Industrie Cartarie Tronchetti (ICT) UK Limited, Crag Hill Estates Ltd (CHEL)

# Paper Mill Facility, Plot C

# Airfields, Northern Gateway

## Environmental Statement

## Part 2 – Noise and Vibration Technical Paper 7

Revision P04 17 September 2021

# Revision Record

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# 1. Introduction

1.1. This Paper, prepared by Cundall on behalf of Industrie Cartarie Tronchetti (ICT) UK Limited and Crag Hill Estates Ltd (CHEL), presents an assessment of the potential noise and vibration effects of the Proposed Development.

1.2. The Paper describes: the baseline conditions at the Application Site and surroundings; the assessment methodology; the anticipated significant environmental effects; and the outline mitigation measures required to prevent, reduce, or offset any significant adverse effects.

1.3. Baseline values from previous environmental noise surveys undertaken at the Site and its environments have been identified and examined. In order to further assess the prevailing levels of environmental noise affecting nearby noise-sensitive receptors to the site, additional environmental noise surveys were undertaken by Cundall in October 2019.

1.4. Effects are considered during both the construction and operational phases. Consideration is given in the assessment to the following potential effects:

- Noise and / or vibration effects on existing sensitive receptors and their occupants during the proposed construction works;
- Effects on occupants of existing sensitive receptors due to noise from operational activities associated with the operation of the Proposed Development; and
- Effects on occupants of existing sensitive receptors associated with increased noise from changes in traffic flows due to the Proposed Development.

1.5. This Paper is supported by the following appendix:

- Appendix 7.1 – Plan of Sensitive Receptors
- Appendix 7.2 – Layout of emission source locations

# 2. Documents Consulted

**Planning Policy Wales, Edition 10 December 2018**

2.1. The Planning Policy Wales (PPW) document *"sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs), Welsh Government Circulars, and policy clarification letters, which together with PPW provide the national planning policy framework for Wales. PPW, the TANs, MTANs and policy clarification letters comprise national planning policy."*

2.2. In the 'Framework for Addressing Air quality and Soundscape' section, the document states:

*"When proposing new strategies for development and when allocating sites in development plans it will be important to avoid instances where incremental development of infrastructure, housing, commercial and industrial development creates or exacerbate health and amenity inequalities by introducing more sensitive receptors into an area or by making existing occupiers more vulnerable to poor air quality or noise."*

2.3. The 'Understanding and Identifying the Sources of Airborne (Air and Noise) Pollution' states the following:

- *"6.7.11 […] Where air and noise pollution are generated from the same source they should be considered and addressed together and links should be made with active travel and other strategies for reducing vehicular use so as to reduce or minimise, pollution and to ensure an appropriate soundscape.*
- *6.7.12 Planning authorities must consider current and future sources of air and noise pollution as part of developing their strategies for locating new development. The pattern of proposed development should be informed by the sensitivity of, and compatibility of, uses in relation to the sources of airborne pollution and the importance of ensuring appropriate soundscapes. […]*
- *6.7.13 […] When proposing to introduce a development activity into an area the impacts which existing pollution sources (including roads, railways and industrial or commercial operations) have in terms of air and noise pollution should be carefully considered, particularly taking into account any increases in pollution levels which may be reasonably expected in the foreseeable future as a result of increased transport activity.*
- *6.7.14 Proposed development should be designed wherever possible to prevent adverse effects to amenity, health and the environment but as a minimum to limit or constrain any effects that do occur. In circumstances where impacts are unacceptable, for example where adequate mitigation is unlikely to be sufficient to safeguard local amenity in terms of air quality and the acoustic environment it will be appropriate to refuse permission."*

**Technical Advice Note (TAN) Wales 11: Noise October 1997**

2.4. The Note *"provides advice on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business. It outlines some of the main considerations which local planning authorities should take into account in drawing-up development plan policies and when determining planning applications for development which will either generate noise or be exposed to existing noise sources."*

2.5. With regards to new noise-generating development TAN 11 states that:

*"Local planning authorities must ensure that noise generating development does not cause an unacceptable degree of disturbance. They should also bear in mind that if subsequent intensification or change of use results in greater intrusion, consideration should be given to the use of appropriate conditions."*

2.6. TAN 11 provides advice on assessing noise and on factors to consider in relation to the major noise sources including roads and industrial developments. TAN 11 suggests that 'the likelihood of complaints' about noise from industrial development can be assessed using guidance in BS 4142:1990.

2.7. However, this British Standard has been superseded and so the approach in BS 4142:2014 has instead been applied, as noted in the Welsh Government 'Updates to technical advice note (TAN) 11 on noise (CL-01-15)' guidance. The methodology in the current version of the BS 4142 Standard no longer assesses 'the likelihood of complaints'. Instead, the 'magnitude of impact' of industrial sound sources on sensitive receptors is assessed, an approach which is in alignment with the requirements of an Environmental Impact Assessment.

**Future Wales: The National Plan 2040**

2.8. 'Future Wales' published in February 2021 is a National Development Framework (NDF) and a spatial development plan with a strategy for addressing key national priorities through the planning system and through its priorities looks to improve air quality and noise.

**Flintshire County Council Unitary Development Plan 2000 – 2015**

2.9. The Unitary Development Plan (UDP) is the adopted development plan for Flintshire for the 15-year period 2000 – 2015. Although the adopted UDP expired at the end of 2015 it remains the adopted development plan for the County.

2.10. The UDP Written Statement contains policies relating to noise, as summarised below.

2.11. Policy GEN 1 'General Requirements for development' states that *"the development should not have a significant adverse impact on the safety and amenity of nearby residents, other users of nearby land/property, or the community in general, through increased activity, disturbance, noise, dust, vibration, hazard, or the adverse effects of pollution."*

2.12. Energy, Waste and Pollution Policy 'Noise and Light EWP 13 Nuisance' states:

- *"Development which is sensitive to noise, vibration, odour, dust or light pollution and which is proposed near to existing sources of nuisance, such as railways, roads, airfields or industrial activities, will be permitted only if the developer is able to demonstrate that sufficient measures will be taken to mitigate any potential adverse effects.*
- *Proposals which are likely to cause an increase in noise, vibration, odour, dust or light pollution will be permitted only if the developer has demonstrated that there will be no detrimental impact on users outside the boundary of the site, who may be sensitive to such nuisance.*
- *Whilst it is not possible to eliminate sources of nuisance completely, this policy seeks to ensure that, wherever practicable, nuisance sensitive development is separated from bad neighbour activities. However, there will be certain circumstances in which developers may be able to take appropriate steps to mitigate any detrimental impacts. Hours of operation can be limited, landscape and other physical barriers can be installed, and technology can be introduced to ensure that quality of life is not undermined. All such measures will be secured through planning conditions and obligations which should be implemented as an integral part of any development.*

**Emerging Local Policy**

2.13. The Council are currently preparing a Local Development Plan (LDP). The submission version of this LDP is currently the subject of examination by a Planning Inspector. This LDP is not yet adopted, therefore has limited weight. Relevant policies concerning noise protection and pollution include: STR14 – Climate Change and Environmental Protection, PC2 – General requirements for development, and EN18 – Pollution and Nuisance.

**Relevant British Standards and Guidance**

2.14. The effects of the Proposed Development upon the existing noise sensitive receptors are to be assessed by reference to the relevant British Standard and relevant guidance as set out in the table below:

| Source | Description |
|---|---|
| BS5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites (BS 5228) | Recommendations for basic methods of noise and vibration control relating to construction sites where work activities may generate significant noise and / or vibration. It also provides guidance on methods of predicting and measuring noise and vibration, and assessing its impact on receptors. |
| BS8233:2014 Guidance on sound insulation and noise reduction for buildings (BS 8233) | Recommendations for desirable internal and external ambient noise levels in dwellings that should not be exceeded for steady external noise sources. |
| BS4142:2014 Methods for rating and assessing industrial and commercial sound (BS 4142) | Methods for determining, at the outside of a building, noise levels from industrial and manufacturing premises, fixed installations and other associated activities. The rating method takes into account specific source characteristics, such as tonality, impulsivity and intermittency. |
| Design Manual for Roads and Bridges, Sustainability & Environment Appraisal LA 111 Noise and Vibration Revision 2 (DMRB) | Advice on the assessment of noise and vibration impacts due to road traffic. The guidance provides a classification of magnitude of impacts related to changes in road traffic noise levels. |
| The Department of Transport/Welsh Office Memorandum 'Calculation of Road Traffic Noise' (CRTN) | Describes procedures for traffic noise calculation, and is suitable for environmental assessments of schemes where road traffic noise may have an impact. |
| British Standard 7385 'Evaluation and Measurement for Vibration in Buildings' (BS 7385). | Presents guide values or limits for transient vibration, above which there is a likelihood of cosmetic damage. |
| The World Health Organisation 'Guidelines for Community Noise' (WHO 1999). | Provides evidence based research on the effect of environmental noise on communities / residential occupants. |

**Table 7.1: Relevant British Standards and Guidance**

# 3. Consultations

3.1. In the case of this application we have not undertaken a detailed Screening or Scoping Opinion Request to the Council. On this basis, Spawforths have sought to confirm with the Council by letter the information to be provided in the Environmental Statement, in accordance with Part 4 (13) of the EIA Regulations, to ensure the scope of the technical chapters and the methodology for assessing the significance of effects is robust. To enable the Council to consider this, Spawforths enclosed the following plans and information:

- A Location Plan identifying "The Land";
- A description of the nature and purpose of the development including a Character Area Plan;
- Topic/Technical Chapters of the ES based on the issues to be assessed;
- Methodology for the Assessment of Significant Effects in accordance with EIA Regulations; and
- The cumulative impacts to be considered.

3.2. The Council subsequently confirmed that they accepted this approach and methodology including the range of environmental issues against which the proposals should be assessed as part of the Environmental Impact Assessment process. See confirmation in writing in Appendix 14 of the ES Part 1 report.

3.3. Details of consultation between Robert Turner and Michael Pimlott of Cundall, Dave Jones, Pollution Control Officer (Public Protection - Environment), and pre-application discussions with Planning Officers are detailed below.

| Theme / Issue | Date | Consultee | Method | Summary of Discussion | Outcome / Output |
|---|---|---|---|---|---|
| Pre-app meeting | 09/08/2021 | Planning Officer | Microsoft Teams Meeting | Outlined scope of assessment and details to be agreed separately with Dave Jones | Additional meeting to be arranged with Dave Jones |
| Discussion on Noise and Vibration ES Paper assessment methodology | 19/08/2021 | Dave Jones – Pollution Control Officer | Microsoft Teams Meeting | Detailed discussion of assessment methodology | Verbal confirmation that assessment methodology is acceptable. |
| Written summary of Noise and Vibration ES Paper assessment methodology | 20/08/2021 | Dave Jones – Pollution Control Officer | Email | Written summary of assessment methodology and the boundary mitigation to be included within the noise modelling exercise at adjacent residential plots | Return email confirming acceptable of proposals received from Dave Jones on 20/08/2021 |

| Theme / Issue | Date | Consultee | Method | Summary of Discussion | Outcome / Output |
|---|---|---|---|---|---|
| Scoping out of operational road traffic assessment | 03/09/2021 & 10/09/2021 | Dave Jones – Pollution Control Officer | Email & Voicemail | Summary of the technical justification for the scoping out of road traffic noise impacts associated with operational traffic noise on the highways network. | Issued email to confirm scoping out of operational traffic noise impacts – current assessment assumes this. |

**Table 7.2: Summary of Consultations and Discussions**

# 4. Methodology and Approach

4.1. There are several potential significant noise and vibration related environmental impacts which will be fully assessed at sensitive receptors. Most of these relate to the impact of noise on existing residential receptors in the locality of the site at both construction and operational phases.

4.2. It is not considered that any element of the typical operational activities undertaken at the Proposed Development will result in significant vibration impacts.

4.3. On this basis, the assessment of potential Operational vibration impacts can be scoped out of the ES assessment, as confirmed with Dave Jones, Pollution Control.

4.4. Operational traffic flows for the scheme development were addressed in the Environmental Statement that was part of the original Deeside Airfields outline planning application. The traffic flow data provided as part of this traffic assessment (as part of this ES, see Paper 2: Traffic and Transport) identifies that operational flows will not exceed the values stated within the consented application. On this basis, the assessment of potential Operational road traffic noise impacts has been scoped out of the ES assessment.

**Construction Phase**

4.5. Potential noise and vibration related environmental impacts which may arise during the Construction Phase are considered to be as follows:

- noise and vibration impacts associated with construction related fixed and mobile plant, including piling; and
- noise impacts associated with increases in traffic to and from the Application Site due to construction related vehicles

**Operational Phase**

4.6. Potential noise related environmental impacts which may arise during the Operational Phase are as follows:

- noise impact associated with the "industrial" noise emissions from the Proposed Development e.g. movement of industrial vehicles, operation of service yards and loading bays and operation of building services plant; and

## Receptors

4.7. Noise-sensitive and vibration-sensitive receptors in proximity to the site which have been taken into consideration in this assessment are detailed in the following table.

| Receptors | Sensitivity to potential sound impacts | Sensitivity to potential vibration impacts | Receptor geographic designation |
|---|---|---|---|
| **A** - Dee Bank Cottages | High | High | Local |
| **B** - The Lodge & Old Hall Farm, Hurlbutts Drive | High | High | Local |
| **C** - Residential, Garden City | High | High | Local |
| **D** - John Summers building (Grade II Listed) | Low | High | Local |
| **E** - Sealand Community Primary School | High | High | Local |
| **F** - Future residential | High | High | Local |
| **G** - Future residential | High | High | Local |
| **H** - Future employment use (B2 and B8 Use Classes) | Not sensitive | Low | Local |
| **I** - Future employment use (B2 and B8 Use Classes) | Not sensitive | Low | Local |
| **Other -** Residential receptors adjacent to roads assessed as part of transport assessment will be considered. These may be situated on the wider highway network. | High | High | Borough |

**Table 7.3: Receptors**

4.8. The approximate locations of noise-sensitive receptors highlighted in the above table are presented in Figure 7.1 and Appendix 7.1. In addition, the sensitivity rating with respect to potential noise and vibration impacts at each received is also defined.

