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# The North Wales Wind Farms Connection Project

## Environmental Statement Chapter 13 - Emissions

Application reference: EN020014

March 2015



Regulation reference: The Infrastructure Planning  
(Applications: Prescribed Forms and Procedure)  
Regulations 2009 Regulation 5(2)(a)

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## **Environmental Statement**

### **Chapter 13 Emissions**

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The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009 – Regulation 5(2)(a)



**The Planning Act 2008**

**The Infrastructure Planning (Applications: Prescribed Forms and Procedure)  
Regulations 2009**

**Regulation 5(2)(a)**

**The North Wales Wind Farms Connection Project**

**Environmental Statement**

**Chapter 13 Emissions**

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## Environmental Statement Documents

<b>Volume 6: Environmental Statement</b>		
Document Reference	Chapter	Document
6.1	1	Introduction
6.2	2	Description of the Proposed Development
6.3	3	Alternatives and Design Evolution
6.4	4	EIA Methodology
6.5	5	Planning Policy Considerations
6.6	6	Ecology and Biodiversity
6.7	7	Landscape and Visual
6.8	8	Historic Environment
6.9	9	Flood Risk and Water Resources
6.10	10	Land Use and Agriculture
6.11	11	Socio-Economics and Tourism
6.12	12	Traffic and Transport
6.13	13	Emissions
6.14	14	Electric and Magnetic Fields
6.15	15	Summary of Environmental Effects
6.16		Environmental Statement Figures
6.17 – 6.26		Appendices
6.27		Glossary
6.28		Non-Technical Summary

This Chapter includes the following Appendices:

<b>DCO Document Reference</b>	<b>Appendix</b>	<b>Document</b>
6.26	13.1	Description of Noise and Vibration Units
	13.2	Construction Details – Proposed Development
	13.3	Sensitive Receptors and Construction Noise Levels

Reference is also made to the following documents:

<b>DCO Document Reference</b>	<b>Document</b>
6.18	Construction Environmental Management Plan (Appendix 2.1 to this ES)
6.30	Planning Inspectorate: North Wales Wind Farm Connections Project; Scoping Opinion: (February 2014)
7.1	Design and Construction Report

## 13 EMISSIONS

### 13.1 Introduction

13.1.1 This chapter assesses the likely significant environmental effects of potential emissions associated with the Proposed Development, particularly considering:

- Noise and vibration;
- Air quality (including dust); and
- Waste.

13.1.2 Each of these potential effects are explained and described in more detail below.

#### **Noise and Vibration**

13.1.3 This Chapter includes an assessment of the likely significant environmental effects of 'Noise and Vibration' that may be caused by the Proposed Development. In particular, it considers the potential effects of noise and vibration during the construction and decommissioning phases of development, as identified in the Secretary of State's Scoping Opinion. Noise and vibration effects during decommissioning are considered to be the same as those during the construction phase as activities and vehicle movements would be similar.

13.1.4 This Chapter includes a description of the methodology used to assess any environmental effects, the potential direct and indirect effects arising from noise and vibration, the mitigation measures required to prevent, reduce, or offset the effects, and the residual effects.

13.1.5 As required by the Secretary of State's Scoping Opinion, a brief general discussion of operational noise is provided in order to present a professional opinion as to why this aspect can be scoped out of the detailed assessments.

13.1.6 A description of noise and vibration units is included as Appendix 13.1. The construction details that have been used to inform the construction noise assessment are presented in Appendix 13.2 and predicted construction noise levels are presented in Appendix 13.3.

#### **Air Quality**

13.1.7 This Chapter also presents an assessment of the potential air quality effects associated with construction and decommissioning of the Proposed Development, considering dust and nitrogen dioxide (NO<sub>2</sub>) emissions.

13.1.8 As identified in the Secretary of State's Scoping Opinion, operational effects have been scoped out of this assessment.

**Waste**

13.1.9 During construction there is the potential for the generation of a variety of waste types. Typical wastes are likely to include vegetation from clearance activities, surplus subsoil, and wastes from the construction compound. Although the types and quantities of these wastes can be controlled through implementation of the Waste Hierarchy (Reduce-Reuse-Recycle) some wastes would remain that would require appropriate handling, treatment and / or disposal. The disposal of waste would be controlled through the adoption of the measures within the Construction Environmental Management Plan (CEMP) (Appendix 2.1 to this ES, (DCO Document Ref 6.18)). As such, no significant environmental effects that may result from the generation of waste during the construction and decommissioning of the Proposed Development are anticipated. Waste generated during the operation of the Proposed Development is likely to be minimal. This chapter therefore provides some background to waste emissions but does not provide an in depth assessment.

**13.2 Legislation and Policy**

**National Policy Statements**

**The Overarching National Policy Statement for Energy (EN-1)**

13.2.1 The Overarching National Policy Statement for Energy (EN-1) includes a number of requirements with respect to noise and vibration. The relevant section of EN-1 and an explanation as to how the ES demonstrates compliance with the requirements of EN-1 is indicated in Table 13.1 below.

**Table 13.1: Compliance with NPS (EN1) Requirements**

NPS EN-1 Section	Covered in ES Section
<b>Noise and Vibration</b>	
<p><b>Para 5.11.4</b> - Where noise impacts are likely to arise from the proposed development, the applicant should include the following in the noise assessment:</p> <ul style="list-style-type: none"> <li>• a description of the noise generating aspects of the development proposal leading to noise impacts, including the identification of any distinctive tonal, impulsive or low frequency characteristics of the noise;</li> <li>• identification of noise sensitive premises and noise sensitive areas that may be affected;</li> <li>• the characteristics of the existing</li> </ul>	<p>An assessment of construction noise and vibration impacts during the construction phase, and also during decommissioning, has been undertaken.</p> <p>Chapter 13 'Emissions' provides:</p> <ul style="list-style-type: none"> <li>• an indication of potential noise sources from the Proposed Development;</li> <li>• the location of noise sensitive receptors;</li> <li>• a description of the baseline conditions</li> <li>• an assessment of the potential noise effects, after embedded and specific noise mitigation measures have been</li> </ul>

NPS EN-1 Section	Covered in ES Section
<p>noise environment;</p> <ul style="list-style-type: none"> <li>• a prediction of how the noise environment will change with the proposed development;</li> <li>• in the shorter term such as during the construction period;</li> <li>• in the longer term during the operating life of the infrastructure;</li> <li>• at particular times of the day, evening and night as appropriate;</li> <li>• an assessment of the effect of predicted changes in the noise environment on any noise sensitive premises and noise sensitive areas; and</li> <li>• measures to be employed in mitigating noise.</li> </ul> <p>The nature and extent of the noise assessment should be proportionate to the likely noise impact.</p>	<p>adopted. A brief general discussion of operational noise is also provided</p>
<p><b>Para 5.11.5</b> - The noise impact of ancillary activities associated with the development, such as increased road and rail traffic movements, or other forms of transportation, should also be considered.</p>	<p>There are no long term significant ancillary activities associated with the Proposed Development that require assessment, short term effects of ancillary activities are considered in this chapter. .</p>
<p><b>Para 5.11.6</b> - Operational noise, with respect to human receptors, should be assessed using the principles of the relevant British Standards and other guidance. Further information on assessment of particular noise sources may be contained in the technology-specific NPSs. In particular, for renewables (EN-3) and electricity networks (EN-5) there is assessment guidance for specific features of those technologies. For the prediction, assessment and management of construction noise,</p>	<p>As required by EN-1, the assessment of short term noise during construction and decommissioning uses relevant British Standards.</p>

<b>NPS EN-1 Section</b>	<b>Covered in ES Section</b>
reference should be made to any relevant British Standards and other guidance which also gives examples of mitigation strategies.	
<b>Para 5.11.7</b> - The applicant should consult EA and Natural England (NE), or the Countryside Council for Wales (CCW), as necessary and in particular with regard to assessment of noise on protected species or other wildlife. The results of any noise surveys and predictions may inform the ecological assessment. The seasonality of potentially affected species in nearby sites may also need to be taken into account.	There are no designated sites affected by the Proposed Development and the short term effects associated with construction and decommissioning.
<b>Air Quality</b>	
NPS EN-1 acknowledges ( <b>Para 5.2.1</b> ) that infrastructure development can have adverse effects on air quality. Where the project is likely to have adverse effects on air quality the applicant should undertake an assessment of the impacts of the proposed project as part of the Environmental Statement” ( <b>Para 5.2.6</b> )	An assessment of the impact of the construction and decommissioning phases of the Proposed Development on air quality has been provided in this chapter. This demonstrates that the Proposed Development is unlikely to have significant adverse effects on air quality.
<b>Para 5.2.7</b> - requires an assessment of any significant air emissions including emissions from road traffic (in this case construction traffic).	This chapter demonstrates that no significant air emissions have been identified during the assessment of the Proposed Development.
<b>Waste</b>	
<b>Para 5.14.6</b> - requires that arrangements are proposed for any waste produced. ...The applicant should seek to minimise the volume of waste produced and the volume of waste sent for disposal	The Construction Environmental Management Plan (Appendix 2.1 to this ES) includes measures to be adopted relating to waste disposal and ensures that arrangements are made for any waste produced. These have formed part of the ‘Embedded Mitigation’ considered in this Chapter.

