensitive migratory periods for local bird and fish species, noise vibration associated with construction of the Wider OPA Site is likely result in **neutral** effects.

Occupation

OPA Phase 1

Development Generated Road Traffic at Existing Sensitive Receptors

12.8.8 The assessment of development generated road traffic associated with the OPA Phase 1 Site, indicates that associated noise effects will be between **moderate** and **neutral**.

Noise Levels at Proposed Residential Dwellings

12.8.9 With the inclusion of 2m high garden wall/fencing, together with the glazing and ventilation strategy outlined in the Chapter, residual effects at proposed residential dwellings will be **neutral** to **moderate**.



Noise Associated with Chalcroft Business Park

12.8.10 Noise associated with Chalcroft Business Park will have a **neutral** effect at the OPA Phase 1.

Noise from Proposed Ancillary Equipment

12.8.11 Providing noise is controlled to the recommended noise limits included in the Chapter noise from proposed ancillary equipment will have a neutral effect at the OPA Phase 1 Site.

The Wider OPA

Development Generated Road Traffic at Existing Sensitive Receptors

12.8.12 The assessment of development generated road traffic associated with the Wider OPA Site, indicates that associated noise effects will be between **moderate** and **neutral**.

Noise Levels at Proposed Residential Dwellings

12.8.13 With the inclusion of recommended mitigation measures outlined in the Chapter, residual effects at proposed residential dwellings within the Wider OPA Site will be **neutral** to **moderate**.

Noise Associated with Chalcroft Business Park

12.8.14 With the inclusion of the recommended 2m high noise barrier outlined in the Chapter, residual effects associated with noise from Chalcroft Business Park will be **moderate**, at the closest sensitive areas of the Wider OPA Site, during the daytime.

12.8.15 Night-time noise effects associated with Chalcroft Business Park are **neutral**, at the Wider OPA Site.

Noise from Proposed Ancillary Equipment

12.8.16 Providing noise is controlled to the recommended noise limits included in the Chapter noise from proposed ancillary equipment will have a **neutral** effect at the Wider OPA Site.

12.9 CUMULATIVE EFFECTS

12.9.1 Committed developments considered within this assessment include Pembers Hill Farm (O/15/77190), Land North West of Boorley Green (P/15/75953), Land West of Woodhouse Lane (O/18/83634) and Land North of Winchester Street (O/18/83698).



12.9.2 The cumulative impacts have been assessed via consideration of these committed schemes, in combination with development generated road traffic and overall predicted change in baseline conditions. Cumulative changes are considered with respect to 2023 opening year for the OPA Phase 1 site and 2030 future operational year for the Wider OPA Site.

12.9.3 Cumulative effects are predicted to be between **moderate** and **neutral**.

12.10 IMPACT OF CLIMATE CHANGE

12.10.1 Climate change is not considered likely to have a material effect on the assessment of noise and vibration reported in this chapter. Wider consideration of climate change in the context of the proposed development is addressed Chapter 3 of this EIA.

12.11 ASSESSMENT SUMMARY

Environmental Statement Chapter 12: Noise and Vibration

One Horton Heath, Eastleigh



Table 12.30: Noise and Vibration Assessment Summary

Environmental Effect	Sensitivity of Receptor	Nature of Impact	Impact Magnitude	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effect
Construction Effects – OPA Phase 1							
Noise at existing residential	Medium	Noise audible within living areas	Medium - Negligible	Major – Neutral	Construction best practice, CEMP and limits.	Low - Negligible	Moderate - Neutral
Vibration at existing residential	Medium	Vibration perceptible within living areas	Medium - Negligible	Major – Neutral	Construction best practice, CEMP and limits.	Low - Negligible	Moderate - Neutral
Construction Effects – The Wider OPA							
Noise at existing residential	Medium	Noise audible within living areas	Medium - Negligible	Major – Neutral	Construction best practice, CEMP and limits.	Low - Negligible	Moderate - Neutral
Vibration at existing residential	Medium	Vibration perceptible within living areas	Medium - Negligible	Major – Neutral	Construction best practice, CEMP and limits.	Low - Negligible	Moderate - Neutral
Noise at nearby bird habitats	Medium	Bird response to construction noise	Medium - Negligible	Major – Neutral	Construction best practice, CEMP and limits.	Low - Negligible	Moderate - Neutral
Noise and vibration at fish habitats	Medium	Fish response to construction noise and vibration	Medium - Negligible	Major – Neutral	Construction best practice, CEMP and limits.	Low - Negligible	Moderate - Neutral
Operation Effects – OPA Phase 1							
Development generated road traffic	Medium	Audible change in noise environment at existing receptors	Negligible	Neutral	n/a	Negligible	Neutral
Noise in proposed gardens	Medium	Noise present in gardens	Negligible	Neutral	2m high garden wall/fencing	Negligible	Neutral
Noise in proposed habitable rooms	Medium	Noise present in habitable rooms	Medium - Negligible	Major - Neutral	Glazing and ventilation strategy	Negligible	Neutral
Industrial noise at proposed dwellings Chalcroft Industrial Estate	Medium	Industrial noise present at proposed dwellings	Negligible	Neutral	n/a	Negligible	Neutral

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Operation Effects – Wider OPA							
Development generated road traffic	Medium	Audible change in noise environment at existing receptors	Low - Negligible	Moderate - Neutral	n/a	Low - Negligible	Moderate - Neutral
Noise in proposed gardens	Medium	Noise present in gardens	Medium - Negligible	Major - Neutral	2m high garden wall/fencing in combination with 15m standoff. Alternative location of gardens on screened side of dwellings	Negligible	Neutral
Noise in proposed habitable rooms	Medium	Noise present in habitable rooms	Medium - Negligible	Major - Neutral	Glazing and ventilation strategy	Negligible	Neutral
Noise at proposed school	Medium	Noise present in teaching areas	Negligible	Neutral	n/a	Negligible	Neutral
Noise at proposed school	Low	Noise present in offices and meeting rooms	Medium - Negligible	Major - Neutral	Glazing and ventilation strategy	Negligible	Neutral
Industrial noise at proposed dwellings Chalcroft Industrial Estate	Medium	Industrial noise present at proposed dwellings	Medium - Negligible	Major - Neutral	2m high close boarded fencing	Low	Moderate
Cumulative Effects							
Effect	Description				Mitigation		Significance
Change in road traffic noise 2020 to 2023	Change in road traffic noise levels as a result of the OPA Phase 1 development, in combination with committed developments and general increase in baseline environment over time.				n/a		Negligible
Change in road traffic noise 2020 to 2030	Change in road traffic noise levels as a result of the Wider OPA development, in combination with committed developments and general increase in baseline environment over time.				n/a		Low
Impact of Climate Change							
Effect	Description				Mitigation		Significance
n/a							



Table 12.31: Mitigation Implementation

Mitigation Measure	Implementing Agent(s)	Legal Instrument	Compliance Target	Implementation Timescale
Construction Environmental Managements Plan	Contractor	Planning condition	CEMP submitted and approved by LPA	Construction Phase
Acoustic screening	Contractor	Planning condition	Mitigation scheme submitted and approved by LPA	Prior to start of works
Glazing and ventilation scheme	Contractor	Planning condition	Strategy be submitted and approved by LPA	Prior to start of works