4.9. Most of the noise and vibration sensitive receptors identified are geographically designated as 'local' as they could experience direct effects as a result of the Proposed Development, due to their proximity to the Development Site. Noise and vibration effects from industrial developments are typically localised in nature and so assessment focuses on those closest to

the site. The exceptions are changes in noise levels due to changes in traffic flows which can affect receptors in a larger area.

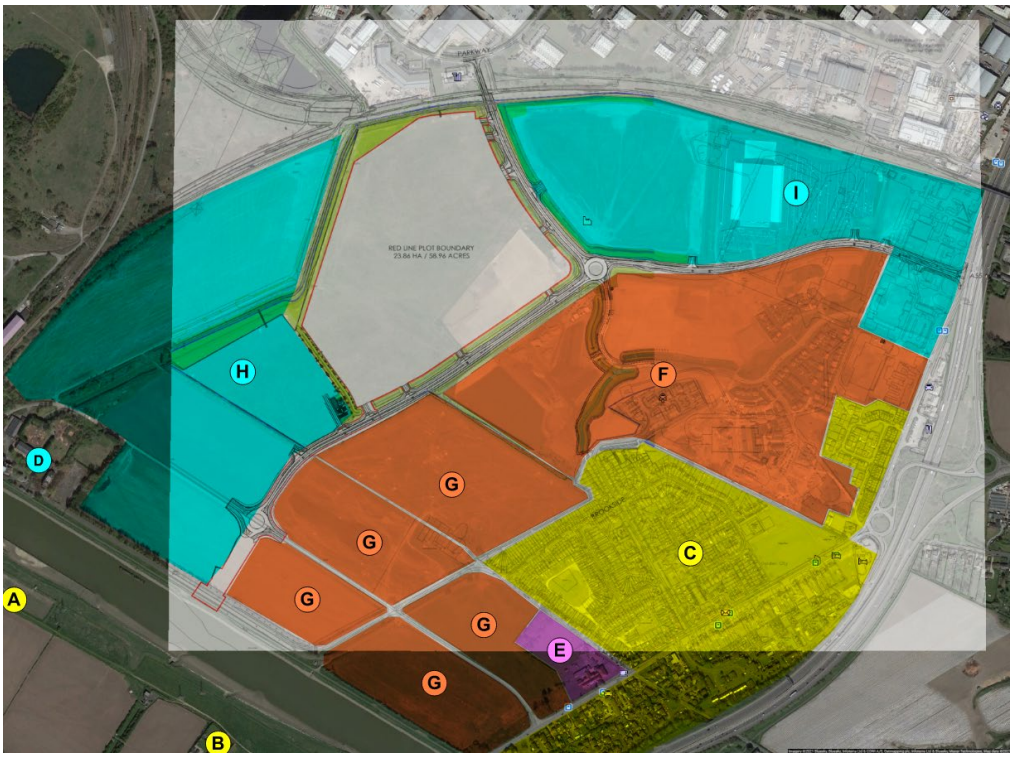


**Figure 7.1 : Noise sensitive receptors**

## Environmental Impacts

### Construction Stage

Construction Noise

4.10. BS 5228 provides practical information on demolition and construction noise and vibration reduction measures and promotes a 'Best Practicable Means' (BPM) approach to control noise and vibration. The calculation method provided in BS 5228 is based on the numbers and types of equipment operating, their associated sound power levels (SWL), and the distance to receptors, together with the effects of any screening. The types and numbers of construction plant used in this assessment will be based on information presented within the Construction Programme.

4.11. There are no current national standards or guidelines that provide specific noise limits for construction sites. However, as a guide, typical daytime levels for noisy temporary works at neighbouring premises usually lie in the range of 70 – 80 dB $L_{Aeq}$.

4.12. It is therefore recommended that the following good practice limits apply to construction noise levels at each identified noise-sensitive receptor:

- 70 dB $L_{Aeq}$ Monday – Friday; and
- 70 dB $L_{Aeq}$ Saturday and Sunday

4.13. The Magnitude of Impact criteria for construction noise have been derived from BS 5228 guidance. A semantic scale for description of the magnitude of construction noise effects is shown in the table below:

| Description | Magnitude of Impact |
|---|---|
| Daytime noise levels more than 10 dB below existing background levels | Neutral |
| Daytime noise levels less than or equal to 65 dB $L_{Aeq}$ | Negligible |
| Daytime noise levels between 65 and 70 dB LAeq | Minor |
| Daytime noise levels between 70 and 75 dB LAeq | Moderate |
| Daytime noise levels greater than 75 dB $L_{Aeq}$ for a total of less than 10 days in any 15-day period, or for a total of days less than or equal to 40 in any 6-month period | Major |

**Table 7.4: Construction Noise Magnitude Criteria**

4.14. Prior to commencing work, contractors would agree hours of working with the Local Authority. Proposed hours of working are as follows:

- 08:00 – 18:00 hrs on Monday – Friday;
- 08:00 – 13:00 hrs on Saturday; and
- No working on Sunday or bank holidays

Construction Traffic Noise

4.15. Construction traffic will be assessed by considering the short-term increase in traffic flows during works, following the principles of CRTN and DMRB.

4.16. The criteria for the assessment of the magnitude of effect of short term traffic noise changes arising from construction works have been taken from Table 3.54a of DMRB and are provided in the table below.

| **Description (change in dB $L_{A10,18hr}$ or $L_{night}$)** | **Magnitude of Impact** |
|---|---|
| 0 dBA | Neutral |
| 0.1 – 0.9 dBA | Negligible |
| 1.0 – 2.9 dBA | Minor |
| 3.0 – 4.9 dBA | Moderate |
| 5 dBA or more | Major |

**Table 7.5: Construction Traffic Noise Magnitude Criteria**

Construction Vibration

4.17. BS 5228 Part 2 provides further guidance on the perception of vibration resulting from construction activities within occupied buildings. This provides a simple method of determining annoyance alongside evaluation of cosmetic damage associated with vibration.

4.18. The table below details potential vibration levels measured in terms of 'Peak Particle Velocity' (PPV), and provides a semantic scale for description of construction vibration impacts on human receptors.

| Peak Particle Velocity Level | Description | Magnitude |
|---|---|---|
| 0 mm/s | No vibration perceptible | Neutral |
| 0.14 mm/s | Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration. | Negligible |
| 0.3 mm/s | Vibration might be just perceptible in residential environments. | Minor |
| 1.0 mm/s | It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents. | Moderate |
| 10 mm/s | Vibration is likely to be intolerable for any more than a very brief exposure to this level. | Major |

**Table 7.6: Guidance on Effects of Construction Vibration (PPV) Levels**

4.19. Construction activities that produce vibration may impact on adjacent buildings. The criteria used in this assessment relate to the potential for cosmetic damage, not structural damage. The principal concern is generally transient vibration due to piling, which at this stage cannot be ruled out as necessary. Cosmetic damage could occur within the first 20 metres (m) of piling activities; at greater distances damage is less likely to occur. Likely levels of vibration at given distances can be estimated from existing piling vibration data, as provided in BS 5228 Part 2.

4.20. BS 7385 establishes the basic principles for carrying out vibration measurements and processing the data, with regard to evaluating vibration effects on buildings. Recommended PPV vibration limits for transient excitation for different types of buildings are presented in the following table.

| Type of Building | Peak Component Particle Velocity in Frequency Range of Predominant Pulse[1] | |
|---|---|---|
| | *4 Hz to 15 Hz* | *15 Hz and above* |
| Reinforced or framed structures. | 50 mm/s at 4 Hz and above | |
| Industrial and heavy commercial buildings | 15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz[2] | 20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above |
| [1] - Values referred to are at the base of the building;<br>[2] - At frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) should not be exceeded; mm/s – millimetres per second. | | |

**Table 7.7: Peak Particle Velocity Limits for Cosmetic Damage to Buildings**

4.21. Where vibration experienced at structures exceeds the values shown in the table above, this would be considered to indicate a significant adverse impact.

## Operational Phase

Industrial Noise

4.22. Industrial noise emissions will be assessed in accordance with the methodology set out in BS 4142. This standard provides an assessment methodology and criteria relating to the following industrial noise sources:

> "a) *sound from industrial and manufacturing processes;*
>
> b) *sound from fixed installations which comprise mechanical and electrical plant and equipment;*
>
> c) *sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and*
>
> d) *sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site."*

4.23. The proposed criteria for the assessment of the magnitude of impact of industrial noise emissions from the Proposed Development are provided in the table below and are based on

the relative level difference between the BS 4142 Rating Level ($L_{Ar,Tr}$) of the industrial noise sources and the representative background sound levels ($L_{A90,T}$).

| Description | Magnitude |
|---|---|
| $L_{Ar,Tr} = L_{A90,T} - 10$ dB | Neutral |
| $L_{Ar,Tr} = L_{A90,T} - 5$ dB | Negligible |
| $L_{Ar,Tr} = L_{A90,T}$ dB | Minor |
| $L_{Ar,Tr} = L_{A90,T} + 5$ dB | Moderate |
| $L_{Ar,Tr} = L_{A90,T} + 10$ dB | Major |

**Table 7.8: BS 4142 Noise Impact Magnitude Criteria**

## Significance of Effects

4.24. The Significance of Effect is determined using the significance matrix presented in Section 6 of the Environmental Statement Part 1 Report and reproduced in Figure 7.2. This identifies the receptor level across the top of the matrix and the magnitude of environmental impact down the side and where they meet within the matrix identifies the significance of the effect.

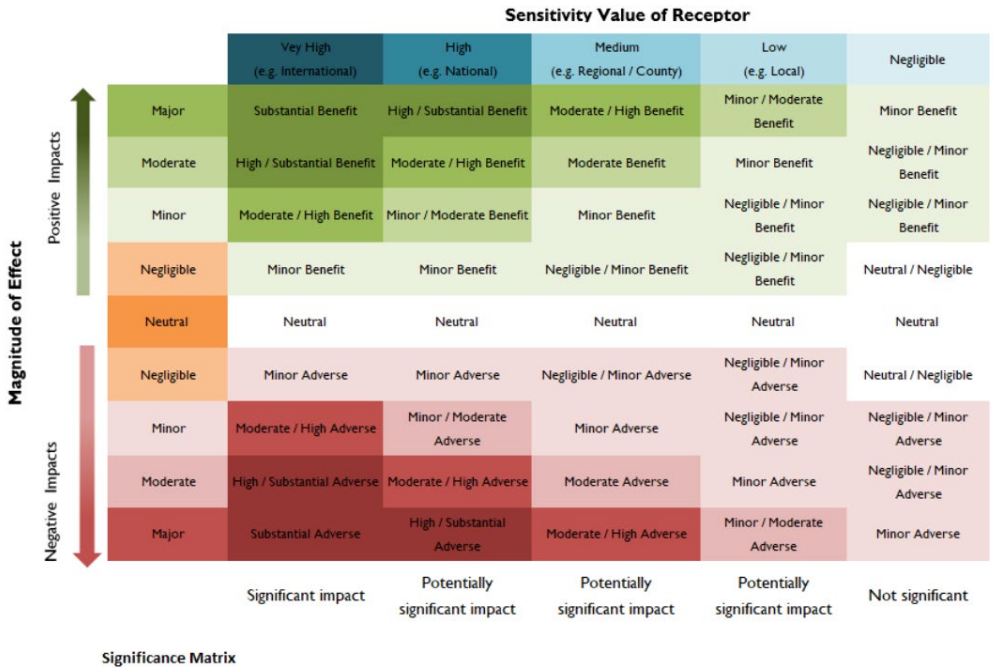


**Figure 7.2: Significance Matrix (project-wide)**

4.25. For the purpose of this Paper, it is proposed that the above project-wide Significance Matrix table is modified to take into account the specific relationship between noise and vibration effects at different types of receptors sensitivities identified in Table 7.3. To this end, Table 7.9 sets out the modified Significant Matrix values for 'High' and 'Low' sensitivity receptors.

| | | **Sensitivity value of receptor** | |
|---|---|---|---|
| | | **High** | **Low** |
| **Magnitude of effect** | **Neutral** | Neutral | Neutral |
| | **Negligible** | Minor Adverse | Neutral / Negligible |
| | **Minor Negative** | Minor / Moderate Adverse | Negligible / Minor Adverse |
| | **Moderate Negative** | Moderate / High Adverse | Negligible / Minor Adverse |
| | **High Negative** | High / Substantial Adverse | Minor Adverse |

**Table 7.9: Significance Matrix adopted from Noise and Vibration effects**

4.26. For noise and vibration impacts, several factors will be considered when identifying whether significant effects have occurred, such as:

- the context in which the impact occurs;
- the duration of the impact;

- the sensitivity of the receptor; and
- the number of receptors affected.

4.27. Where the identified Significance of Effect is equal to or lower than Minor Adverse, noise and vibration impacts are considered a 'Not Significant' in EIA terms.

4.28. Where the Significance of Effect is equal to or higher than Moderate Adverse, noise and vibration impacts are be considered a 'Significant' in EIA terms.