**National Policy Statement for Electricity Networks Infrastructure (EN-5)**

13.2.2 The National Policy Statement for Electricity Networks Infrastructure (EN-5) also contains some specific considerations that apply to noise from electricity networks infrastructure. Compliance with the requirements of EN-5 is indicated in Table 13.2 below.

**Table 13.2: Compliance with NPS EN-5 Requirements**

NPS EN-5 Section	Covered in ES Section
<p><b>Para 2.9.9</b> - An alternative noise assessment method to deal with rain-induced noise is needed, such as the one developed by National Grid as described in report TR(T)94, 1933. This follows recommendations broadly outlined in ISO 1996 (BS 7445:1991) and in that respect is consistent with BS 4142:1997. The IPC is likely to be able to regard it as acceptable for the applicant to use this or another methodology that appropriately addresses these particular issues.</p>	<p>The Scoping Opinion does not require a detailed assessment of operational noise but only a brief general discussion as to why this aspect can be scoped out of the assessment. Rain-induced noise does not affect the construction or decommissioning phases.</p>

13.2.3 NPS EN-5 does not make any specific references to air quality or waste.

**Environment Act 1995**

13.2.4 The provisions of Part IV of the Environment Act 1995 establish a national framework for air quality management, which requires all Local Authorities in England, Northern Ireland, Scotland and Wales to conduct local air quality reviews. The Act requires these reviews to include an assessment of the current air quality in the area and the predicted air quality in future years. Should the reviews indicate that the objectives prescribed in the UK Air Quality Strategy (AQS) for England, Scotland, Wales and Northern Ireland and the Air Quality (England) Regulations 2010 will not be met, the Local Authority is required to designate an Air Quality Management Area (AQMA).

**Environmental Protection Act 1990**

13.2.5 This act provides a system of integrated pollution control for the disposal of wastes to land, water and air. Part II of the Act deals with the storage and treatment of controlled wastes and the requirements for waste management licensing.

### **UK Air Quality Strategy**

- 13.2.6 The AQS identifies nine ambient air pollutants that have the potential to cause harm to human health. These pollutants are associated with local air quality problems, with the exception of ozone, which is instead considered to be a regional issue. The Air Quality Regulations set objectives for the seven pollutants that are associated with local air quality. These objectives aim to reduce the health effects of the pollutants to negligible levels.

### **Technical Advice Note (TAN) 11 Noise**

- 13.2.7 The principal purpose of Technical Advice Note (TAN) 11, Noise, is to determine the suitability of land for residential development, especially where land is affected by noise from transportation or industrial sources, and to this effect the TAN provides guidance for four Noise Exposure Categories (NEC) rated A-D. However, the TAN also provides general guidance with respect to matters to be taken into account in determining planning applications both for noise-sensitive developments and for those activities that will generate noise.

### **British Standards**

- 13.2.8 For noise from construction sites, Section B20 advises that detailed guidance on assessing noise from construction sites can be found in BS 5228, parts 1-4. In particular, Part 1: 1984, "Code of Practice for Basic Information and Procedures for Noise Control" describes a method for predicting noise from construction sites as well as giving general advice. BS 5228 has recently been updated as BS 5228-1:2009+A1:2014: 'Code of Practice for Noise and Vibration Control on Construction and Open Sites'.

### **Guidance on Air Quality**

- 13.2.9 The following documents provide guidance on air quality assessment:
- Guidance on the Assessment of Dust from Demolition and Construction; Institute for Air Quality Management (IAQM) (2014);  
This document provides guidance on how to undertake a construction impact assessment. It recognises that impacts depend on the mitigation measures adopted and therefore the emphasis is on classifying the risk of dust impacts from a site, which will then allow mitigation measures commensurate with that risk to be identified.
  - Significance in Air Quality; IAQM (2009); and  
This document sets out terminology to describe the magnitude of impacts, and the sensitivity of receptors.

- Planning for Air Quality (2010 Update); Environmental Protection UK (EPUK) (2010).

This guidance recognises the importance of having good air quality policies within the local development framework. The guidance deals principally with those pollutants regulated under the local air quality management (LAQM) regime. It also covers nitrogen oxides which, although not covered in regulations, are relevant for assessment of ecosystem impacts. The main focus of the guidance is on the impact of traffic emissions.

### **The Waste Hierarchy**

- 13.2.10 The waste hierarchy is set out at Article 4 of the revised Waste Framework (Directive 2008/98/EC).
- 13.2.11 The “waste hierarchy” ranks waste management options according to what is best for the environment. It gives top priority to preventing waste in the first place. When waste is created, it gives priority to preparing it for re-use, then recycling, then recovery, and last of all disposal (e.g. landfill).

### **Local Development Plan Policies**

*Denbighshire County Council – Adopted Local Development Plan 2013*

- 13.2.12 Policy RD 1, ‘Sustainable development and good standard design’ states that;
- Development proposals will be supported within development boundaries provided that all of the following criteria are met:*
- vi) Does not unacceptably affect the amenity of local residents, other land and property users or characteristics of the locality by virtue of increased.....noise, dust, fumes, litter....etc.*
- 13.2.13 With regard to waste, whilst not including a specific policy the plan states in the preamble to Policy VOE7 (‘Locations for Waste Management’) that:
- ‘Waste is a cross cutting issue because it is produced by all types of land use, during construction, operation and demolition. The need to change the way in which we deal with waste is recognised in policy at all levels, particularly to reduce its production in the first place. Mechanisms to reduce the production of waste have been introduced at the national level, including the need to consider materials efficiency in Design and Access Statements, and the requirement for Site Waste Management Plans for large scale projects’.*
- 13.2.14 Policy VOE 10 ‘Renewable energy technologies’ states that:
- Development proposals which promote the provision of renewable energy technologies may be supported providing they are located so as to minimise visual, noise and amenity impacts and demonstrate no unacceptable impact upon the interests of nature conservation, wildlife, natural and cultural heritage, landscape, public health and residential amenity.*

*Conwy County Borough Council Adopted Local Development Plan 2013*

13.2.15 Strategic Policy DP/1 'Sustainable Development Principles' states that

*'Development will only be permitted where it is demonstrated that it is consistent with the principles of sustainable development. All developments are required to:*

*f) Take account of and address the risk of flooding and pollution in the form of noise, lighting, vibration, odour, emissions or dust ...'*

13.2.16 Strategic Policy NTE/1 'The Natural Environment' states that:

*In seeking to support the wider economic and social needs of the Plan Area, the Council will seek to regulate development so as to conserve and, where possible, enhance the Plan Area's natural environment, countryside and coastline. This will be achieved by:*

*i) Preventing, reducing or remedying all forms of pollution including air, light, noise, soil and water, "...*

### 13.3 Consultation

#### Response to Scoping

13.3.1 Table 13.3 below identifies the comments made by the SoS in the Scoping Opinion and summarises how this Chapter adequately addresses those comments:

**Table 13.3: Issues Raised and Responses to the SoS Scoping Opinion**

Issue Raised by SoS	Response
<p>2.48 The SoS recommends that the ES should include a clear description of all aspects of the proposed development, at the construction, operation and decommissioning stages and include:...</p> <ul style="list-style-type: none"> <li>• Emissions (water, air sand soil pollution, noise, vibrations etc)</li> </ul>	<p>This Chapter provides information as to the potential emissions from the project and mitigation measures that would be adopted.</p> <p>Additional information is provided in Chapter 9 'Flood Risk and Water Quality'.</p>
<p>2.51 The environmental effects of all wastes to be processed and removed from the site should be addressed. The ES will need to identify and describe the methods, control processes, and mitigation procedures for storing and transporting waste off site. All waste types should be quantified and classified.</p>	<p>This Chapter provides information as to the potential waste emissions from the project and mitigation measures that would be adopted.</p> <p>Further information on the mitigation measures proposed is included within the Construction Environmental Management Plan (Appendix 2.1 to this ES).</p>

Issue Raised by SoS	Response
<p>3.15 The Secretary of State agrees that air quality impacts during the operational stage can be scoped out but does not agree at this stage that air quality impacts during the construction and decommissioning phases can be scoped out as insufficient information has been provided... to justify such an approach.</p>	<p>This Chapter provides information as to the potential air quality effects and the mitigation measures that would be adopted.</p>
<p>3.72 The study area for the assessment of potential noise impacts of the proposed development is not defined in this section, and reference is only made to the proposed route corridor in the information provided on the baseline context. It is stated that a baseline noise survey has not been undertaken but it is not made clear whether it is intended to undertake one in the future. The SoS recommends that the methodology and choice of noise receptors should be agreed with the relevant Council's Environmental Health Directorate and NRW.</p>	<p>The Study Area for the assessment of potential noise impacts is defined within this Chapter.</p> <p>A baseline survey has not been undertaken as due to the linear nature of the Proposed Development it is impractical to define ambient noise levels at each receptor location, therefore, the assessment uses approved prediction methodologies defined in British Standards as put forward to the Council's Environmental Health Officer.</p>
<p>3.73 Information should be provided on the types of vehicles and plant to be used during the construction phase, and the noise assessment should take account of the traffic movements along access routes, especially during the construction phase. Noise impacts on residential receptors should be specifically addressed and particularly any anticipated noise disturbance at night or other unsocial hours such as weekends and public holidays. Consideration should be given to monitoring noise complaints during the construction phase.</p>	<p>Information on potential construction traffic movements is included within Chapter 12 'Traffic and Transport' and has been used to inform the assessment of potential noise impacts.</p> <p>Construction details have been used to predict impacts on noise sensitive premises. Embedded and site specific mitigation has been recommended where significant impacts are predicted.</p>