## Impact Prediction Confidence

4.29. It is also of value to attribute a level of confidence by which the predicted impact has been assessed. The criteria for these definitions are set out in Table 7.10:

| Confidence Level | Description |
|---|---|
| High | The predicted impact is either certain i.e. a direct impact, or believed to be very likely to occur, based on reliable information or previous experience. |
| Low | The predicted impact and its levels are best estimates, generally derived from first principles of relevant theory and experience of the assessor. More information may be needed to improve confidence levels. |

**Table 7.10: Confidence Levels**

# 5. Baseline Information

**Description of baseline conditions**

5.1. The Site sits within the jurisdiction of Flintshire Council and the prevailing noise climate is affected by a number of sources. These include:

- Distant road traffic noise, predominantly from the A548 Weighbridge Road to the north and the A494 Welsh Road to the east; and
- Distant non-specific industrial sources from industrial estates (Tata Steel Shotton, Deeside Industrial Park and Deeside Industrial Estate) to the north and west.

**Baseline noise values**

5.2. As detailed in paragraph 3.3, through consultation with Flintshire County Council it was established that noise survey data from previous surveys at the Site would be considered in establishing existing baseline conditions at the site. The following subsections present a summary of previously measured background noise data the Site and its environs, as well as results from an additional noise survey undertaken by Cundall in 2019.

2012 Baseline Noise Survey (Northern Gateway ES Addendum)

5.3. A baseline survey was undertaken and submitted as part of the Northern Gateway Environmental Statement Addendum (Chapter 7 Noise, Document Reference 101195/Issued/ Rep 0DG) issued on 18 November 2013, associated with a mixed-use planning application now granted permission (ref. 054758).

5.4. Four separate measurement positions were defined for the noise survey, as follows:

- L1 – Within the proposed development site boundary, on the western edge of the areas currently proposed for residential development and close to the adjacent CHEL site
- L2 – On land located at the end of Farm Road. This position is representative of noise environment at the proposed residential dwellings located to the south east of the site.
- L3 – In the rear garden a residential dwelling on Hurlbutts Drive. This position is representative of some of the nearest existing noise sensitive receivers to the proposed industrial units.
- L4 – At Dee Bank Cottages in the back garden of residential dwelling. This position is representative of the nearest existing noise sensitive receivers to the proposed industrial units.

5.5. The approximate locations of each measurement position are indicated in Figure 7.3.

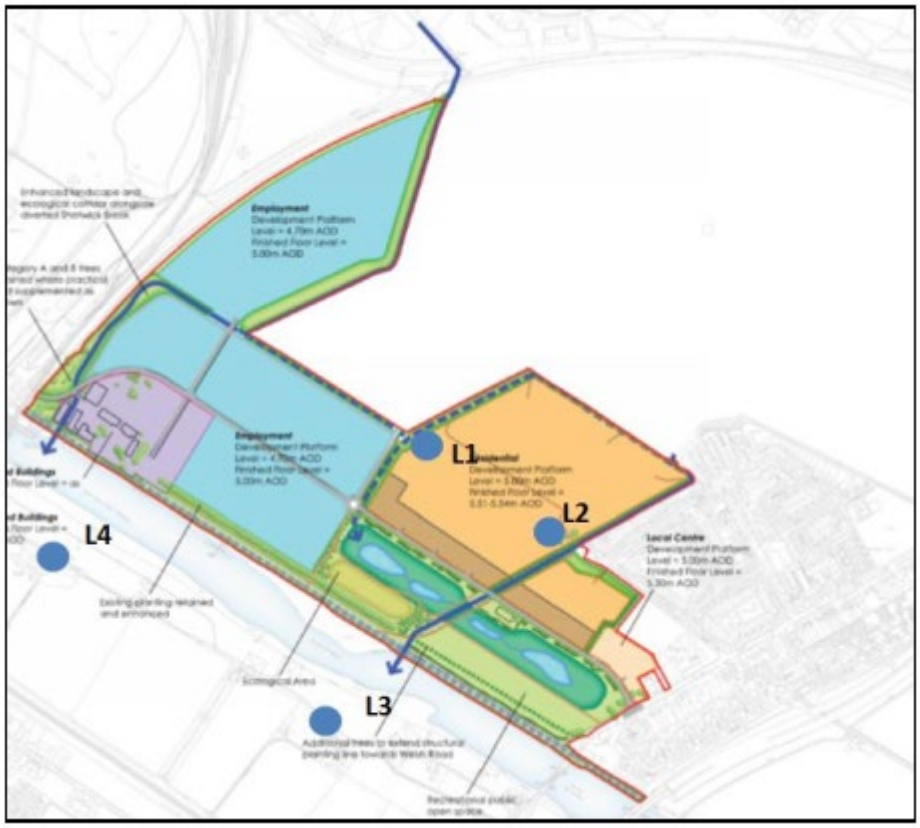


**Figure 7.3 : Receptor locations for 2012 baseline noise survey**

5.6. The measured daytime and night-time survey results and timings as presented in the 2012 Northern Gateway ES addendum are reproduced in Table 7.11 and Table 7.12, respectively:

| Location | Date | Daytime baseline noise levels, dB | |
|---|---|---|---|
| | | $L_{Aeq,16hr}$ | $L_{A90,16hr}$ |
| L1 – Western Boundary of proposed residential dwellings | 28 Jun 2012* | 45.7 | 40.8 |
| | 29 Jun 2012 | 51.2 | 45.4 |
| L2 – Land near end of Farm Road | 28 Jun 2012* | 43.4 | 39.3 |
| | 29 Jun 2012 | 50.6 | 45.5 |
| L3 – Hurlbutts | 28 Jun 2012* | 48.7 | 48.3 |
| | 29 Jun 2012 | 49.2 | 40.7 |
| L4- Dee Bank Cottages | 28 Jun 2012* | 50.6 | - |
| | 29 Jun 2012 | 52.8 | - |
| | 30 Jun 2012 | 53.6 | - |
| | 01 Jul 2012 | 51.5 | - |

| Location | Date | Daytime baseline noise levels, dB | |
|---|---|---|---|
| | | $L_{Aeq,16hr}$ | $L_{A90,16hr}$ |
| | 02 Jul 2012 | 52.1 | - |
| | 03 Jul 2012 | 51.6 | - |
| *indicates shortened measurement period | | | |

**Table 7.11:Summary of previously measured day time baseline noise levels (0700-2300 hrs) (2012)**

| Location | Date | Night-time baseline noise levels, dB | |
|---|---|---|---|
| | | $L_{Aeq,8hr}$ | $L_{A90,8hr}$ |
| L1 – Western Boundary of proposed residential dwellings | 28 Jun 2012* | 46.2 | 42.1 |
| | 29 Jun 2012 | 40.3 | 35.0 |
| L2 – Land near end of Farm Road | 28 Jun 2012 | 47.7 | 41.8 |
| | 29 Jun 2012* | 40.2 | 35.8 |
| L3 – Hurlbutts | 28 Jun 2012 | 44.7 | 36.5 |
| | 29 Jun 2012 | - | - |
| L4- Dee Bank Cottages | 28 Jun 2012 | 49.2 | - |
| | 29 Jun 2012 | 47.7 | - |
| | 30 Jun 2012 | 49.0 | - |
| | 01 Jul 2012 | 47.2 | - |
| | 02 Jul 2012 | 47.0 | - |
| * indicates shortened measurement period | | | |

**Table 7.12: Summary of previously measured night-time baseline noise levels (2300-0700 hrs) (2012)**

5.7. No $L_{A90}$ data was obtained for position L4 Dee Bank Cottages during the survey; however, as the average day and night time $L_{Aeq,\,T}$ data at position L4 is higher than at position L3, it was considered that the use of the L3 $L_{A90}$ data for position L4 provided a robust assessment in the absence of this data.

5.8. It can be seen from the tables above that overall daytime $L_{A90,16hr}$ background noise levels range from 39 – 48 dB whereas night-time $L_{A90,8hr}$ background noise levels range from 35 to 42 dB.

<u>2019 Baseline Noise Survey (Northern Gateway Phase 1A)</u>

5.9. Additional baseline noise survey measurements were undertaken by Agility Acoustics in January 2019 in support of the discharge of Condition 40 attached to the proposed Northern Gateway Phase 1A residential site (report ref: Report Ref: AA18-1114-R01v2 February 2019). Submitted by Keepmoat Homes with a reserved matters application (ref. 060411).

5.10. Three measurement locations around the proximity of the Keepmoat residential site (Receptor F) were identified for the purpose of the noise survey, as follows:

- **NML1** - 12m back from Corus access road, adjacent to SE boundary. Representative of dwellings closest and most exposed to Welsh Road and the 'Corus access road'
- **NML2** – SE of site. Representative of dwellings in southernmost areas of the site set back and exposed road traffic noise from Welsh Road.
- **NML3** - 4m back from NE boundary with Corus access road. Representative of dwellings closest to 'Corus access road' and set well away from Welsh Road

5.11. The approximate locations of each measurement position are indicated in Figure 7.4, below:

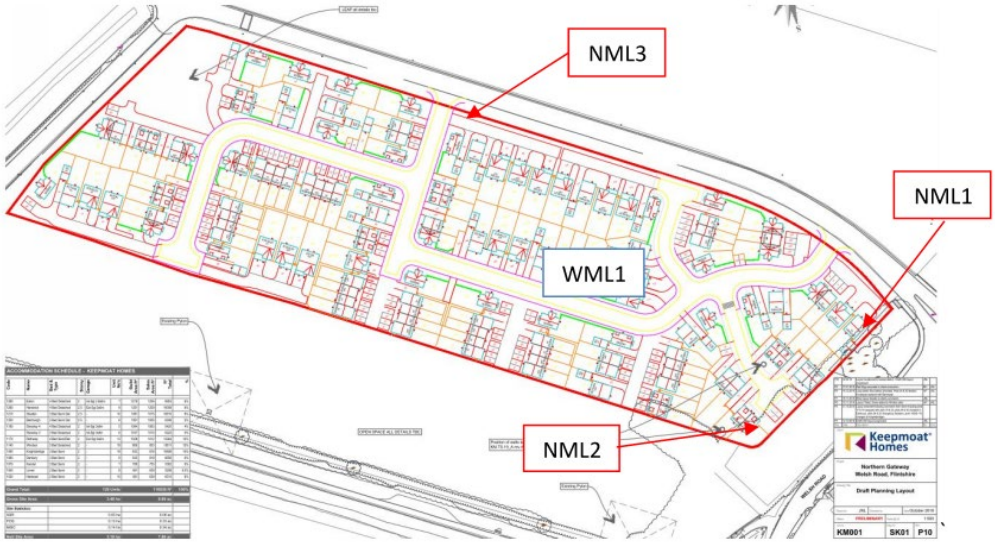


**Figure 7.4: Receptor locations for 2019 baseline noise survey**

5.12. Noise measurements were undertaken during the following periods:

- Night-time: 09/01/2019 between 04:00 and 07:00 hrs;
- Daytime: 09/01/2019 between 10:00 and 13:00 hrs.

5.13. The measured daytime and night-time survey results as presented in the Agility Acoustics report are reproduced in Table 7.13:

| Location | Daytime baseline noise levels, dB | | | | Night-time baseline noise levels, dB | | | |
|---|---|---|---|---|---|---|---|---|
| | $L_{AFmax}$ | $L_{Aeq,15min}$ | $L_{A10,15min}$ | $L_{A90,15min}$ | $L_{AFmax}$ | $L_{Aeq,15min}$ | $L_{A10,15min}$ | $L_{A90,15min}$ |
| NML1 | 67 – 75 | 56 – 57 | 58 – 59 | 49 - 54 | 57 – 75 | 46 – 57 | 49 – 59 | 42- 52 |
| NML2 | 63 – 68 | 56 | 59 | 50 - 52 | 62 – 66 | 50 – 56 | 55 – 58 | 45 - 54 |
| NML3 | 75 – 80 | 55 – 57 | 51 – 56 | 42 - 45 | 74 – 78 | 51 – 60 | 49 – 61 | 43 – 52 |

**Table 7.13: Summary of previously measured day time and night-time baseline noise levels (2012)**

5.14. It can be seen from the tables above that background noise levels range from 42 – 54 dB $L_{A90,15min}$ during both daytime and night-time periods. This represents a notable increase upon

the previously measured background levels (as low as 35 dB $L_{A90,8hr}$) at similar locations (L1 and L2) during the 2012 noise survey.

5.15. On this basis, it is reasonable to conclude that the background noise climate in this location has increased between 2012 and 2019, and that the 2012 survey results can no longer be considered representative for the purpose of assessing future operation noise impacts.

2019 Cundall noise survey

5.16. To further ascertain the prevailing environmental noise levels at the Site, attended daytime and night-time measurements were undertaken by Cundall in the proximity of the two closest residential receptors.

5.17. Table 7.14 below documents the monitoring positions and the corresponding measurement type / period.

| Monitoring position | Monitoring location | Measurement duration |
|---|---|---|
| MP 1 | Approximately 250 m to the south-west of the site, at the end of Rowley's drive.<br><br>Assumed to be representative of the prevailing background noise climate at the Dee Bank Cottages. | Attended night-time measurements undertaken between approximately 23:30 hrs on 01/10/2019 to 02:30 hrs on 02/10/2019. Attended daytime measurements undertaken from approximately 13:00 hrs to 15:45 hrs on 02/10/2019. |
| MP 2 | Approximately 350 m to the south-east of the site on Corus Road.<br><br>Assumed to be representative of the prevailing background noise climate at Garden City and general future proposed residential. | |

**Table 7.14: Cundall survey monitoring positions and measurement periods**

5.18. A figure detailing the approximate location of each unattended measurement position is presented overleaf.

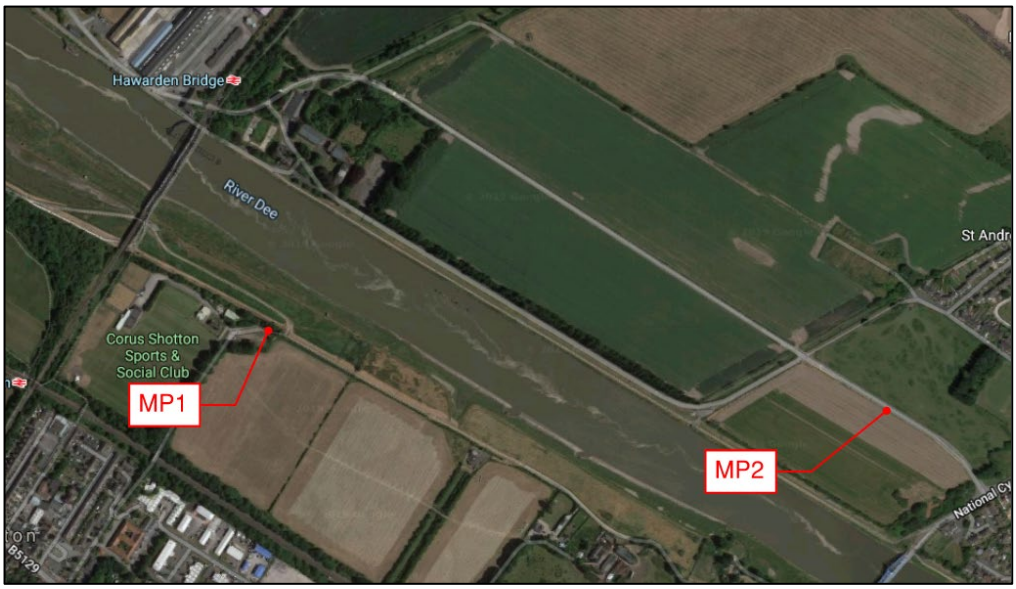


**Figure 7.5 : Receptor locations for Cundall 2019 baseline noise survey**

5.19. Based on survey results and subjective impressions from Cundall engineers who attended site, the following table provides a review of existing noise sources noted to contribute to the existing noise climate at each measurement position.

| Measurement Position | Existing noise climate |
|---|---|
| MP1 | The $L_{Aeq}$ noise climate and background noise levels ($L_{A90}$ values) are largely driven by road traffic noise on the A494 to the east and industrial noise from large industrial sites to the north. |
| MP2 | The $L_{Aeq}$ noise climate was largely driven by road traffic on Corus Road during daytime hours, background noise levels ($L_{A90}$ values) and night-time $L_{Aeq}$ levels largely driven by road traffic noise on the A494 to the east, and a smaller contribution of industrial noise from large industrial sites to the north and west. |

**Table 7.15: Description of baseline conditions**

5.20. A summary of the average daytime (07:00 – 23:00 hrs) and night-time (23:00 – 07:00 hrs) ambient noise levels recorded is detailed within the following table. The values are the logarithmically averaged $L_{Aeq,15min}$, the maximum $L_{AFmax,15min}$ and range of $L_{A90,15min}$ dB values measured. All values have been rounded to the nearest integer value (as fractions of a decibel are imperceptible) and are given in dBA.

| Period | Location | Average $L_{Aeq,15min}$ (dB) | Highest $L_{AF,Max}$ (dB) | Highest $L_{AF10,15min}$ (dB) | Range $L_{AF90,15min}$ (dB) |
|---|---|---|---|---|---|
| Daytime (measurements between 07:00 – 23:00 hours) | MP1 | 46 | 69 | 52 | 39 – 41 |
| | MP2 | 58 | 82 | 61 | 41 – 42 |
| Night-time (measurements between 23:00 – 07:00 hours) | MP1 | 43 | 48 | 45 | 42 |
| | MP2 | 45 | 69 | 47 | 40 - 42 |

**Table 7.16: Summary of Baseline Monitoring Results**

5.21. The baseline survey undertaken by Cundall has indicated a broad similarity in background levels when comparing Cundall's MP2 position measurements with the nearest representative measurement position in Keepmoat's 2019 survey at the NML3 position. The lowest measured background at position MP2 during the Cundall survey is slightly lower when compared with the lowest measured background levels of Keepmoat's 2019 survey, and as such it is considered that assessing against these levels will form the most robust assessment available across all surveys. For Cundall's MP1 position, there are no existing background measurements available from previous surveys in this vicinity, and as such receptors in this area will also be assessed against data obtained during the Cundall Survey.

**Summary of baseline noise conditions**

5.22. Based on the information presented in paragraph 5.20, Table 7.17 below presents a summary of representative background levels at each monitoring location during the daytime and night-time:

| Period | Noise sensitive receptor | Survey location adopted | Representative $L_{A90,15min}$ (dB) |
|---|---|---|---|
| Daytime | A - Dee Bank Cottages | Cundall MP1 | 39 |
| | B - The Lodge & Old Hall Farm, Hurlbutts | Cundall MP2 | 41 |
| | C - Residential, Garden City | Cundall MP2 | 41 |

| Period | Noise sensitive receptor | Survey location adopted | Representative $L_{A90,15min}$ (dB) |
|---|---|---|---|
| (measurements between 07:00 – 23:00 hours) | D - John Summers building (Grade II Listed) | n/a – not noise sensitive | |
| | E - Sealand Community Primary School | Cundall MP2 | 41 |
| | F - Future residential, | Cundall MP2 | 41 |
| | G - Future residential | Cundall MP2 | 41 |
| | H - Future employment use (B2 and B8 Use Classes) | n/a – not noise sensitive | |
| | I - Future employment use (B2 and B8 Use Classes) | n/a – not noise sensitive | |
| Night-time (measurements between 23:00 – 07:00 hours) | A - Dee Bank Cottages | Cundall MP1 | 42 |
| | B - The Lodge & Old Hall Farm, Hurlbutts Drive | Cundall MP2 | 40 |
| | C - Residential, Garden City | Cundall MP2 | 40 |
| | D - John Summers building (Grade II Listed) | n/a – not noise sensitive | |
| | E - Sealand Community Primary School | Cundall MP2 | 40 |
| | F - Future residential, | Cundall MP2 | 40 |
| | G - Future residential | Cundall MP2 | 40 |
| | H - Future employment use (B2 and B8 Use Classes) | n/a – not noise sensitive | |
| | I - Future employment use (B2 and B8 Use Classes) | n/a – not noise sensitive | |

**Table 7.17: Representative background sound levels at each identified sensitive receptor**

# 6. Alternatives Considered

6.1. Cundall have been an active member of the project design team and have provided design advice which has informed the current proposals, which has been an iterative process, assessing the scheme as it has evolved with respect to noise and vibration impacts at identified sensitive receptors.

6.2. Specific advice was provided with regards to the location of service yards which were kept as far from existing and proposed residential receptors as possible.

6.3. The proposed layout is therefore the result of early consideration of noise effects by the design team.

# 7. Potential Environmental Effects

7.1. The following sub-sections provide an assessment of noise and vibration effects through the construction and operational phases against the significance criteria listed above.

## Construction Phase

7.2. A 3D SoundPLAN noise model has been used to predict the noise impact created during the construction of the Proposed Development and associated infrastructure, in accordance with BS 5228.

7.3. Detailed construction information was not available at the time of writing. Therefore, Cundall's extensive experience of similar developments has been used to formulate construction phasing scenarios and select typical noisy activities for the noise assessment.

7.4. The comprehensive Paper Mill Facility will come forward in three phases of development after the initial phase of site enabling and infrastructure works. The Environmental Impact Assessment (EIA) has been tested based on the following phasing programme and timescales:

- Initial Site Enabling – 2022 (Q3) – 2022 (Q4)
- (Including cut and fill and creation of development platform)
- Phase 1 of the Paper Mill Facility – 2022 (Q3) – 2024 (Q1)
- Phase 2 of the Paper Mill Facility – 2024 (Q4) – 2026 (Q2)
- Phase 3 of the Paper Mill Facility – 2034 (Q1) – 2035 (Q3)

7.5. To determine the worst-case construction noise impact, and based upon current anticipated construction phasing, the noise model has simulated the following construction scenarios:

- Scenario 1 – Concurrent site-wide earthwork operations;
- Scenario 2 – Concurrent site-wide substructure;
- Scenario 3 – Phase 1 construction;
- Scenario 4 – Phase 2 construction;
- Scenario 5 – Phase 3 construction.

7.6. Construction plant noise source data has been taken from BS 5228. The following table lists the source data used in the modelling process, as well as the percentage 'on time' during a working day.

| Construction Phase | Plant Item | Quantity | Sound Pressure Level @ 10 m / dBA | On Time | BS 5228:2009 Reference |
|---|---|---|---|---|---|
| Scenario 1 Phase 1 Earthworks & Demolition | Breaker Mounted on Excavator 15t | 1 | 90 | 80% | Table C.1 Ref no. 9 |
| | Tracked Excavator 44t (Loading Dump Truck) | 2 | 85 | 80% | Table C.1 Ref no. 10 |
| | Articulated Dump Truck 29t | 3 | 80 | 80% | Table C.1 Ref no. 11 |
| | Tracked Excavator 44t | 1 | 82 | 80% | Table C.1 Ref no. 12 |
| | Wheeled Backhoe Loader 8t | 3 | 68 | 80% | Table C.2 Ref no. 8 |
| | Dozer 28t | 6 | 79 | 80% | Table C.2 Ref no. 11 |
| | Tracked Excavator 40t | 6 | 79 | 80% | Table C.2 Ref no. 14 |
| | Wheeled Loader | 2 | 79 | 80% | Table C.2 Ref no. 26 |
| | Dump Truck (Empty) 29t | 3 | 87 | 80% | Table C.2 Ref no. 31 |
| | Roller (Rolling Fill) 18t | 3 | 79 | 80% | Table C.2 Ref no. 37 |
| | Vibratory Plate (Petrol) 62kg | 3 | 80 | 80% | Table C.2 Ref no. 41 |
| | Directional Drill (generator) | 3 | 77 | 80% | Table C.2 Ref no. 44 |
| | Water Pump | 3 | 62 | 100% | Table C.2 Ref no. 46 |
| Scenario 2 Substructure & Road Construction | Tracked Excavator 40t | 1 | 79 | 80% | Table C2 Ref no. 14 |
| | Articulated dump truck 23t | 1 | 90 | 80% | Table C2 Ref no. 33 |
| | Hydraulic vibratory compactor | 1 | 84 | 80% | Table C2 Ref no. 42 |

| Construction Phase | Plant Item | Quantity | Sound Pressure Level @ 10 m / dBA | On Time | BS 5228:2009 Reference |
|---|---|---|---|---|---|
| | Concrete pump 2.8 t | 2 | 86 | 80% | Table C3 Ref no. 25 |
| | Crawler-mounted flight auger piling rig | 2 | 86 | 80% | Table C3 Ref no. 21 |
| | Concrete mixer truck | 4 | 85 | 80% | Table C4 Ref no. 20 |
| | Diesel generator | 1 | 80 | 100% | Table C4 Ref no. 84 |
| | Angle grinder (grinding steel) | 2 | 80 | 80% | Table C4 Ref no. 93 |
| | Dozer 11 t | 2 | 88 | 80% | Table C5 Ref no. 13 |
| | Articulated dump truck 25 t | 2 | 93 | 80% | Table C5 Ref no. 16 |
| | Road roller 22 t | 2 | 90 | 80% | Table C5 Ref no. 19 |
| Scenario 3 Phase 1 Construction | Tracked Excavator 40t | 1 | 79 | 80% | Table C2 Ref no. 14 |
| | Articulated dump truck 23t | 1 | 90 | 80% | Table C2 Ref no. 33 |
| | Hydraulic vibratory compactor | 1 | 84 | 80% | Table C2 Ref no. 42 |
| | Concrete mixer truck | 2 | 85 | 80% | Table C4 Ref no. 20 |
| | Diesel generator | 1 | 80 | 100% | Table C4 Ref no. 84 |
| | Angle grinder (grinding steel) | 2 | 80 | 80% | Table C4 Ref no. 93 |
| Scenario 4 Phase 2 Construction | Tracked Excavator 40t | 1 | 79 | 80% | Table C2 Ref no. 14 |
| | Articulated dump truck 23t | 1 | 90 | 80% | Table C2 Ref no. 33 |

| Construction Phase | Plant Item | Quantity | Sound Pressure Level @ 10 m / dBA | On Time | BS 5228:2009 Reference |
|---|---|---|---|---|---|
| | Hydraulic vibratory compactor | 1 | 84 | 80% | Table C2 Ref no. 42 |
| | Concrete mixer truck | 2 | 85 | 80% | Table C4 Ref no. 20 |
| | Diesel generator | 1 | 80 | 100% | Table C4 Ref no. 84 |
| | Angle grinder (grinding steel) | 2 | 80 | 80% | Table C4 Ref no. 93 |
| Scenario 5 Phase 3 Construction | Tracked Excavator 40t | 1 | 79 | 80% | Table C2 Ref no. 14 |
| | Articulated dump truck 23t | 1 | 90 | 80% | Table C2 Ref no. 33 |
| | Hydraulic vibratory compactor | 1 | 84 | 80% | Table C2 Ref no. 42 |
| | Concrete mixer truck | 2 | 85 | 80% | Table C4 Ref no. 20 |
| | Diesel generator | 1 | 80 | 100% | Table C4 Ref no. 84 |
| | Angle grinder (grinding steel) | 2 | 80 | 80% | Table C4 Ref no. 93 |

**Table 7.18: Construction Noise Source Data**

7.7. The following table shows the magnitude of the predicted noise impact at existing nearby noise sensitive receptors, during the construction phases described above. It should be noted that the noise levels predicted are based upon plant source noise data taken from BS 5228.