Issue Raised by SoS	Response
<p>3.74 The SoS agrees that noise impacts during the operational phase of the proposed development do not need to be assessed in the ES                      .....This should be clearly identified in the ES together with the other topics that have been scoped out of the assessment.</p>	<p>Operational noise has not been considered in this assessment.</p>
<p>3.75 Vibration has not been included in this topic section, nor included in the list of matters proposed to be scoped out .....but particular consideration should be given to whether information should be included in the ES on impacts from vibration during the construction phase, e.g. as a result of traffic movements and construction activities on site, particularly on ecological interests.</p>	<p>This Chapter assesses the likely significant effects in terms of noise and vibration. In particular, it considers the potential effects during the construction phase and decommissioning,</p>

13.3.2 Section 14 of Denbighshire County Council’s response to the pre-application consultation under Section 42 of the Planning Act 2008 set out their views on noise as following:

*“Good site management practice should control most of the construction noise and environmental health issues (dust, noise, hours of operation etc.).*

*However, the crackling noise –corona discharge – should be expanded upon. It is stated in 14.1.4 that local effects may result in audible corona discharge in certain conditions but not at a significant noise level, and as such effects during operation have not been assessed within the EIA.*

*However, it is not clear where these local effects will be experienced, or if sensitive receptors will be affected. Furthermore, low background levels will mean that if this noise source is sited close to a residential property, then it may be an issue, as it may be perceived to be a noise nuisance.*

*The Council therefore would request further information on the exact location of the proposed overhead line within the route alignment where it is close to residential properties”.*

13.3.3 This Chapter of the ES identifies those poles supporting the overhead line that would lie close to sensitive receptors, which are primarily residential properties, and considers the potential for audible noise based on the expected level of noise attenuation due to distances between the wood poles and the receptors.

- 13.3.4 The views of NFU Cymru expressed in their S42 response were as follows with respect to noise:

*“We are aware that pylons do generate a degree of noise particularly during damp weather and this could be to an unacceptable high level when pylons are placed in valleys which are remote and tranquil and naturally silent. We would also wish to highlight the potential for the level of noise to impact on property and livestock, particularly milk production”.*

- 13.3.5 The likelihood of potential noise disturbance has been considered based on the separation distances between the wood poles and sensitive receptors that have been used for the construction noise assessment and the professional opinion of the assessor is that the significant separation distances suggest no indication of unacceptable levels from this intermittent noise. There is likewise no evidence within the industry to suggest that the noise levels, which would be relatively low and also infrequent, would be capable of adversely affecting livestock or milk production.

## 13.4 Methodology

### Noise and Vibration – Construction and Decommissioning

- 13.4.1 Noise and vibration impacts during the construction phase, and also decommissioning, which would involve similar construction methods, are the temporary effects that occur between the start of the works and the end of a project's construction or decommissioning period. Where materials need to be transported to or from the works, the effects of the haulage traffic along local roads may give rise to a potential environmental effect, although this would depend on the baseline traffic volumes and the number of additional haulage vehicles per day.
- 13.4.2 Construction noise is normally assessed against established day and night-time noise criteria, and exceedences of the criteria for a defined number of days or weeks is often used to determine whether further noise controls are required. For this reason, construction noise effects are not routinely assessed against existing ambient noise levels, and a background noise survey is not a requirement for noise assessment purposes. Due to the linear nature of the project and the number of isolated premises, it would also be unreasonable to expect the ambient noise levels to be defined by measurement. Background noise levels are likely to be low, and, if necessary, typical data can be adopted for rural locations.
- 13.4.3 In addition to airborne noise that may be audible to local residents, ground-borne vibrations caused either by the movement of heavy construction plant over road surface irregularities or by imparting high-energy impulsive forces into the ground, for example during piling, may be perceptible in and around dwellings and may cause nuisance or annoyance to local residents.

*Guidance Provided by BS5228*

- 13.4.4 For both noise and vibration, the levels experienced at sensitive receptors such as dwellings (see BS5228 definitions in 'Method 2' section) are strongly dependent on the levels generated by the source and the separation distance between the source and the receptor, although mitigation measures such as noise and vibration controls applied to the source, or, in the case of noise, barriers along the noise pathway, can substantially reduce the exposure levels. In all cases however the adverse impacts of construction nuisance diminish fairly rapidly with distance.
- 13.4.5 The latest methods for evaluating the significance of construction noise and vibration are those within BS 5228-1:2009+A1:2014: 'Code of Practice for Noise and Vibration Control on Construction and Open Sites'.
- 13.4.6 With regard to neighbourhood nuisance due to construction works, BS 5228-:2009+A1:2014: identifies the key factors affecting community reaction as follows:
- a) Site location – the closer noise sensitive premises (NSP) are to the works the greater will be the need for noise controls;
  - b) Existing ambient noise levels – the likelihood of complaints increase as the ambient/background noise levels decrease;
  - c) Duration of site operations – in general, the longer the duration of works then the greater the adverse response from any affected NSPs;
  - d) Hours of work – the periods when people are getting to sleep and just before they wake are particularly sensitive. Site activity outside normal weekday and Saturday morning working hours need special consideration, and noise need control targets will need to be stricter for works during evening and night-time periods;
  - e) Attitude to the site operator – noise from a site will tend to be accepted more readily by local residents if they consider that the contractor is taking all possible measures to avoid unnecessary noise. Good community liaison is important; and
  - f) Noise characteristics – the presence of regular or loud tonal or impulsive noise characteristics can make the noise less acceptable than normal.
- 13.4.7 Example criteria for the assessment of potentially significant noise effects during construction of a development are given in Annex E of BS 5228. The guidance provides three methods for assessing significance, one based upon fixed noise limits and two based upon noise change. Further thresholds are suggested to determine eligibility for noise insulation or temporary rehousing in situations where noise exposures are deemed to be high. Further criteria are suggested for construction works involving long-term substantial earth moving, although these would only apply to works similar in scale to surface mineral extraction works.

### *Significance Based on Fixed Noise Limits*

13.4.8 The older and more simplistic approach was based upon exceedance of fixed noise limits. Although there have been no formal noise limits applicable to construction noise within any planning policy guidance, criteria that have been commonly applied to large civil engineering contracts (such as national road and rail projects, and urban development projects) are approximately 70-75 dB<sub>L<sub>Aeq</sub>(1 or 12 hour)</sub> for daytime construction activities, reducing to about 65 dB(A) in the evening and about 50 dB(A) at night. Similar limits were promoted by an earlier Department of the Environment Advisory Leaflet (AL) 72 'Noise Control on Building Sites'.

13.4.9 The wording within AL72 is referenced in BS 5228 as follows:

*“Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut. The noise can be measured with a simple sound level meter, as we hear it, in A- weighted decibels (dB(A)) – see note below. Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:*

*70 decibels (dBA) in rural, suburban and urban areas away from main road traffic and industrial noise;*

*75 decibels (dBA) in urban areas near main roads in heavy industrial areas.*

*These limits are for daytime working outside living rooms and offices. In noise- sensitive situations, for example, near hospitals and educational establishments – and when working outside the normal hours say between 19.00 and 22.00 hours – the allowable noise levels from building sites will be less: such as the reduced values given in the contract specification or as advised by the Environmental Health Officer (a reduction of 10 dB(A) may often be appropriate). Noisy work likely to cause annoyance locally should not be permitted between 22.00 hours and 07.00 hours”.*

13.4.10 The above principles have historically been developed into a range of noise levels covering different periods of the day or week that take account of the varying sensitivity of receptors at different times of the day or week. The most frequently used criteria are those shown in Tables 13.5 and 13.6 of the following sections. The levels in Table 13.6 are often used as limits above which noise insulation would be provided if the temporal criteria are also exceeded.

### *Significance of Effect Methodology Based on Change of Noise*

#### Method 1 – The ABC Method

13.4.11 The ABC method involves rounding the existing ambient noise levels to the nearest 5dB for the appropriate time period (nighttime, evening/weekends or daytime) and then comparing these levels to the total noise level, including construction noise. If the total noise level exceeds the existing rounded value, then a significant environmental effect is deemed to have occurred. The assessment categories and equivalent noise thresholds for different time periods are shown in Table 13.4 below.

**Table 13.4: Threshold of Potential Significant Effect at Dwellings from Construction Noise**

Assessment Category and Threshold Value Period	Threshold Value dB $L_{Aeq,T}$		
	Category A <sup>A)</sup>	Category B <sup>B)</sup>	Category C <sup>C)</sup>
Night-time (23:00 – 07:00)	45	50	55
Evenings and weekends <sup>D)</sup>	55	60	65
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75

Note 1: A potential significant effect is indicated if the  $L_{Aeq,T}$  noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.

Note 2: If the ambient noise level exceeds the Category C threshold values given in the table (i.e. if the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total  $L_{Aeq,T}$  noise level for the period increases by more than 3 dB due to site noise.

Note 3: These thresholds are applied to residential receptors only.

A) Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

B) Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as Category A values.

C) Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than Category A values.

D) 19.00-23.00 weekdays, 13.00-23.00 Saturdays and 07.00-23.00 Sundays.

**Method 2 – 5 dB(A) Change**

- 13.4.12 Under this method, noise levels generated by site activities are deemed to be potentially significant if the total noise (pre-construction ambient plus site noise) exceeds the pre-construction ambient noise by 5 dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB  $L_{Aeq,T}$  from site noise alone, for the daytime, evening and night-time periods respectively; coupled with a duration of one month or more, unless works of a shorter duration are likely to result in significant effect.

13.4.13 The above criteria are applicable to the following types of receptor:

- residential buildings;
- hotels and hostels;
- buildings in religious use;
- buildings in educational use; and
- buildings in health and/or community use.

13.4.14 For public open space, the method also assumes an impact might be deemed to cause significant effects if the total noise exceeds the ambient noise ( $L_{Aeq,T}$ ) by 5 dB or more for a period of one month or more. However, the extent of the area impacted relative to the total available area of the resource also needs to be taken into account in determining whether the impact causes a significant effect.

*Thresholds for Noise Insulation and Temporary Relhousing*

13.4.15 In those scenarios where, after a contractor has taken all reasonable measures to reduce noise levels, serious annoyance to residents is considered to arise for a substantial period of time (either continuously or sporadically), the need for noise insulation and/or temporary rehousing can be considered using thresholds such as those set out in Table 13.5. There is no fixed definition of 'serious annoyance' and a scheme-specific criterion would normally be devised based upon the level of noise attained after mitigation, coupled with the total duration of exposure.

**Table 13.5: Examples of Time Periods, Averaging Times and Noise Levels Associated with the Determination of Eligibility for Noise Insulation<sup>1</sup>**

Day	Time Period	Averaging time, T	Noise insulation trigger level dB $L_{Aeq,T}$
Monday to Friday	07.00-08.00	1 hr	70
	08.00-18.00	10 hr	75
	18.00-19.00	1 hr	70
	19.00-22.00	3 hr	65
	22.00-07.00	1 hr	55

<sup>1</sup> From BS5228:2014

Day	Time Period	Averaging time, T	Noise insulation trigger level dB $L_{Aeq,T}$
Saturday	07.00-08.00	1 hr	70
	08.00-13.00	5 hr	75
	13.00-14.00	1 hr	70
	14.00-22.00	3 hr	65
	22.00-07.00	1 hr	55
Sunday and Public Holidays	07.00-21.00	1 hr	65
	21.00-07.00	1 hr	55

All noise levels are predicted or measured at a point 1m in front of the most exposed of any windows and doors in any façade of any eligible dwelling.

- 13.4.16 Noise insulation, or the reasonable costs thereof, has historically been offered to owners or occupiers where the construction works (in particular, road construction works that fall within the requirements of the Noise Insulation Regulations) causes a measured or predicted noise level that either exceeds one of the thresholds in Table 13.6 or is 5 dB or more above the existing pre-construction ambient noise level for the corresponding times of day, whichever is the higher. The 'exceedance' is not a single event but is normally based on a 'significant' period of exceedance, which may, for example, be represented by a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any 6 consecutive months. Other periods might equally be set based upon scheme-specific circumstances.
- 13.4.17 BS5228's examples for thresholds for temporary housing equate to a noise level 10 dB above any of the trigger noise levels in Table 13.6 above for the corresponding times of the day, or a noise level 10 dB above the pre-construction ambient noise level for the corresponding times of the day, whichever is the higher. As for eligibility for noise insulation, the thresholds need to be exceeded for a significant period, and BS5228's examples suggest 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any 6 consecutive months.

### *Noise Criteria used to Define Significance*

- 13.4.18 As set out in the above sections, there is no single construction noise criterion that has been defined by national guidance to define the onset of significance and the need for mitigation. Due to the linear nature of the project and the low ambient noise levels expected in rural areas, the threshold of significance used for assessment purposes has been based upon the typical criteria based on fixed noise limits coupled with the guidance with BS5228's Method 1. Exceedance of these is an indication that mitigation measures are required. This approach is considered to be consistent with normal Environmental Health Department procedures and enables a need for mitigation to be measured against standards commonly applied to construction works.

### **Air Quality - Construction and Decommissioning**

- 13.4.19 A desk based and qualitative assessment of the potential significant environmental effects of construction and decommissioning has undertaken using the following guidance:
- Guidance on the Assessment of Dust from Demolition and Construction; Institute for Air Quality Management (IAQM) (2014);
  - Significance in Air Quality; IAQM (2009); and
  - Planning for Air Quality (2010 Update); Environmental Protection UK (EPUK) (2010).
- 13.4.20 Potential effects are predominantly associated with the generation and dispersal of dust and airborne particulate matter, as well as emissions from construction traffic. All predicted environmental effects would therefore be temporary.
- 13.4.21 The guidance and approach used for assessing dust is different to that used for assessing air quality (NO<sub>2</sub> and PM<sub>10</sub>), therefore the two are presented separately.

### *Assessing Air Quality*

- 13.4.22 Nitrogen dioxide (NO<sub>2</sub>) is produced from the reaction of nitrogen and oxygen gases during combustion. Exhaust emissions from Non Road Mobile Machinery (NRMM) and construction vehicles accessing site can add to levels of local NO<sub>2</sub> concentrations unless effective mitigation measures are applied.
- 13.4.23 The Environment Act 1995 requires local authorities to review and assess air quality in accordance with the objectives for seven pollutants specified in the national Air Quality Strategy. Authorities are then required to carry out an updating and screening assessment of their area every three years. If potential hotspots are identified where air quality objectives are likely to be exceeded, then a detailed assessment of these areas is required. Where objectives are not predicted to be met, then the area must be declared an Air Quality Management Area (AQMA). Local authorities are required to produce an Air Quality Action Plan (AQAP) for those areas setting out measures to improve air quality.
- 13.4.24 Construction has the potential to impact on existing air quality as a result of road traffic exhaust emissions associated with vehicles travelling to and from a site during the construction phase.

- 13.4.25 EPUK Guidance defines a criterion, above which a quantitative air quality assessment is required to determine the potential effect of traffic derived pollutant concentrations NO<sub>2</sub> and fine Particulate Matter (PM<sub>10</sub>) (see below) at sensitive receptors. According to the EPUK Guidance, a quantitative assessment is required if 'large, long term construction sites generate large HGV flows (>200 movements per day) over a period of a year or more'.
- 13.4.26 Increases in traffic flows during the construction phase would not exceed the criteria for any construction routes (see Chapter 12 'Traffic and Transport') therefore no quantitative air quality assessment has been undertaken and the assessment therefore provides:
- a review of the existing air quality conditions for the area in which the Proposed Development is located; and
  - a qualitative assessment of the potential changes in air quality arising from the site preparation and construction (and decommissioning) process, including from the use of local roads by construction traffic.

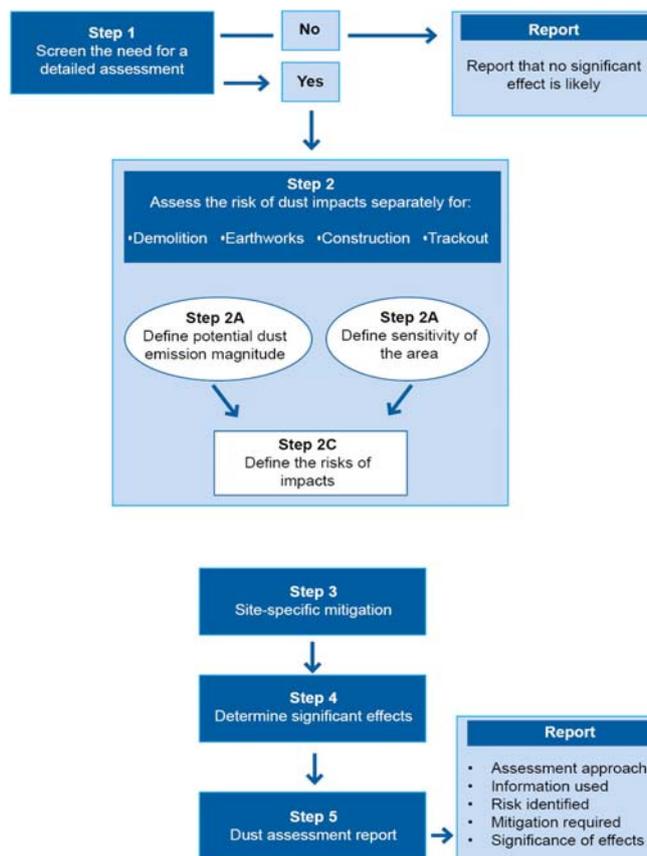
#### *Assessing Dust Emissions*

- 13.4.27 Dust is the generic name used in the British Standard 6069 to describe particulate matter up to 75 µm in diameter and comprises both suspended and deposited material. Dust can be generated from construction activities, particularly as a result of vehicles entering or leaving site and moving on unpaved surfaces. Most dust particles are too big to be inhaled but can cause eye, nose and throat irritation and lead to deposition on cars, windows and property. Dust impacts are more likely to occur during drier periods as rainfall acts as a natural suppressant.
- 13.4.28 Dust depositing on the surface of plants has the potential to adversely affect photosynthesis and other biological functions and have an indirect effect on fauna (e.g. on foraging habitats).
- 13.4.29 Airborne dust particles with an aerodynamic diameter of 10 microns or less are known as PM<sub>10</sub>. PM<sub>10</sub> is a component of dust but represents only a small fraction of the total particulate matter. It is formed in the same way as dust through the disturbance of aggregate material but is also a component of vehicle exhaust emissions. As PM<sub>10</sub> particles are so small, they can travel further than coarser dust particles.
- 13.4.30 PM<sub>10</sub> is of more concern to human health than coarser dust particles as it can enter the lungs, causing cardiovascular and respiratory problems.
- 13.4.31 IAQM Guidance identifies the steps necessary to perform a dust assessment (see Figure 13.1). These are:
- Step 1: Need for the Assessment - screening to determine whether a detailed assessment is required:
  - Step 2: Assess Risk of Dust Impacts – comprising 3 elements:
    - Step 2A- defining the potential dust emission magnitude based on the scale and nature of the works being undertaken.
    - Step 2B - determining the sensitivity of the surrounding area for each dust effect (earthworks, construction and trackout) based on

distance to the dust source, numbers of receptors, their sensitivity to dust, the local PM<sub>10</sub> background concentrations and any other site specific factors.