7.8. The predicted noise levels do not take account of the Best Practicable Means (BPM) of noise control - pragmatic construction noise mitigation measures detailed in the mitigation section below. Actual noise impact magnitude is therefore likely to be lower than predicted when BPM are implemented.

7.9. The magnitude of impact has been determined at each receptor by comparing predicted worst-case noise levels taken from the SoundPLAN noise model at 4.5 m above the

topographical ground level (i.e. representative of first floor window height) with the construction noise magnitude criteria shown in Table 7.4.

| Construction Phase | Receptor | Sensitivity | Predicted Worst Case Noise Level / $L_{Aeq,T}$ dB | Magnitude of Impact | Significance of Effect |
|---|---|---|---|---|---|
| Scenario 1 | A | High | 53 | Negligible | Negligible |
| | B | High | 52 | Negligible | Negligible |
| | C | High | 57 | Negligible | Negligible |
| | E | High | 54 | Negligible | Negligible |
| | F | High | 69 | Minor Negative | Minor Adverse |
| | G | High | 66 | Minor Negative | Minor Adverse |
| Scenario 2 | A | High | 49 | Negligible | Negligible |
| | B | High | 48 | Negligible | Negligible |
| | C | High | 53 | Negligible | Negligible |
| | E | High | 50 | Negligible | Negligible |
| | F | High | 67 | Minor Negative | Minor Adverse |
| | G | High | 61 | Negligible | Negligible |
| Scenario 3 | A | High | 45 | Negligible | Negligible |
| | B | High | 42 | Negligible | Negligible |
| | C | High | 49 | Negligible | Negligible |
| | E | High | 46 | Negligible | Negligible |
| | F | High | 61 | Negligible | Negligible |
| | G | High | 54 | Negligible | Negligible |
| Scenario 4 | A | High | 45 | Negligible | Negligible |
| | B | High | 45 | Negligible | Negligible |
| | C | High | 51 | Negligible | Negligible |
| | E | High | 48 | Negligible | Negligible |
| | F | High | 65 | Minor Negative | Minor Adverse |
| | G | High | 60 | Negligible | Negligible |
| Scenario 5 | A | High | 44 | Negligible | Negligible |

| Construction Phase | Receptor | Sensitivity | Predicted Worst Case Noise Level / $L_{Aeq,T}$ dB | Magnitude of Impact | Significance of Effect |
|---|---|---|---|---|---|
| | B | High | 43 | Negligible | Negligible |
| | C | High | 48 | Negligible | Negligible |
| | E | High | 47 | Negligible | Negligible |
| | F | High | 65 | Minor Negative | Minor Adverse |
| | G | High | 62 | Negligible | Negligible |

**Table 7.19: Construction Noise Assessment**

7.10. It can be seen from the results in the table above that noise effects as a result of construction are predicted to be Negligible to Minor Adverse.

7.11. Minor adverse effects are considered Not Significant in ES terms.

**Construction Traffic Noise**

7.12. Changes in 18-hour traffic noise levels have been considered using methodologies in line with CRTN guidance. Baseline traffic flow data has been provided as part of the traffic assessment (as part of this ES, see Paper 2: Traffic and Transport).

7.13. From discussions with the Transport Consultant it is understood that the expected maximum number of daily HGV movements to and from site along the Welsh Government constructed commercial spine road during construction will be <10% of overall traffic per day for all phases of the construction programme (see paragraph 7.4 for timescales).

7.14. Based on a reasonable worst-case scenario of 10% increase in traffic flows due to construction traffic, the noise change in dB at affected receptors would be <1dB and the magnitude of impact would be Negligible. Assuming the presence of highly sensitive receptors along the Welsh Government constructed commercial spine road, and with reference to the construction traffic noise assessment criteria in Table 7.5, it is predicted that the significance of effect of construction traffic noise will be Minor Adverse.

7.15. A Construction Environmental Management Plan (CEMP) for this development will detail various measures to minimise noise impacts. Provision will be made, wherever possible, to ensure that unloading of vehicles will be carried out onsite rather than on the adjacent roads.

All construction traffic entering and leaving the site will be closely controlled. Vehicles making deliveries will travel via designated traffic routes previously agreed with Local Authorities and interested parties. Construction traffic will be controlled by means of a vehicle arrival and departure management plan to achieve an even spread of vehicle movements during the working day. Access and egress for construction vehicles may vary according to the particular stage or phase of the works.

**Construction Vibration**

7.16. It is understood that the need for piling cannot be ruled out at this stage. To this end, it is necessary to consider the potential vibration impacts associated with piling activities.

7.17. BS 5228 indicates that construction activities (particularly piling) generally only generate vibration impacts when they are located less than 20 m from sensitive locations. The impact depends on the type of piling, ground conditions, and receptor distance.

7.18. It is assumed that the substructure strategy would likely comprise of augered piles. Indicative vibration levels for this piling method, based on the possible plan distances between areas of piling works and receptor locations (sourced from BS5228 Part 2) are presented in the following table.

| BS 5228 Reference | Soil Conditions | Mode | Plan Distance / m | PPV / $mms^{-1}$ |
|---|---|---|---|---|
| Table D.6 Ref No. 106 | Made up ground over bedrock | Augering | 5[1] | 0.54 |
| | | Surging casing | 5[1] | 0.36 |
| | | Twisting in casing | 5[1] | 0.22 |
| | | Spinning off | 5[1] | 0.42 |
| | | Boring with rock auger | 5[1] | 0.43 |

[1] – note that the closest plan distance between a potential piling location (i.e. the closest part of the Pulp Storage A2 building) and the residential plot identified as receptor G is approximately 63 m. It can therefore be seen that use of this data will represent a severe worst-case assessment.

**Table 7.20: Example Piling Vibration Levels**

7.19. Based on the example vibration levels the table above at a plan distance of 5 m, potential vibration levels from auger piling affecting nearby human receptors (i.e. occupants of the closest adjacent residential dwellings to a potential development cell) is not expected to exceed a minor adverse magnitude impact. At a much greater distance of approximately 100m m from the piling vibration source (i.e. approximate distance to the nearest sensitive receptor G) the vibration levels will reduce even further to a magnitude of negligible impact.

7.20. Therefore, effects on people in nearby buildings as a result of vibration generated by unmitigated piling (or other) activities are predicted to be negligible.

7.21. In comparison to the BS 7385 vibration thresholds for cosmetic damage to structures (Table 7.7), example vibration levels from piling are below the BS 7385 thresholds for cosmetic damage to structures (i.e. surrounding residential structures). As such, it is considered very unlikely that cosmetic damage to the adjacent sensitive structures will occur and impacts on buildings (in terms of cosmetic damage) due to vibration from piling would be likely to have a negligible impact.

7.22. Therefore, it is considered that adverse effects related to building damage as a result of construction vibration are unlikely to occur. It should be noted that the above assessment of potential construction vibration effects is based upon a theoretical worst-case assessment that piles will be required within 63 m of existing nearby sensitive receptors. As stated, piling will be avoided wherever possible. Any piling required will be carried out over as short a period of time as possible.

7.23. Also, it should be borne in mind that any impacts are only likely to occur when piling takes place close to the boundary of the site and these tend to be relatively easy to mitigate e.g. by warning residents in advance of works taking place.

**Summary of Construction Phase Effects**

7.24. Table 7.2 summarises the identified noise and vibration effects through the construction phase.

| Nature of Impact | Receptor sensitivity | Environmental Impact | Significance of Effect | Confidence Level |
|---|---|---|---|---|
| Construction noise impacting on existing noise sensitive receptors | High | Negligible to Moderate Negative | Negligible to Minor Adverse | Low[1] |
| Construction traffic noise impacting on existing noise sensitive receptors | High | Negligible | Negligible to Minor Adverse | High |
| Construction vibration impacting on existing noise sensitive receptors | High | Neutral to Negligible | Neutral to Negligible | High |
| [1] – confidence level is low as noise modelling carried out demonstrates potential noise impact based upon a defined set of construction plant. In practice, plant items and operation requirements will vary daily depending upon the phase of construction. The modelling exercise undertaken has been based on assumed 'worst-case' typical scenarios; however, it will remain the responsibility of the main contractor to adhere to agreed construction noise limits. | | | | |

**Table 7.21: Significance of Effect - Construction Phase**

## Operational Phase

### Industrial Noise

7.25. It can be seen from the assessment methodology section above that industrial noise emissions from the operational phase of the Proposed Development are to be assessed in accordance with BS 4142. The following sub-sections provide additional background information to the BS 4142 assessment methodology and detail the outcome of a computer noise modelling assessment exercise.

BS 4142 Summary of Assessment Method

7.26. BS 4142 provides methods for rating and assessing sound of an industrial and / or commercial nature, which includes sound from industrial and manufacturing processes, fixed services plant, sound generated by the loading/unloading of goods and sound from mobile plant / vehicles associated with industrial / commercial premises.

7.27. The standard utilises various descriptors to assess the likelihood of complaints, the impact of sound associated with proposed industrial / commercial activities on existing sound-sensitive receptors, or the impact and likely suitability of siting new sound-sensitive receivers in the vicinity of existing industrial / commercial sound sources.

7.28. The standard specifically precludes the assessment of internal sound levels arising from external sound, or from the assessment of various sound sources for which other (more relevant) guidance exists, including music/entertainment sound, person sound and construction sound.

7.29. The magnitude of impact is assessed by subtracting the measured background sound level, at a location representative of the nearest sound-sensitive receptor, from the 'rating level' of the sound source (the specific sound source to be introduced into the locality, corrected for acoustically distinguishing characteristics which may make it more subjectively prominent).

7.30. Typically, the greater the difference between the background and rating level, the greater the magnitude of impact, although BS 4142 emphasises that this is highly context specific.

7.31. As a guideline, BS 4142 states that:

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

7.32. Whilst BS 4142 states that "*a difference of +10dB or more is likely to be an indication of a significant adverse impact*", it also states that the estimation of potential impacts should also be modified for context. Examples of factors that BS 4142 considers pertinent are as follows:

- The absolute level of sound. For a given difference between the rating level and the background sound level, the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low. Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

- Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.
- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:
    - i) facade insulation treatment;
    - ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and
    - iii) acoustic screening.

7.33. Above all, BS 4142 requires qualified engineering consultants and technical planning professionals (e.g. Environmental Health Officers) to use a combination of quantitative assessment techniques and rational qualitative judgements to come to a sensible and reasonable conclusion.

Definitions

7.34. BS 4142 uses several specific terms to define the various levels used in assessments, as follows:

- Specific sound – the commercial / industrial sound source under consideration;
- Residual sound – the sound level at the sound-sensitive receivers in the absence of the specific sound;
- Ambient sound – the sound level at the sound-sensitive receivers in the presence of the specific sound (i.e. ambient = residual + specific);
- Background sound level – the sound pressure level which is exceeded by the residual sound for 90% of the measurement period;
- Rating level – the specific sound, corrected for acoustically distinguishing characteristics.

Background sound level

7.35. BS 4142 emphasises that the background sound level ($L_{A90,T}$) is in fact a range of levels, not one absolute value. Whilst stating that the measurements of background sound should be normally not less than 15 minutes, the focus is on obtaining a level for use in assessment that is representative of typical conditions at the sound-sensitive receivers.

7.36. An example methodology by which this typical value may be obtained is given in the document. In this example, monitoring of $L_{A90,15mins}$ is undertaken during periods which represent when the specific sound will be operational. After obtaining a sequence of representative contiguous or disaggregated results, it is then proposed that the modal value is representative of the 'typical' background level.

Specific sound level

7.37. BS 4142 requires that the specific sound level ($L_{Aeq,Tr}$) is obtained over a reference period of 1 hour (daytime) and 15 mins (at night). Ideally, measurements would be taken of the ambient sound and residual sound at the assessment location, with these measurements used to accurately calculate the specific sound (ambient – residual = specific).

7.38. Where the source (specific sound) is not yet operational, it is permissible to measure the specific sound elsewhere (or to use known manufacturers' or library data) and then model the impact of this and compare against the known background level.

7.39. The specific sound level should typically represent the cumulative level at the receiver from all new industrial sound sources and be representative of 'normal' conditions i.e. the assessment shouldn't focus only on the worst-case operational scenario.

Rating level

7.40. Once the specific sound level has been determined, it may be necessary to add a correction to account for acoustically distinctive characteristics. These corrections reflect the increased subjective impact that a sound may have at a receiver when it contains characteristics that are particularly noticeable or annoying.

7.41. BS 4142 states that it is normally possible to carry out a subjective assessment of characteristics, based on the following correction guidelines:

- Tonality: +2 dB for a 'just perceptible' tone, +4 dB for 'clearly perceptible', rising to +6 dB for 'highly perceptible' tones;
- Impulsivity (rapidity of change and overall change in level): +3 dB for 'just perceptible' impulsivity, +6 dB for 'clearly perceptible', rising to +9 dB for 'highly perceptible' impulsivity;
- Intermittency: if the on/off-time of the specific sound is readily distinctive at the sound-sensitive receivers, +3 dB.
- Other: Where the specificsound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of +3 dB can be applied

7.42. It should be noted that where one feature is clearly perceived as dominant, it may be applicable to correct for that feature only. Where multiple features are likely to affect perception and response, each should be added arithmetically.