- Step 2C - defining the risk of impacts for each activity with no mitigation applied (other than embedded mitigation).
- Step 3: Site-Specific Mitigation - the risk of impacts identified in Stage 2 is used to determine the level of site specific mitigation that must be applied: and
- Step 4: Determine any Significant Residual Effects - once the risk of dust impacts have been identified and the appropriate mitigation measures set out, determine whether there are any significant residual effects arising from the construction phase.

**Figure 13.1 Steps to Perform a Dust Assessment<sup>2</sup>**



<sup>2</sup> Source: IAQM (2014) Guidance on the Assessment of Dust from Demolition and Construction

- 13.4.32 For dust soiling and PM<sub>10</sub> exposure for people during the construction phase, the assessment focuses on areas within 350m of the Final Route Alignment and up to 50m away from accesses. For the same effects on sensitive ecological sites, the assessment focuses on areas within 50m of the Proposed Development and / or within 50m away from accesses. These distances are based on guidance issued by IAQM<sup>3</sup>.
- 13.4.33 According to the IAQM Guidance, an ecological receptor refers to any sensitive habitat affected by dust soiling. This includes the direct effects on vegetation or aquatic ecosystems of dust deposition and the indirect effects on fauna (e.g. on foraging habitats). Ecological receptors include locations with a statutory designation e.g. Sites of Special Scientific Interest (SSSI) and Special Areas of Conservation (SAC); and, consideration needs to be given as to whether the particular site is sensitive to dust and would depend on why it has been designated.
- 13.4.34 Potential effects beyond 350m are unlikely to be significant and any mitigation measures designed to protect sensitive receptors within 350m would also help to reduce effects further away. These distances are recommended in the IAQM<sup>4</sup> guidance for the assessment of both human and other sensitive receptors in relation to small scale construction sites.
- 13.4.35 The IAQM guidance considers the potential for dust emissions from dust generating activities associated with construction and decommissioning, defined as demolition, earthworks, construction and trackout. Earthworks refer to the processes of soil stripping, ground levelling, excavation and in this case, tree removal. Trackout is the transport of dust and dirt from the site onto the public road network where it may be deposited and then re-suspended by vehicles using the network. This arises when vehicles leave the site with dusty materials, which may then spill onto the road, or when they travel over muddy ground on site and then transfer dust and dirt onto the road network.
- 13.4.36 For each of these dust-generating activities, the guidance considers the risk of dust annoyance and / health effects or ecological effects and determines risk in three categories, low medium and high. The risk category is different for each of the four activities.

#### Demolition

- 13.4.37 In this instance demolition is considered to reflect the construction and decommissioning phases. Using IAQM guidance and with regard to the nature and scale of decommissioning (i.e. a linear project and removal of the double wood poles) the potential dust emission class is:-
- Small: total building <20000m<sup>3</sup>, construction material with low potential for dust release, demolition activities <10m above ground, demolition during wetter months.

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<sup>3</sup> Institute of Air Quality Management (IAQM) (2014) *Guidance on the Assessment of Dust from Demolition and Construction*

<sup>4</sup> Institute of Air Quality Management (IAQM) (2014) *Guidance on the Assessment of Dust from Demolition and Construction*

13.4.38 The matrix to determine the demolition risk category based on the distance to the nearest receptors and the dust emission class is provided in Table 13.6 below.

**Table 13.6: Risk Category from Demolition Activities**

Distance to Nearest Receptor (m)		Dust Emission Class		
Dust Soiling and PM <sub>10</sub> <sup>A</sup>	Ecological	Large	Medium	Small
< 20	-	High Risk Site	High Risk Site	Medium Risk Site
20 – 100	<20	High Risk Site	Medium Risk Site	Low Risk Site
100 – 200	20 – 40	Medium Risk Site	Low Risk Site	Low Risk Site
200 - 350	40 - 100	Medium Risk Site	Low Risk Site	Negligible

Note: Distances are from the dust emission sources, or the site boundary if this is unknown

### Earthworks

13.4.39 The risk category for earthworks varies with timing, geology, topography and duration. Examples of potential dust emission classes provided in IAQM guidance are as follows:

- large: total site area >10000m<sup>2</sup>, potentially dusty soil type (e.g. clay), >10 heavy earth moving vehicles active at any one time, formation of bunds >8m in height, total material moved >100000 tonnes;
- medium: total site area 2500 - 10000m<sup>2</sup>, moderately dusty soil type (e.g. silt), 5 -10 heavy earth moving vehicles active at any one time, formation of bunds 4 - 8m in height, total material moved 20000 - 100000 tonnes; and
- small: total site area < 2500m<sup>2</sup>, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4m in height, total material moved <10000 tonnes, earthworks during wetter months.

13.4.40 The matrix to determine the earthworks risk category is provided in Table 13.7 below.

**Table 13.7: Risk Category from Earthworks Activities**

Distance to Nearest Receptor (m)		Dust Emission Class		
Dust Soiling and PM10 <sup>A</sup>	Ecological	Large	Medium	Small
< 20	-	High Risk Site	High Risk Site	Medium Risk Site
20 – 50	-	High Risk Site	Medium Risk Site	Low Risk Site
50 – 100	< 20	Medium Risk Site	Medium Risk Site	Low Risk Site
100 – 200	20 – 40	Medium Risk Site	Low Risk Site	Negligible
200 - 350	40 - 100	Low Risk Site	Low Risk Site	Negligible

### Construction

13.4.41 The risk category for construction varies in relation to timing, building type, duration, and scale. Potential dust emissions classes provided in the IAQM guidance as follows:

- large: total building/infrastructure volume >100000m<sup>3</sup>, piling, on site concrete batching;
- medium: total building volume 25000 – 100000m<sup>3</sup>, potentially dusty construction material (e.g. concrete), piling, on site concrete batching; and
- small: total building volume <25000m<sup>3</sup>, construction material with low potential for dust release (e.g. metal cladding or timber).

13.4.42 The matrix to determine the construction risk category is the same as that for earthworks above.

### Trackout

13.4.43 Factors which determine the magnitude class of trackout activities are vehicle size, vehicle speed, vehicle number, geology and duration. Potential dust emissions classes provided in the guidance as follows:

- large: >100 heavy duty vehicle (HDV) (3.5t) trips in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100m;
- medium: 25 – 100 HDV (>3.5t) trips in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 – 100m; and
- small: <25 HDV (<3.5t) trips in any one day, surface material with low potential for dust release, unpaved road length <50m.

13.4.44 The matrix to determine the earthworks risk category is provided in Table 13.8 below.

**Table 13.8: Risk Category from Trackout**

Distance to Nearest Receptor (m)		Dust Emission Class		
Dust Soiling and PM10 <sup>A</sup>	Ecological	Large	Medium	Small
< 20	-	High Risk Site	Medium Risk Site	Medium Risk Site
20 – 50	-	Medium Risk Site	Medium Risk Site	Low Risk Site
50 – 100	< 20	Low Risk Site	Low Risk Site	Negligible

### Sensitivity of Receptors

13.4.45 Example criteria to identify the sensitivity of the surrounding area are provided in the IAQM guidance and are summarised in Table 13.9 below.

**Table 13.9 Sensitivity of the Area Surrounding the Site**

Sensitivity of Area	Human Receptors	Ecological Receptors(1)
Very High	Very densely populated area; >100 dwellings within 20m; Local PM10 concentrations exceed the AQS objective; Contaminated building present; Very sensitive receptors (e.g.	European Designated site.

Sensitivity of Area	Human Receptors	Ecological Receptors(1)
	<p>oncology units);</p> <p>Works continuing in one area of the site close to off- site receptors for more than 1 year</p>	
High	<p>Densely populated area;</p> <p>10 - 100 dwellings within 20m;</p> <p>Local PM10 concentrations close to the objective (annual mean 36 - 40g/m<sup>3</sup>);</p> <p>Commercially sensitive horticultural land within 20m.</p>	Nationally Designated site
Medium	<p>Suburban or edge of town area;</p> <p>&lt;10 dwellings within 20m;</p> <p>Local PM10 concentrations below the objective (annual mean 30 - 36g/m<sup>3</sup>)</p>	Locally designated area
Low	<p>Rural or industrial area;</p> <p>No receptor within 20m;</p> <p>Local PM10 concentrations well below the objective (&lt;75%)</p> <p>Wooded area between site and receptors</p>	No designations

Note: (1) Only if there are habitats that might be sensitive to dust.