Assessment Profile

7.43. The site will operate 24 hours per day, with a large number of HGV movements taking place during the day. In addition, the site will be constructed in 3 phases with earlier phases of development coming online whilst later phases are constructed. Phase 2 will be constructed only once Phase 1 is fully operational, and Phase 3 will be constructed only once Phases 1 & 2 are both full operational.

7.44. Therefore the following operational scenarios are expected:

- Phase1
  - Daytime – operation of internal equipment and HGV movements
  - Night-time – operation of internal equipment and HGV movements
- Phases 1 and 2
  - Daytime – operation of internal equipment and HGV movements
  - Night-time – operation of internal equipment and HGV movements
- Phases 1, 2 and 3
  - Daytime – operation of internal equipment and HGV movements
  - Night-time – operation of internal equipment and HGV movements

SoundPLAN Noise Model

7.45. In order to accurately assess the noise impact at the nearest residential receptors, a 3D noise model of the site has been created using SoundPLAN 8.2 software. This model has been built using the following information:

- AEW Architects' Proposed Site Layout – Phase 1,2 & 3 – this drawing shows how the Proposed Development shall be delivered. This drawing has been used in the model to show building locations in each phase. See Appendix 4 and 8 of the ES Part 1 Report.
- AEW Architect's GA Elevations drawings have been used to determine industrial unit building heights. See Appendix 6 of the ES Part 1 Report.
- Shepherd Gilmour's Enabling Works Ground Model (drawing no. C1405/508 dated 23/07/2021) has been included in the model to represent the topography of the site. See Appendix 12 of the ES Part 1 Report.
- LIDAR height (Composite Digital Terrain Model) data from the Environment Agency was used to model the topography of the areas surrounding the site.

7.46. The main noise sources associated with distribution operations were modelled as follows:

- Within the model, noise levels generated by the HGV movements have been calculated based on the linear 'Haul Road' methodology of BS 5228.
- It has been assumed within the calculations that the sound power level of a HGV is 105.5 dBA as calculated from the maximum permitted value in EC Directive 92/97/EC.

- It is understood from the Transport Consultant that the worst case movement of HGVs around the development (on 'Pick Days') will have the following cumulative flows with 5% of these occurring during 10pm – 6am:
    - Phase 1 – 201 two-way movements per day
    - Phase 2 - 200 two-way movements per day
    - Phase 3 - 321 two-way movements per day
- It is understood the worst-case hours on 'Pick Days' are to occur during 5pm – 6pm and the cumulative flows are as follows;
    - Phase 1 – 16 two-way movements
    - Phase 2 - 16 two-way movements
    - Phase 3 - 25 two-way movements
- The above worst-case movements have formed the basis of the daytime assessment, with 5% of these values forming the basis of the night-time assessment
- HGV movements were assumed based on the Preliminary Swept Path Analysis drawing associated with the scheme layout (no. 73080 – CUR – 00 – XX – DR – TP – 05001 – P01) by Curtins and include movements within loading areas as well as HGV movements on non-adopted roads.
- External chimney / exhaust stack noise sources modelled based on the following information associated with the previous scheme layout:
    - 'ICTUK-EMISS-01-29062021' (authored to be ICT); and
    - Information on the noise emission data for each individual emission stack / chimney is detailed in paragraph 7.47 and Table 7.22.
- The various factory buildings modelled as 'industrial buildings' which have area sources for external walls and roofs based on:
    - Internal point sources with a sound pressure level (SPL) of 100.4 dBA have been modelled within Paper Mills B1-B3 based on the highest recorded noise level (as per data issued by ICT). Due to the large volume of the B1-B3 spaces, sound pressure values decrease by up to 10 dB at other areas within the rooms at a greater distances from the point source.
    - All other industrial buildings assumed to have a constant 24hr internal SPL of 80 dBA in line with the lower daily exposure action value from the Control of Noise at Work Regulations 2005.
    - Paper Mill wall and roof constructions providing broadband sound reduction of 46 dB $R_w$.
    - All other industrial building wall constructions providing broadband sound reduction of 39 dB $R_w$.
    - All other industrial building roof constructions providing broadband sound reduction of 47 dB $R_w$.

7.47. Drawing 'ICTUK-EMISS-01-29062021' referenced above which details the locations of all stack / chimney noise emission sources through all three phases of the scheme is reproduced in full in Appendix 7.2. An extract from the SoundPLAN noise model showing the presences of 'point source'stack locations for each emission source is provided in Figure 7.6 overleaf.

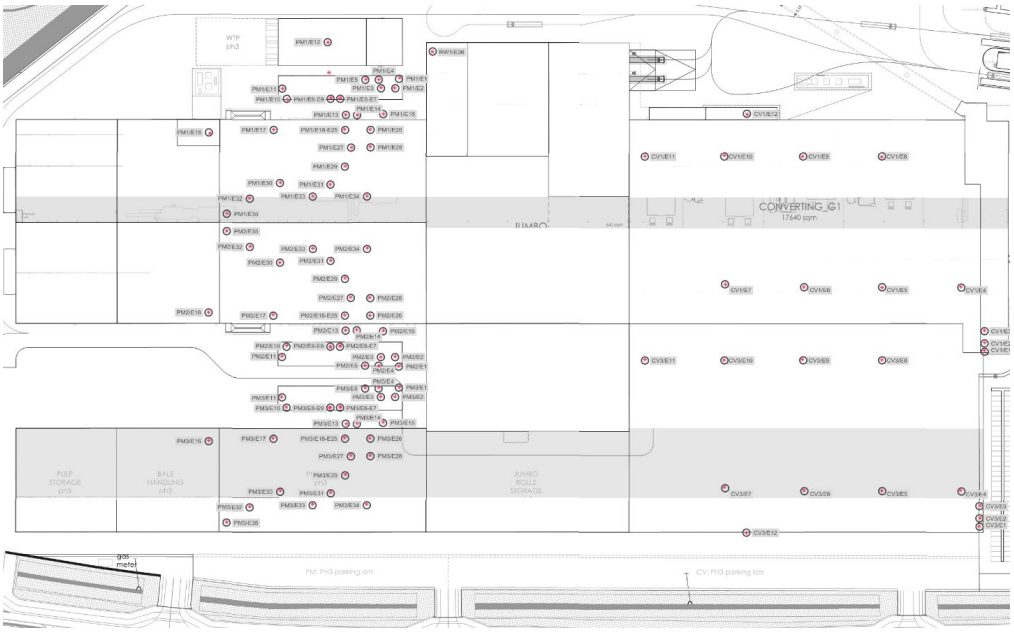


**Figure 7.6 : Extract from SoundPLAN model showing point source stack locations**

7.48. Based on data provided to Cundall by ICT UK Ltd, the following table details the stack / chimney noise emissions data as included within the SoundPLAN noise modelling exercise. Where some form of acoustic mitigation is proposed to be incorporated and embedded into the design of the Stack / Chimney emissions source to achieve the stated dB values (e.g. via silencers or noise hoods), this has also been identified.

| ID [1] | Height | Sound Pressure Level (dBA @1m) [2] | Sound Power Level (dBA) | Noise reduction incorporated into design? [3] |
|---|---|---|---|---|
| **Phase 1** | | | | |
| CV1/E1 | +11.00 | | 80 | - |
| CV1/E2 | +11.00 | | 80 | - |
| CV1/E3 | +10.00 | 75 | | - |
| CV1/E12 | +13.00 | | 86 | - |
| CV1/E4 | +22.00 | | 86 | - |
| CV1/E5 | +22.00 | | 86 | - |
| CV1/E6 | +22.00 | | 86 | - |
| CV1/E7 | +22.00 | | 86 | - |

| ID [1] | Height | Sound Pressure Level (dBA @1m) [2] | Sound Power Level (dBA) | Noise reduction incorporated into design? [3] |
|---|---|---|---|---|
| CV1/E8 | +22.00 | | 86 | - |
| CV1/E9 | +22.00 | | 86 | - |
| CV1/E10 | +22.00 | | 86 | - |
| CV1/E11 | +22.00 | | 86 | - |
| PM1/E1 | +6.49 | 80 | | Noise hood |
| PM1/E2 | +6.50 | 80 | | Noise hood |
| PM1/E3 | +28.50 | 75 | | Silencer |
| PM1/E4 | +6.49 | 80 | | - |
| PM1/E5 | +6.48 | 80 | | - |
| PM1/E6 | +6.49 | 80 | | - |
| PM1/E7 | +6.50 | 80 | | - |
| PM1/E8 | +6.50 | 80 | | - |
| PM1/E9 | +6.50 | 80 | | - |
| PM1/E10 | +28.50 | 75 | | Silencer |
| PM1/E11 | +6.49 | 80 | | - |
| PM1/E12 | +6.50 | 80 | | - |
| PM1/E13 | +28.50 | 75 | | Silencer |
| PM1/E14 | +28.50 | 75 | | Silencer |
| PM1/E15 | +28.50 | 75 | | Silencer |
| PM1/E16 | +20.00 | | 91 | - |
| PM1/E17 | +17.00 | 75 | | Silencer |
| PM1/E18 | +10.00 | 80 | | - |
| PM1/E19 | +10.00 | 80 | | - |
| PM1/E20 | +10.00 | 80 | | - |
| PM1/E21 | +10.00 | 80 | | - |
| PM1/E22 | +10.00 | 80 | | - |
| PM1/E23 | +10.00 | 80 | | - |

| ID [1] | Height | Sound Pressure Level (dBA @1m) [2] | Sound Power Level (dBA) | Noise reduction incorporated into design? [3] |
|---|---|---|---|---|
| PM1/E24 | +10.00 | 80 | | - |
| PM1/E25 | +10.00 | 80 | | - |
| PM1/E26 | +10.00 | 75 | | Silencer |
| PM1/E27 | +23.00 | 75 | | Silencer |
| PM1/E28 | +23.00 | 75 | | Silencer |
| PM1/E29 | +27.50 | 75 | | Silencer |
| PM1/E30 | +27.50 | 75 | | Silencer |
| PM1/E31 | +27.50 | 75 | | Silencer |
| PM1/E32 | +27.50 | 75 | | Silencer |
| PM1/E33 | +27.50 | 75 | | Silencer |
| PM1/E34 | +27.50 | 75 | | Silencer |
| PM1/E35 | +27.50 | 75 | | Silencer |
| PM1/E36 | +27.50 | 75 | | Silencer |
| **Phase 2** | | | | |
| PM2/E1 | +6.49 | 73 | | Noise hood |
| PM2/E2 | +6.50 | 73 | | Noise hood |
| PM2/E3 | +28.50 | 75 | | Silencer |
| PM2/E4 | +6.49 | 73 | | Noise hood / Silencer |
| PM2/E5 | +6.48 | 73 | | Noise hood / Silencer |
| PM2/E6 | +6.49 | 73 | | Noise hood / Silencer |
| PM2/E7 | +6.50 | 73 | | Noise hood / Silencer |
| PM2/E8 | +6.50 | 73 | | Noise hood / Silencer |
| PM2/E9 | +6.50 | 73 | | Noise hood / Silencer |

| ID [1] | Height | Sound Pressure Level (dBA @1m) [2] | Sound Power Level (dBA) | Noise reduction incorporated into design? [3] |
|---|---|---|---|---|
| PM2/E10 | +28.50 | 75 | | Silencer |
| PM2/E11 | +6.49 | 73 | | Noise hood / Silencer |
| PM2/E12 | +6.50 | 80 | | - |
| PM2/E13 | +28.50 | 75 | | Silencer |
| PM2/E14 | +28.50 | 75 | | Silencer |
| PM2/E15 | +28.50 | 75 | | Silencer |
| PM2/E16 | +20.00 | | 83 | Noise hood / Silencer |
| PM2/E17 | +17.00 | 75 | | Silencer |
| PM2/E18 | +10.00 | 70 | | Noise hood / Silencer |
| PM2/E19 | +10.00 | 70 | | Noise hood / Silencer |
| PM2/E20 | +10.00 | 70 | | Noise hood / Silencer |
| PM2/E21 | +10.00 | 70 | | Noise hood / Silencer |
| PM2/E22 | +10.00 | 70 | | Noise hood / Silencer |
| PM2/E23 | +10.00 | 70 | | Noise hood / Silencer |
| PM2/E24 | +10.00 | 70 | | Noise hood / Silencer |
| PM2/E25 | +10.00 | 70 | | Noise hood / Silencer |
| PM2/E26 | +10.00 | 70 | | Silencer |
| PM2/E27 | +23.00 | 75 | | Silencer |
| PM2/E28 | +23.00 | 75 | | Silencer |
| PM2/E29 | +27.50 | 75 | | Silencer |

| ID [1] | Height | Sound Pressure Level (dBA @1m) [2] | Sound Power Level (dBA) | Noise reduction incorporated into design? [3] |
|---|---|---|---|---|
| PM2/E30 | +27.50 | 75 | | Silencer |
| PM2/E31 | +27.50 | 75 | | Silencer |
| PM2/E32 | +27.50 | 75 | | Silencer |
| PM2/E33 | +27.50 | 75 | | Silencer |
| PM2/E34 | +27.50 | 75 | | Silencer |
| PM2/E35 | +27.50 | 75 | | Silencer |
| PM2/E36 | +27.50 | 75 | | Silencer |
| **Phase 3** | | | | |
| CV3/E1 | +11.00 | | 80 | - |
| CV3/E2 | +11.00 | | 80 | - |
| CV3/E3 | +10.00 | 75 | | - |
| CV3/E4 | +22.00 | | 81 | Noise hood / Silencer |
| CV3/E5 | +22.00 | | 81 | Noise hood / Silencer |
| CV3/E6 | +22.00 | | 81 | Noise hood / Silencer |
| CV3/E7 | +22.00 | | 81 | Noise hood / Silencer |
| CV3/E8 | +22.00 | | 86 | - |
| CV3/E9 | +22.00 | | 86 | - |
| CV3/E10 | +22.00 | | 86 | - |
| CV3/E11 | +22.00 | | 86 | - |
| CV3/E12 | +13.00 | | 81 | Noise hood / Silencer |
| PM3/E1 | +6.49 | 80 | | Noise hood |
| PM3/E2 | +6.50 | 80 | | Noise hood |
| PM3/E3 | +28.50 | 75 | | Silencer |
| PM3/E4 | +6.49 | 80 | | - |