### Significance of Effects

- 13.4.46 The criteria for significance of impacts for each of the four construction activities, assuming the effective application of mitigation measures, is summarised in Table 13.10<sup>5</sup>.

**Table 13.10 Significance of Effects for Each Activity (With Mitigation)**

Sensitivity of Surrounding Area	Risk of Site Giving Rise to Dust Effects		
	High	Medium	Low
Very High	Slight adverse	Slight adverse	Negligible
High	Slight adverse	Negligible	Negligible
Medium	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible

- 13.4.47 The standard mitigation measures, as included within the Construction Environmental Management Plan (Appendix 2.1 to this ES, DCO Document Ref 6.18) would be applied during the construction of the Proposed Development.

### **Waste**

- 13.4.48 Waste would be generated during the construction and decommissioning phases. The main waste generated from the construction would be from the clearance of vegetation. This could include scrub, hedges, timber, tree roots and debris. Topsoil would be reinstated though there may be some excess excavated material particularly in areas with poorer conditions. Small amounts of waste would also be generated from general construction for example for the packaging of components etc.
- 13.4.49 There is potential for more significant volumes of waste to be generated during the decommissioning of the Proposed Development. It is likely that environmental control measures in place at the time though will be more stringent than current regulations and effects would also be controlled so as to be negligible. Due to the potential lifespan of the Proposed Development it is not possible to assess these effects further at this stage.
- 13.4.50 The assessment included below is high level and based on professional judgement as it is considered that the measures incorporated within the CEMP for the construction phase (see Appendix 2.1) would control potential effects so as to be negligible. Waste generation from the operational phase would itself be negligible.

<sup>5</sup> Reproduced from Table 7: Significance of Effects for Each Activity with Mitigation pp25-26 IAQM Guidance on Construction Impacts - December 2011,).

## 13.5 Baseline Conditions

### *Background*

- 13.5.1 The assessment of potential noise and vibration effects is dependent on the ground conditions within which construction would take place and the likely plant and equipment that would be used.
- 13.5.2 Details of construction methods for the Proposed Development is provided within the Design and Construction Report (DCO Document Ref 7.1. This information has been used to inform the construction noise assessment as summarised in Appendix 13.2. Source noise data for items of machinery has been derived from BS 5228-1:2009+A1:2014
- 13.5.3 The Geotechnical Desk Study (Appendix 10.1 to this ES, DCO Document Ref 6.22) has established the type of ground conditions in the vicinity of each pole carrying the overhead line, and these are classified as poor, moderate or rock as shown in the extracts in Appendix 13.2 (DCO Document Ref 6.25). It is estimated that there would be approximately 145 poles in moderate ground, 43 within the vicinity of shallow rock and 30 within poor ground. The ground classification has in turn determined the type of construction methods and machinery that are likely to be required for each pole.
- 13.5.4 For moderate ground conditions standard wood pole foundations would be used consisting of timber foundation baulks, and the excavated ground in such cases is deemed suitable for the back-fill. As a consequence, installation would involve simple excavation typically to a depth of 2.5m deep (4m long and 2m wide).
- 13.5.5 For poor ground conditions, the excavated material may not possess the required bearing strength characteristics in which case it would be replaced with a granular material. The installation would again require simple excavation for the foundation but this time typically up to about 3m (7m long and 3.5m wide).
- 13.5.6 Only in some locations where the ground is very poor, there might be a necessity to install additional measures such as a concrete or screw anchor pile foundation. There are also eight pole positions where stabilization measures, such as retaining walls and sheet piling may be required due to the presence of ditches and streams, or steep slopes.
- 13.5.7 In areas where rock is present an excavator-mounted hydraulic jackhammer would be required to break out the rock. This excavated material would not be suitable as back-fill due to its large size. In this case, and as for poor ground conditions, it would be necessary to use a granular backfill material. In all cases the top soil would be separated during the excavation and used to top off the hole when it is backfilled.

13.5.8 The typical plant noise levels for machinery that would be used to construct the overhead line of the Proposed Development are presented in Table 13.11 below and have been used to calculate noise levels at the closest receptors<sup>6</sup>. Not all of the construction plant would operate simultaneously, but as a realistic worst case assessment it has been assumed that for each phase of construction, all those plant shown for that phase could operate simultaneously and continually during each working day, except for the specialist additional tasks such as auger or sheet piling that might be required to stabilise ground conditions at some 'poor' sites. In practice, there would be periods when some plant are not operated at all and others only operate for variable periods during the day, which would result in lower noise exposures for local receptors. The time required at each pole would also be limited to only a few days, after which the plant would move on to more distant poles and generate lower noise levels (see the Design and Construction Report (DCO Document Ref 7.1)).

**Table 13.11: Typical Plant Noise Levels for Overhead Line**

Ground Conditions	Plant	BS5228 Ref.	L <sub>Aeq</sub> at 10m, dB
<b>Moderate (145 poles)</b>	360 Excavator	C2 14-25	74
	Dumper	D3 98	73
<b>Poor (30 poles)</b>	360 Excavator	C2 14-25	74
	Tipper Lorries	C8 20	79
	Dumper	D3 98	73
	Concrete mixer lorry	C4 18-23	73
	Auger piling	C3 14-16	81
	Sheet piling	D4 3-14	87
<b>Rock (43 poles)</b>	360 Excavator with hydraulic jackhammer	C5 1-2	86
	360 Excavator	C2 14-25	74
	Tipper Lorries	C8 20	79
	Dumper	D3 98	73

<sup>6</sup> The receptors closest to the Proposed Development have been identified as part of the Visual Assessment (Chapter 7 'Landscape and Visual' DCO Document Ref 6.7) and are indicated on Figure 7.13

*Noise*

- 13.5.9 Due to the linear nature of the Proposed Development and the short term effects it is impractical to define ambient noise levels at each receptor location, therefore, the assessment uses approved prediction methodologies defined in BS5228:2014, as set out above in the Methodology section. Exceedance of pre-defined thresholds determines the significance of effects and the need for mitigation.

*Vibration*

- 13.5.10 Due to the linear nature of the Proposed Development and the short term effects of construction and demolition it is impractical to define ambient levels of vibration at receptor locations, therefore, the assessment uses details of construction methods and distances between the works being undertaken and each receptor to establish whether vibration impacts are likely to exceed recognised criteria and hence warrant mitigation.

*Air Quality*

- 13.5.11 The aim of the baseline is to provide an understanding of the existing air quality within the study area, particularly with respect to NO<sub>2</sub> and PM<sub>10</sub> levels, to help in the identification and assessment of potential environmental effects.
- 13.5.12 The area in which the Proposed Development is located is rural in character. Levels of nitrogen oxide and sulphur dioxide and other air pollutants associated with industrial and vehicle pollution are low. The current air environment comprises mainly natural sources.
- 13.5.13 Baseline conditions have been identified through a desk based review. This review has is based on analysis of air quality monitoring data published on the UK Air Information Resource website<sup>7</sup> and the Denbighshire County Council and Conwy County Borough Council websites.

Background Concentrations of NO<sub>2</sub> and PM<sub>10</sub>

- 13.5.14 The DEFRA website provides estimated background air pollution data for NO<sub>2</sub> and PM<sub>10</sub> for each 1km by 1km OS grid square across the UK<sup>8</sup>. Estimated pollutant concentrations are shown in Figures 13.2 – 13.4<sup>9</sup>. This shows that baseline background levels of NO<sub>2</sub> and PM<sub>10</sub> are below the air quality objective level of 40 µg/m<sup>3</sup> set by DEFRA's 2007 Air Quality Strategy for England, Scotland, Wales and Northern Ireland<sup>10</sup>.
- 13.5.15 Neither Denbighshire County Council nor Conwy County Borough Council have identified AQMAs.

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<sup>7</sup> <http://uk-air.defra.gov.uk/>

<sup>8</sup> Baseline data is provided on the website for 2011

<sup>9</sup> DCO Document 6.16 Environmental Statement Figures

<sup>10</sup> DEFRA (2007) *The Air Quality Strategy for England, Scotland, Wales and Northern Ireland*

- 13.5.16 Within Denbighshire, the main source of NO<sub>2</sub> is from the motor car. Denbighshire County Council participate in the UK nitrogen dioxide (NO<sub>2</sub>) diffusion tube survey. This involves the monitoring of NO<sub>2</sub> through passive diffusion tubes at four sites in the Rhyl area. These tubes are beyond the Study Area for the Proposed Development.
- 13.5.17 Conwy County Borough Council has an ongoing programmed work to monitor and assess air quality within the Borough. This includes the ongoing measurement of potentially significant vehicle emissions from main Trunk routes, including the A55 dual carriageway, which are located within relatively close proximity to areas of housing and public open space. No monitoring locations within the Study Area for the Proposed Development.