| ID [1] | Height | Sound Pressure Level (dBA @1m) [2] | Sound Power Level (dBA) | Noise reduction incorporated into design? [3] |
|---|---|---|---|---|
| PM3/E5 | +6.48 | 80 | | - |
| PM3/E6 | +6.49 | 80 | | - |
| PM3/E7 | +6.50 | 80 | | - |
| PM3/E8 | +6.50 | 80 | | - |
| PM3/E9 | +6.50 | 80 | | - |
| PM3/E10 | +28.50 | 75 | | Silencer |
| PM3/E11 | +6.49 | 80 | | - |
| PM3/E12 | +6.50 | 80 | | - |
| PM3/E13 | +28.50 | 75 | | Silencer |
| PM3/E14 | +28.50 | 75 | | Silencer |
| PM3/E15 | +28.50 | 75 | | Silencer |
| PM3/E16 | +20.00 | | 86 | Noise hood / Silencer |
| PM3/E17 | +17.00 | 75 | | Silencer |
| PM3/E18 | +10.00 | 80 | | - |
| PM3/E19 | +10.00 | 80 | | - |
| PM3/E20 | +10.00 | 80 | | - |
| PM3/E21 | +10.00 | 80 | | - |
| PM3/E22 | +10.00 | 80 | | - |
| PM3/E23 | +10.00 | 80 | | - |
| PM3/E24 | +10.00 | 80 | | - |
| PM3/E25 | +10.00 | 80 | | - |
| PM3/E26 | +10.00 | 75 | | Silencer |
| PM3/E27 | +23.00 | 75 | | Silencer |
| PM3/E28 | +23.00 | 75 | | Silencer |
| PM3/E29 | +27.50 | 75 | | Silencer |
| PM3/E30 | +27.50 | 70 | | Silencer |
| PM3/E31 | +27.50 | 70 | | Silencer |

| ID [1] | Height | Sound Pressure Level (dBA @1m) [2] | Sound Power Level (dBA) | Noise reduction incorporated into design? [3] |
|---|---|---|---|---|
| PM3/E32 | +27.50 | 70 | | Silencer |
| PM3/E33 | +27.50 | 70 | | Silencer |
| PM3/E34 | +27.50 | 70 | | Silencer |
| PM3/E35 | +27.50 | 70 | | Silencer |
| PM3/E36 | +27.50 | 75 | | Silencer |

**Notes on table**:

(1) The ID reference for each source refers to the following locations / operational phases:

PM1 = Paper Mill Phase 1 source
CV1 = Converting Hall Phase 1 source
PM2 = Paper Mill Phase 2 source
CV2 = Converting Hall Phase 2 source
PM3 = Paper Mill Phase 3 source
CV3 = Converting Hall Phase 3 source

(2) Where sound pressure values have been provided, these have been converted to sound power values within the SoundPLAN model based on full sphere radiation (directivity factor Q = 1). Corrections for directivity due to flue openings were subsequently applied to all sources within the model.

(3) Where no noise mitigation method is stated, chimney / stack mitigation is not required to achieve the stated sound pressure / power values

**Table 7.22: Noise emission data for external chimney / stack sources**

7.49. To reflect a worst-case scenario, all the operational noise sources were assumed to be in continuous operation for the full Specific Noise Level assessment i.e. 1-hour during the day and 15 minutes at night.

Additional bund/barrier mitigation at proposed residential dwellings

7.50. The following mitigation measures to be adopted at proposed residential dwellings on the opposite side of the Welsh Government constructed commercial spine road have been included within the Operational Phase industrial noise modelling:

- Receptor F – 2.6m tall earth bund (1:2.5 slope on either side) with 1.4m acoustic barrier positioned on top (total effective height 4m) along the full boundary extent with the Welsh Government road (Residential Plots H5 and H5 of CHEL Site).

7.51. The inclusion of these bund/barrier mitigation measures has been agreed with Dave Jones of Flintshire Council (see Table 7.2).

Determination of BS 4142 Acoustic Feature Corrections

7.52. The specific sound levels associated with the proposed development must be corrected in terms of the subjective prominence of the impact of the sound at sound-sensitive receivers, and the extent to which acoustically distinctive characteristics will attract attention.

7.53. ICT UK Ltd has confirmed that sound sources considered are typically broad-band in nature, without specific tonal elements and chimney / exhaust stack noise sources will not be distinctive in terms of impulsiveness and intermittency.

7.54. The following penalties for acoustic features have been added to the rating level external noise sources:

- External stack / chimney emissions: +3 dB for 'Where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, '

Results

7.55. The figures below show the noise rating level map based upon the operation of the noise sources listed above. The noise maps have a calculation height of 4.5 m to display the noise impact at first floor residential window level (a worst case as ground floor levels are reduced).

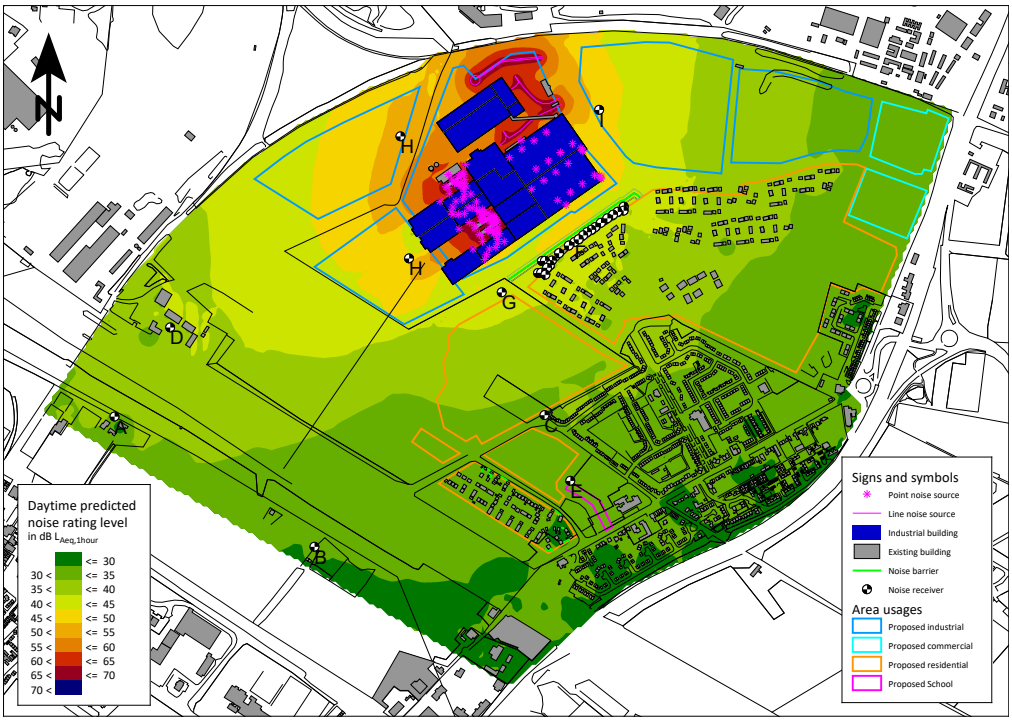


**Figure 7.7: Predicted Phase 3 daytime grid noise map at height of 4.5 metres**


**Figure 7.8 : Predicted Phase 3 night-time grid noise map at height of 4.5 metres**

7.56. The table below shows predicted noise levels at the most exposed sensitive receptors at 4.5m above ground level (i.e. representative of the height of first floor bedroom windows). The predicted levels include BS 4142 rating penalties applied to chimneys / exhaust stack sources, to account for impulsivity and intermittency, and so are effectively BS 4142 rating noise levels.

| Receptor | Phase 1 | | Phase 2 | | Phase 3 | |
|---|---|---|---|---|---|---|
| | Daytime $L_{Aeq,1hour}$ dB | Night-time $L_{Aeq,15mins}$ dB | Daytime $L_{Aeq,1hour}$ dB | Night-time $L_{Aeq,15mins}$ dB | Daytime $L_{Aeq,1hour}$ dB | Night-time $L_{Aeq,15mins}$ dB |
| A | 35 | 34 | 36 | 35 | 38 | 38 |
| B | 27 | 26 | 29 | 29 | 30 | 30 |
| C | 34 | 33 | 38 | 38 | 37 | 37 |
| E | 29 | 28 | 32 | 32 | 32 | 32 |
| F | 39 | 38 | 44 | 44 | 44 | 44 |
| G | 37 | 37 | 43 | 43 | 42 | 42 |

**Table 7.23: Predicted BS 4142 Rating Noise Level at 4.5m above ground level**

BS 4142 Assessment Summary & Discussion

7.57. The magnitude of impact is assessed by subtracting the measured background sound level at a location representative of the nearest sound-sensitive receiver, from the rating level.

7.58. Typically, the greater the difference between the background and rating level, the greater the magnitude of impact, although BS 4142 emphasises that this is highly context-specific.

7.59. With reference to the magnitude of impact criteria, the table below summarises the assessment for first-floor receptors. The magnitude of impact has been determined at each receptor by comparing predicted worst-case noise levels (for any of the 3 phases considered) with the operational noise magnitude criteria shown in Table 7.8:

| Receptor | Period | Rating Level / dB $L_{Ar,15min}$ | Background Level / dB $L_{A90,15min}$ | Difference | Magnitude of Impact |
|---|---|---|---|---|---|
| A | Day | 38 | 39 | -1 | Negligible |
| | Night | 38 | 42 | -4 | Negligible |
| B | Day | 30 | 41 | -11 | Negligible |
| | Night | 30 | 40 | -10 | Negligible |
| C | Day | 38 | 41 | -3 | Negligible |
| | Night | 38 | 40 | -2 | Negligible |
| E | Day | 32 | 41 | -9 | Negligible |
| | Night | 32 | 40 | -8 | Negligible |
| F | Day | 44 | 41 | +3 | Minor |
| | Night | 44 | 40 | +4 | Minor |
| G | Day | 42 | 41 | +1 | Minor |
| | Night | 42 | 40 | +2 | Minor |

**Table 7.24: Impact of noise from operational phase**

7.60. With reference to the industrial noise impact criteria, it can be seen from the results in the table above that the magnitude of impact associated with operational noise effects are Minor Negative at the worst-case affected residential receivers.

7.61. As all residential receptors identified above in Table 7.24 are considered have a 'High' sensitivity value, this equates to a significance of effect of Minor Adverse.

7.62. Minor Adverse impacts would be considered Not Significant in ES terms.

## Summary of Operational Phase Effects

7.63. The table below summarises the identified noise[1] effects through the operational phase.

| Nature of Impact | Receptor Sensitivity | Environmental Impact | Significance of Effect | Confidence Level |
|---|---|---|---|---|
| Industrial noise | High | Minor Negative | Minor Adverse | High |

**Table 7.25: Summary of Effect - Operation Phase**

[1] Note – as documented at the beginning of this Paper, operational vibration effects and operational road traffic noise are scoped out of this assessment.

# 8. Proposed Mitigation

## Construction Phase

8.1. It is anticipated that the main contractor delivering the scheme will be required to submit a detailed Construction Environmental Management Plan (CEMP) in order to discharge a planning condition applied to any consent (a Framework CEMP is included in Appendix 15 of the ES Part 1 Report). They will therefore be committed to following Best Practicable Means (BPM) to minimise the noise and vibration impact on nearby noise sensitive properties. Such measures include the following:

- All construction plant and equipment should comply with EU noise emission limits.
- Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum.
- Proper use of plant with respect to minimising noise emissions and regular maintenance. All vehicles and mechanical plant used for the purpose of the works should be fitted with effective exhaust silencers and should be maintained in good efficient working order.
- Selection of inherently quiet plant where appropriate. All major compressors should be 'sound reduced' models fitted with properly lined and sealed acoustic covers which should be kept closed whenever the machines are in use and all ancillary pneumatic percussive tools should be fitted with mufflers or silencers of the type recommended by the manufacturers.
- Plant and equipment such as flatbed lorries, skips and chutes should be lined with noise attenuating materials. Materials should be handled with care and be placed, not dropped.
- Care should be taken when erecting or striking scaffolds to avoid impact noise from banging steel. All operatives undertaking such activities should be instructed on the importance of handling the scaffolds to reduce noise to a minimum before access is possible.
- All ancillary plant such as generators, compressors and pumps should be positioned so as to cause minimum noise disturbance. If necessary, localised screens and enclosures should be used to reduce noise from particular noisy, static operations.
- Wherever possible, the use of hydraulic attachments or other means of crushing concrete and hard materials should be used in preference to pneumatic breakers. Where the use of impact hammers is necessary, their attachment to larger and heavier excavators often can reduce the level of vibration.
- Deliveries should be programmed to arrive during daytime hours wherever practicable. Care should be taken when unloading vehicles to minimise noise. Delivery vehicles should be routed so as to minimise disturbance to local residents. Delivery vehicles should be prohibited from waiting on the highway or within the site with their engines running.

- Construction contractors would be obliged to adhere to the codes of practice for construction working and piling given in British Standard BS 5228 and the guidance given therein minimising noise emissions from the site.
- Piling should be avoided wherever possible and low vibration piling techniques such as continuous flight auger piling should be adopted wherever practicable.