#### Sensitive Receptors

- 13.5.18 The area in which the Proposed Development is located is sparsely populated with most of the population living in scattered farms, hamlets or villages. The main centres of population within approximately 3km of the Proposed Development are:
- St Asaph - approximately 2km from the Proposed Development at its closest point: and
  - Bodelwyddan - approximately 2km from the Proposed Development at its closest point.
- 13.5.19 The receptors closest to the Proposed Development have been identified as part of the Visual Assessment (Chapter 7 'Landscape and Visual' DCO Document Ref 6.7) and are also as noted in the assessment of noise and vibration above.
- 13.5.20 Sensitive ecological sites are those for which their designated features are sensitive to air pollutants, either directly or indirectly, and which could be adversely affected by the effect of air pollution on vegetation within the nature conservation sites. There are no ecologically designated sites within 50m of the Proposed Development. In addition the locally designated sites within 50m are not considered to support habitats sensitive to dust.

## **13.6 Embedded Mitigation**

- 13.6.1 In accordance with modern working practices, the principles of the "best practicable means" (BPM), as defined in the Control of Pollution Act 1974 would be used to reduce emissions throughout the construction period. This would incorporate the use of measures to control noise and vibration that do not unreasonably inhibit the work, and the use of working methods that result in minimum effects compatible with normal working practices.

- 13.6.2 The measures within the Construction Environmental Management Plan (CEMP) (DCO Document Ref 6.18) would be developed and implemented to minimise, amongst other things, noise and vibration during construction, which would control emissions in accordance with accepted criteria, e.g. those defined in BS5228:2014. These measures would be implemented by the Contractor, who would also be required to liaise with the Local Authorities' Environmental Health Department to minimise impacts at all times. Control measures routinely applied in this way would include the following:
- selecting inherently quiet plant;
  - the use, where necessary and practicable, of enclosures and screens around noisy fixed plant;
  - limiting site work where possible to daytime hours; and
  - adherence to relevant British Standards.
- 13.6.3 The above range of noise controls and the measures included within the CEMP are measures that are regularly and successfully applied to large scale construction projects in order to minimise noise effects on local communities. The application of such control measures during the construction and/or decommissioning of the Proposed Development would likewise ensure that the works proceed with the minimum disturbance to local residents.
- 13.6.4 Measures to control air quality and dust effects, such as dust suppression measures and wheel washing prior to vehicle leaving the construction compound have been identified in the Design and Construction Report (DCO Document Ref 7.1) are incorporated within the CEMP (DCO Document Ref 6.18).
- 13.6.5 The volume of waste generated would be minimised and resource efficiency maximised by applying the waste hierarchy (reduce – reuse – recycle – responsible disposal). Measures to control waste have been identified in the Design and Construction Report (DCO Document Ref 7.1) are incorporated within the CEMP). These include:
- waste to be removed at frequent intervals:
  - all waste to be identified, quantified and where practicable appropriately segregated:
  - site waste susceptible to spreading by wind or liable to cause litter would be stored in secure containers;
  - only registered carriers would be used to take waste off-site;
  - no burning of waste materials would be permitted on site;
  - in the event of a spillage, all contaminated material would be removed from the site to a licensed waste facility;
  - only soil that is to be re-used would be stored on site; and
  - Any soil moved, handled or stored on site would be treated in accordance with Defra's Construction Code of Practice for the Sustainable Use of Soils on Construction Sites.

- 13.6.6 The main contractor would be required to develop a Site Waste Management Plan (SWMP). The SWMP would set the framework for the management of wastes generated during the construction process. It would document the decisions taken during the planning and design stages to minimise waste and set objectives and targets for the main waste types. It would also identify the following:
- responsibilities within the construction team for waste management;
  - the types of waste and the quantities likely to be generated;
  - measures to be adopted during construction to minimise waste generated;
  - opportunities for recycling and/or reuse;
  - proposed treatment and disposal sites together with details of their Environmental Permit; and
  - provisions for staff training and use of the SWMP.

## 13.7 Assessment of Effects

### Noise - Construction Phase

- 13.7.1 The main sources of noise would be the movement of construction vehicles through adjacent residential areas to the construction working areas and along the route of the Proposed Development, areas of tree-felling associated with the overhead line route through forest and farmland, and the use of plant involved in the placement of the poles.
- 13.7.2 The Geotechnical Desk Study (Appendix 10.1 to this ES, DCO Document Ref 6.22) has established the type of ground conditions in the vicinity of each pole carrying the overhead line. Details of construction methods is provided within the Design and Construction Report (DCO Document Ref 7.1). Information on the construction of the proposed Collector substation and underground cable is contained within Appendices 1.1 and 1.2 respectively. This information has been used to inform the construction noise assessment as summarised in Appendix 13.2 (DCO Document Ref 6.25). Source noise data for items of machinery has been derived from BS 5228-1:2009+A1:2014 and is used in the assessment (see Table 13.12), together with distances between each activity and the closest noise-sensitive receptor, e.g. dwellings, to calculate construction noise levels in accordance with the procedures of BS5228.
- 13.7.3 The Study Area has been defined as the Order Limits plus a 2km buffer. Sensitive receptors within the Study Area have been identified (by Receptor ID<sup>11</sup>). Appendix 13.3, Table 13.3.1 indicates receptors, the closest pole location and the type of ground conditions that apply. The latter influences the type of plant used to install the poles, as set out in Table 13.11.

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<sup>11</sup> Note: Receptor IDs are the same as those used for the Assessment of Visual Effects (see Chapter 7 'Landscape and Visual')

- 13.7.4 The pole distance and the type of ground conditions/plant have been used to calculate the façade noise level at each receptor, and the results are also shown in Appendix 13.3 (DCO Document Ref 6.25), Table 13.3.1. For each receptor, other poles than that identified in the Table would be at a greater distance, therefore, construction noise levels from activities at all other pole locations would be lower.
- 13.7.5 The results show that noise levels due to the construction of the Proposed Development would range from 43 to 72 dB  $L_{Aeq}$ . Only 3 poles would generate noise levels greater than 70 dB  $L_{Aeq}$ . These are poles 50, 87 and 214 receptor and involve construction into rock or poor ground conditions. These pole locations are at distances of less than 100m from the respective nearest sensitive. All other poles either involve construction in moderate ground conditions, which would require less plant and generate less noise, or are at distances greater than 100m from sensitive receptors.
- 13.7.6 Apart from the three effects identified above, the noise levels would lie well below the typical daytime construction noise criterion of 70-75 dB  $L_{Aeq}$  and also lie well below the threshold typically applied for insulation/compensation. In the absence of specific baseline ambient noise levels for each receptor, Method 2 of BS5228 (5 dB change) cannot be applied but, in the case of Method 1, it can be reasonably assumed given the remote location that daytime ambient noise levels would lie below the value of 65 dB  $L_{Aeq}$  for Category A in Table 13.5. On this basis, the threshold for potential significant effects at dwellings closest to the works would be 65 dB  $L_{Aeq}$ .
- 13.7.7 Those receptors where the construction noise level is calculated to exceed the threshold of 65 dB  $L_{Aeq}$  have also been highlighted in Appendix 13.3 (DCO Document Ref 6.25). Only a further 3 dwellings are predicted to exceed the 65 dB threshold, making a total of 6 locations where some specific mitigation measures may be required to minimise noise impacts. All 6 locations are identified in Table 13.12 below. Of the six locations, one is presently identified as a derelict agricultural building in Pandy Wood (ID 71a), therefore, no specific noise controls would be required.

**Table 13.12: Locations for Noise Mitigation during Construction of Overhead Line**

Pole	Receptor ID	Receptor Name	Construction Noise Level dB $L_{Aeq}$
50	7	Tan Yr Allt, Peniel, Denbigh LL16 4TN	71.1
87	71a	Agricultural Building in Pandy Wood - derelict	71.5
133	267	Erivat Bach Isa, Henllan, Denbigh LL16 5BS	65.6

Pole	Receptor ID	Receptor Name	Construction Noise Level dB L <sub>Aeq</sub>
157	432	LLechryd Bach, LLanefydd, Denbigh LL16 5DG	67.9
214	340	Plas Hafod, Groesffordd Marli, Abergele LL22 9DS	71.1
218	358	Tyddyn Eos, Groesffordd Marli, Abergele LL22 9DR	65.6

- 13.7.8 Where the three receptors experience noise levels that just exceed the threshold of 65 dB, embedded mitigation measures as identified in the CEMP (Appendix 2.1 to this ES (DCO Document Ref 6.18)) would be adequate to reduce noise levels below the threshold:
- selecting inherently quiet plant;
  - limiting where practicable the times when plant operates simultaneously, and ensuring machines are not left idling when not in use; and
  - adherence to relevant British Standards.
- 13.7.9 For those three receptors where noise levels are calculated to just exceed 70 dB, which are both locations where the ground conditions are rock and require the use of an excavator with hydraulic jackhammer, the following additional noise control measure would be provided:
- the use, where practicable, of a portable noise screen close to the hydraulic jackhammer at relevant points between the noise source and the distant receptor;
- 13.7.10 Groundborne generated vibrations materialise most when impulsive forces are applied to the ground, for example when piles are driven into the ground, or when receptors are very close to operating machinery. None of the normal activities associated with the construction of the Proposed Development are expected to require significant forces to be applied into the ground and this, coupled with the separation distances between the sensitive receptor and the Proposed Development would mean that there would be no vibration impacts associated with the routine works.
- 13.7.11 The use of sheet piling at locations where soil stabilisation is required would be the activity most capable of generating groundborne vibrations if the piles are driven into the soil by impact hammer. One location has been identified where this is required (Pole 85) however this would be at a distance of 350m (Receptor ID 72, see Appendix 13.3, Table 13.3.1). No significant groundborne vibrations would be capable of carrying across this degree of separation, therefore, no impacts are predicted and no mitigation measures would be required for vibration.