8.2. Problems concerning noise from construction works can sometimes be avoided by taking a considerate and neighbourly approach to relations with the local residents. Working hours will be 08:00 to 18:00 hrs Monday to Friday, 08:00 to 13:00 hrs on Saturday with no proposed working Sundays and bank holidays, unless otherwise agreed in writing with the Local Planning Authority.

## Operational Phase

8.3. The external building fabric constructions will be designed to see that the following weighted sound reduction index values as proposed and considered within noise modelling assessment (see Paragraph 7.46) are maintained:

- Paper Mill wall and roof constructions providing broadband sound reduction of 46 dB Rw.
- All other industrial building wall constructions providing broadband sound reduction of 39 dB Rw.
- All other industrial building roof constructions providing broadband sound reduction of 47 dB Rw.

8.4. Table 7.22 identifies where noise emission from individual flue / stack emission sources will be embedded into the design and controlled via acoustic mitigation (e.g. silencers or noise hoods) to see that the sound power level values presented and included within the noise modelling assessment are not exceeded.

8.5. All stack / chimney sources are designed to discharge vertically and the resultant benefits of acoustic directivity losses at nearby noise-sensitive receptors has been considered within the 3D noise modelling process.

8.6. Mitigation measures to be adopted at proposed residential dwellings on the opposite side of the Welsh Government constructed commercial spine road have been included within the Operational Phase industrial noise modelling exercise (see paragraph 7.50). It is understood that these boundary mitigation measures will be completed prior to the occupation of dwellings at the affected development plots.

# 9. Potential Residual Effects

9.1. The following tables show the residual significance of the environmental effect from noise post mitigation, through both the construction and operational phase.

9.2. The 'Significance of Effect' refers to the Significance Matrix table given in Section 6 of the Environmental Statement Part One Report.

## Potential Residual Effects – Construction Phase

9.3. The overall impact of the proposal in terms of noise and vibration issues during the construction phase is highlighted in the table below:

| Nature of Impact | Receptor | Environmental Impact | Significance of Effect | Confidence Level | Mitigation | Residual Significance of Effect |
|---|---|---|---|---|---|---|
| Construction noise impacting on existing noise sensitive receptors | High | Negligible to Moderate Negative | Negligible to Minor Adverse | Low[I] | Measures contained in a Construction Environmental Management Plan | Negligible to Minor Adverse |
| Construction traffic noise impacting on existing noise sensitive receptors | High | Negligible | Negligible to Minor Adverse | High | Measures contained in a Construction Environmental Management Plan | Negligible to Minor Adverse |
| Construction vibration impacting on existing noise sensitive receptors | High | Neutral to Negligible | Neutral to Negligible | High | Limit piling activities / utilise low vibration plant techniques | Neutral to Negligible |
| [I] – confidence level is low as noise modelling carried out demonstrates potential noise impact based upon a defined set of construction plant. In practice, plant items and operation requirements will vary daily depending upon the phase of construction. The modelling exercise undertaken has been based on assumed 'worst-case' typical scenarios; however, it will remain the responsibility of the main contractor to adhere to agreed construction noise limits. | | | | | | |

**Table 7.26: Residual Significance of Effect - Construction Phase**

## Potential Residual Effects – Operational Phase

9.4. The overall impact of the proposal in terms of noise issues during the operational phase is highlighted in Table 7.27:

| Nature of Impact | Receptor Sensitivity | Environmental Impact | Significance of Effect | Confidence Level | Mitigation | Residual Significance of Effect |
|---|---|---|---|---|---|---|
| Industrial noise | High | Negligible to Moderate Negative | Negligible to Minor Adverse | High | Embedded mitigation (i.e. acoustic attenuation measures. in the form of silencers / acoustic hoods) has been adopted within the design of stack emission sources.<br><br>The vertical orientation of all plant flues provides additional noise reductions at noise-sensitive receptors through directivity losses (as opposed to horizontally discharging flues).<br><br>Appropriate specification of façade and roof constructions to provide adequate sound insulation levels.<br><br>Acoustic bund/barrier mitigation to be adopted at proposed residential dwellings on the opposite side of the Welsh Government constructed commercial spine road (Plot H4 and H5 on CHEL Site) have been included within the Operational Phase industrial noise modelling | Negligible to Minor Adverse |

**Table 7.27: Residual Significance of Effect - Operation Phase**

# 10. Additive Impacts (Cumulative Impacts and their Effects)

10.1. For the purposes of this ES we define the additive cumulative effects as:

> ***'Those that result from additive impacts (cumulative) caused by other existing and/or approved projects together with the project itself'***

10.2. The developments that are likely to have a cumulative impact when considered with the proposed development have been agreed with the Local Authority during the preparation of this ES (a full list is included within Section 6 of the ES Part 1 Report). The following table includes the agreed list of cumulative developments that have been assessed in respect of Noise & Vibration. These are also shown geographically on the plan included at **Appendix 13** of the ES Part 1 Report.

| | **Cumulative Development and Status** | **Details** | **To be considered in the CIA (Yes/No)** | **Justification for inclusion Cumulative Assessment** |
|---|---|---|---|---|
| 1 | Airfields (former RAF Sealand) Site (Northern Gateway)<br><br>LPA ref: 049320 and last varied S73 application LPA ref: 061125.<br><br>Applicant:<br>Crag Hill<br>Estates Ltd. | Outline application for the redevelopment of a strategic brownfield site for an employment led mixed use development with new accesses and associated infrastructure including flood defences and landscaping.<br><br>The Net Cumulative Development associated with the Airfields site after deducting the floor space (124,344m²) taken up by the Proposed ICT Paper Mill Facility (B2, B8, ancillary B1a) and operational Amazon development (ref: 060222) is as follows:<br><br>Development comprises:<br><br>Residential (C3): 689 units<br>Retail (A1): 4,646m²<br>Office (B1a): 6,533m²<br>B2 /B8 Employment: 60,044m²<br>Car Dealership (Sui generis): 7,779m²<br><br>**Total Net floorspace: 689 units / 79,002m²** | LPA ref: 049320 Planning permission granted by Flintshire County Council in January 2013.<br><br>The last varied S73 application was granted on the 26 April 2021 (ref: 061125) to remove conditions 26, 28, 30, 34 and 44 and vary condition 13.<br><br>Development expected to come forward over the next 0-5 years. | Potential for increased cumulative noise impacts at nearby receptors from an increased number of industrial / commercial noise sources, increases in traffic flows and concurrent construction operations. |

| | Cumulative Development and Status | Details | To be considered in the CIA (Yes/No) | Justification for inclusion Cumulative Assessment |
|---|---|---|---|---|
| 2 | Former Corus Garden City Site (Northern Gateway)<br><br>Applicant: PGNGL<br><br>Outline (LPA ref: 054758) / S73 application (LPA ref: 059635) | Employment-led mixed-use development, incorporating Logistics and Technology Park (B1, B2, B8) with residential (C3), local retail centre (A1), hotel (C1), training and skills centre (C2, D1), new parkland; conversion of buildings, demolition of barns; and associated infrastructure comprising construction of accesses, roads, footpaths / cycle paths, earthworks and flood mitigation / drainage works at Northern Gateway, Land off Welsh Road, Deeside.<br><br>Development comprises:<br><br>Residential (C3): 770 units<br>Retail (A1): 2500m²<br>Office (B1a): 3300m²<br>Light industrial uses (B1b, B1c): 7400m²<br>Hotel Uses (C1): 3000m²<br>Training and skills centre (C2, D1): 4000m²<br>Logistics Park (B2, B8, ancillary B1a): 120000m²<br>Total floorspace: 770 units / 140,200m² | Outline planning permission granted by Flintshire County Council in May 2014.<br><br>The last permission to be granted under a S73 application was approved in June 2020 (ref: 059635) was for removal of conditions 6, 8, 11 and 32 and variation of conditions 7, 31, 36 and 44.<br><br>Development expected to come forward over the next 0-10 years. | Potential for increased cumulative noise impacts at nearby receptors from an increased number of industrial / commercial noise sources, increases in traffic flows and concurrent construction operations. |

**Table 7.28: Cumulative Development**

## Cumulative Construction and Operational Noise and Vibration

10.3. Both of the above Northern Gateway developments (the Airfields site and the Former Corus Garden City site) have been considered as cumulative developments in terms of construction and operational noise.

10.4. It is assumed that the developments will be required to consider the cumulative impact of noise and vibration at sensitive receptors as part of a reserved matters application and that (if consented) the developments will be designed such that operational and construction noise will be limited during both construction and operational phases.

10.5. Previously identified sensitive receptors that are most likely to be affected by cumulative impacts associated with the above developments are those to the east of the Proposed Development and to north of the River Dee including:

- C - Residential, Garden City;
- D - John Summers building (Grade II Listed);
- E - Sealand Community Primary School;
- F - Future residential; and
- G - Future residential.

10.6. Where receptors are located elsewhere, the possibility of cumulative noise impacts is reduced due to distance and acoustic screening.

10.7. The table below details the previously predicted worst case noise levels at the identified receivers, as well as the resultant magnitude of impact assuming a further +3 dB increase due to cumulative impacts. This would represent a doubling in the number of noise sources affecting the receptors (assuming the noise sources are identical) and is considered worst-case.

| Receptor | Original assessment | | Revised assessment including +3 dB allowance for cumulative impacts | |
|---|---|---|---|---|
| | BS 4142 assessment outcome | Magnitude of Impact | BS 4142 assessment outcome | Magnitude of Impact |
| A | -1 | Negligible | +2 | Minor Negative |
| B | -7 | Negligible | -4 | Negligible |
| C | -3 | Negligible | +0 | Minor Negative |
| E | -7 | Negligible | -4 | Negligible |
| F | +4 | Minor Negative | +7 | Moderate Negative |
| G | +4 | Minor Negative | +7 | Moderate Negative |

**Table 7.29: Predicted cumulative operational noise impact**

10.8. It can be seen from the above that with a 3 dB increase in predicted noise levels at the receptors, the noise impact magnitude would potentially increase at most receptors, without adequate mitigation.

10.9. It is worth noting that this is a very simplistic assessment due to the natural lack of information associated with future commercial portions of the cumulative schemes listed above. In reality, it is considered unlikely that operational noise effects would be equal to those predicted as part of this development, as the most exposed receptors will vary significantly. The above assessment should therefore be considered as a very worst case which carried a low certainty and could only be properly quantified once further details regarding future developments become available.

## Summary

10.10. It is assumed that the Northern Gateway developments considered above will be required to consider the cumulative impact of noise and vibration at sensitive receptors as part of a reserved matters application and that (if consented) the developments will be designed such that operational and construction noise will be limited during both construction and operational phases.

10.11. However, it has been identified that adverse noise effects at sensitive receptors could increase due to cumulative industrial/commercial operations at the remaining development plots on the Northern Gateway strategic allocated site.

# 11. Conclusion

11.1. This technical Paper has assessed the environmental impact of Noise & Vibration.

11.2. The assessment concludes that the proposals may have a Minor Negative impact on most of the affected sensitive receptors at this stage. Based on the sensitive criteria adopted, this is expected to result in a Minor Adverse Significance of Effect.

11.3. The assessment of Operational Phase vibration and road traffic noise impacts has been scoped out of the assessment.

11.4. On this basis, all effects are considered 'Not Significant' in ES terms.

11.5. The control of construction noise and vibration will be addressed by an appropriate Construction Environmental Management Plan (CEMP), developed by the main contractor, as part of future planning condition discharge. A number of best practice construction noise mitigation measures have been provided in a Framework CEMP submitted with Appendix 15 of the ES Part 1 Report.

11.6. The following mitigation measures to be adopted at proposed residential dwellings on the opposite side of the Welsh Government constructed commercial spine road have been included within the Operational Phase industrial noise modelling. It is understood that these bund/barrier measures will be fully implemented before occupation of the dwellings.

- Receptor F – 2.6m tall earth bund with 1.4m acoustic barrier positioned on top along the full boundary extent with the Welsh Government road, currently under construction.

11.7. Good acoustic design measures have been incorporated within the Development design to control of noise impacts during the development's operational phase. A number of general mitigation methods to limit the potential for noise impacts have been included, and these will be adopted within any development of the scheme. Such measures include:

- The orientation of services plant flues away from the nearest sensitive receptors to minimise noise propagation;
- The proposed specification of façade and roof constructions to provide adequate sound insulation levels:
    - Paper Mill wall and roof constructions providing broadband sound reduction of 46 dB Rw.
    - All other industrial building wall constructions providing broadband sound reduction of 39 dB Rw.

    - All other industrial building roof constructions providing broadband sound reduction of 47 dB Rw.
- The noise emission from individual flue / stack emission sources will be controlled via acoustic attenuation measures (e.g. silencers and/or acoustic hoods) to see the values modelled (see Table 7.22) are not exceeded.

11.8. Adverse noise effects at sensitive receptors could increase due to cumulative effects from other nearby Northern Gateway developments during construction and operation.

11.9. However, it is assumed that (if consented) the Northern Gateway developments considered will be designed such that noise and vibration impacts will be limited during both construction and operational phases.

# 12. Reference List


- British Standards Institution (1993) 'BS 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration', British Standards Institution, London.
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- Planning Guidance Wales (1997): 'Technical Advice Note (Wales) 11', Welsh Government.
- Design Manual for Roads and Bridges, Sustainability & Environment Appraisal LA 111 Noise and Vibration Revision 2

# Appendices

# Appendix 7.1 – Plan of sensitive receptors

# Appendix 7.2 – Layout of emission source locations