### Noise and Vibration - Operation

- 13.7.12 Overhead lines can occasionally create some noise but this is typically at a low level and generally only in specific weather conditions, i.e. it is not continuous.
- 13.7.13 The distances between the 132 kV Overhead Line and noise-sensitive receptors are significant and, for those poles closest to existing dwellings, the distances range across the values shown in Table 13.13. The average separation distances are in excess of 200m, which means that for most receptors, any low level of noise generated by the 132 kV Overhead Line would undergo an additional distance attenuation of at least 58 dB based on spherical sound propagation. Since any noise perceived under the overhead line would be low it can be seen that after allowing for this degree of noise attenuation, noise levels at receptors would be extremely low and would lie below typical background noise levels and consequently be inaudible.

**Table 13.13: Average Distances from 132 kV Overhead Line to Sensitive Receptors**

Port	Pole Distances m	Average distance m	Closest
1	100-500	274	Pole 50, Receptor 7
2	20-450	220	Pole 88, Receptor 16
3	80-550	250	Pole 171, Receptor 32

### Noise and Vibration - Decommissioning

- 13.7.14 The processes and plant required to decommission and remove the structures would be similar to those required to the installation. Therefore, noise and vibration exposure levels are likely to be similar to and no greater than those generated during the construction phase. Similar mitigation measures would, therefore, suffice during this phase.

### Air Quality - Construction

- 13.7.15 Construction activities have been described in the Design and Construction Report (DCO Document Ref 7.1) and summarised in Chapter 2 of this ES ('Description of the Proposed Development' (DCO Document Ref 6.2)).
- 13.7.16 Using the categories in Table 13.9 above, and given the nature and location of sensitive receptors, the sensitivity of the area surrounding the Proposed Development to construction phase dust emissions is assessed as 'Low'.

### *Significance of Construction Activities*

- 13.7.17 The risk categories for the four activities previously identified in Tables 13.6, 13.7 and 13.8 above have been assessed as follows:
- demolition – Low Risk;
  - earthworks – Low Risk;
  - construction – Low Risk; and
  - track out - Low Risk.
- 13.7.18 This assessment reflects the linear nature of the Proposed Development and the small scale nature of the works at the pole locations. The risks may be slightly higher at the construction compound and the temporary storage areas however with the implementation of the measures proposed in the CEMP this would still result in the effects being **negligible**.
- 13.7.19 As the risks have been assessed as ‘low’ in all instances the assessment has not progressed to Stage 3 as defined in the IAQM Guideline (see Figure 13.1)
- 13.7.20 Based on the above and using the criteria in Table 13.9 and 13.10 the significance of effect is therefore considered to be **negligible**.

#### **Construction - Waste**

- 13.7.21 With the embedded mitigation measures include within the Construction Environmental Management Plan the effects are likely to be **negligible**.

## **13.8 Specific Mitigation Measures**

### **Noise and Vibration**

- 13.8.1 At pole positions 50 and 214 the ground conditions are rock and require the use of an excavator with hydraulic jackhammer, therefore, the following additional noise control measure would be adopted in in addition to those standard measures identified in the CEMP (in order to reduce noise levels below the threshold of significance):
- the use, where practicable, of a portable noise screen close to the hydraulic jackhammer at relevant points between the noise source and the distant receptor.

### **Air Quality**

- 13.8.2 No specific mitigation measures have been identified.

### **Waste**

- 13.8.3 No specific mitigation measures have been identified.

## 13.9 Assessment of Cumulative Effects

13.9.1 A two stage approach to the assessment of cumulative effects has been adopted as described in Chapter 4 'EIA Methodology' (DCO Document Ref 6.4):

- **Stage 1** – assessed the Proposed Development + the Wider Scheme (Collector Substation + the underground cable route + works at St Asaph substation + lower voltage overhead line diversions + Temporary storage areas within the two substations) + the Wind Farms;

This assessment considers Cloganeog Forest and Brenig Wind farms only as Nant Bach, and Derwydd Bach are located at some distance to the south of the Proposed Development. They would also not use the same highway network as would be used for the Proposed Development and Wider Scheme, as such there are not cumulative traffic effects.

- **Stage 2** – assessed the proposals in Stage 1 together with other proposed and consented developments in the area.

13.9.2 Waste has not been considered as part of the cumulative assessment. Effects arising from the Proposed Development would be negligible and it is not considered that there is any potential for the effects to increase when considered alongside the Wider Scheme or the Stage 2 Developments.

### Stage 1 Assessment

13.9.3 Due to the separation distances between the construction for the Collector Substation and local receptors, and the absence of other development in the area, there would be no direct cumulative effects. There is however the potential for cumulative effects for noise and air quality associated with traffic and transport effects. Chapter 12 has identified that the traffic and transport effects would not be significant.

13.9.4 Due to the linear nature of the works associated with the Proposed Development and the relatively rapid rate of progress past any sensitive receptor, any noise and vibration exposure or potential air quality effects would be limited to a brief period of time unlikely to exceed a few days in the total construction contract, and there would be little risk of this coinciding with noise from other development works causing cumulative effects.

13.9.5 Likewise, due to the separation distances between the modifications for the St Asaph Substation and local receptors, and the greater contribution from other ambient noise, vibration, air quality and dust sources, such as road traffic, there would be no cumulative effects.

**Stage 2 Assessment****Table 13.14: Stage 2 Developments**

<b>Developments Considered in Stage 2</b>		
<b>Development</b>	<b>Description</b>	<b>Comments</b>
Hafod Ty Ddu Wind Turbine	Single wind turbine located in relatively close proximity to the proposed overhead line.	<p>Potential cumulative effects could arise during the construction and decommissioning of this development, if it occurs within the same timescales. Construction effects would however would be short term and temporary.</p> <p>Due to the scale of this development no cumulative effects are anticipated with the Proposed Development and the Wider Scheme</p>
Tyn y ffynnon Wind Turbine	Single wind turbine (up to 48m height to blade tip).	<p>Potential cumulative effects could arise during the construction and decommissioning of this development, if it occurs within the same timescales. Construction effects would however would be short term and temporary.</p> <p>Due to the scale of this development no cumulative effects are anticipated with the Proposed Development and the Wider Scheme</p>
Meifod Farm, Saron, Wind Turbine	Single wind turbine (up to 34.5m to blade tip).	<p>Potential cumulative effects could arise during the construction and decommissioning of this development, if it occurs within the same timescales. Construction effects would however would be short term and temporary.</p> <p>Due to the scale of this development no cumulative effects are anticipated with the Proposed Development and the Wider Scheme</p>

<b>Developments Considered in Stage 2</b>		
<b>Development</b>	<b>Description</b>	<b>Comments</b>
Pant y Maen Wind Farm	8no. wind turbines in SSA A.	<p>Potential cumulative effects could arise during the construction and decommissioning of this development if it occurs within the same timescales.</p> <p>Due to the distance of this development from the Proposed Development and the Wider Scheme no cumulative effects are anticipated.</p>
Bryn Cocyn Wind Turbine	Single wind turbine	<p>Potential cumulative effects could arise during the construction and decommissioning of this development if it occurs within the same timescales. Construction effects would however would be short term and temporary.</p> <p>No cumulative effects are anticipated due to the scale of the development.</p>
Burbo Bank Extension (including onshore substation)	Extension to existing offshore wind farm and proposed substation near the northern end of the Proposed Development.	<p>Potential cumulative effects could arise during the construction and decommissioning of this development if it occurs within the same timescales.</p> <p>Construction effects would however would be short term and temporary.</p> <p>There is the potential for traffic and transport effects which could generate secondary noise and air quality effects. However traffic and transport effects are no significant and would only effect the A55 corridor, therefore no cumulative effects are anticipated.</p>

<b>Developments Considered in Stage 2</b>		
<b>Development</b>	<b>Description</b>	<b>Comments</b>
<b>Developments Considered But Not Included in the Stage 2</b>		
Llys Dymper Wind Farm	10no. wind turbines to be connected to the National Grid locally at Llansannan.	Given the distance from the Proposed Development no cumulative effects are anticipated.
Crematorium proposal on land to south of Glascoed Road	Denbighshire planning application ref: 31/2013/1537.	<p>Potential cumulative effects could arise during the construction of this development, if it occurs within the same timescales. Construction effects would however would be short term and temporary.</p> <p>The proposal is to the south of the Glascoed Road. No significant effects are predicted for the underground cable in this area.</p> <p>Due to the distance of this development from the remainder of the Proposed Development and the Wider Scheme no cumulative effects are anticipated.</p>
Pilkington Playing fields site on the St Asaph business park	Development of 3.9ha of land for office/light industrial use (Class B1) and construction of new vehicular/pedestrian access.	<p>Potential cumulative effects could arise during the construction of this development, if it occurs within the same timescales. Construction effects would however would be short term and temporary.</p> <p>There is the potential for traffic and transport effects which could generate secondary noise and air quality effects. However traffic and transport effects are no significant and would only effect the A55 corridor, therefore no cumulative effects are anticipated.</p>
Bodelwyddan Key Strategic Site A	Development Plan allocation in Denbighshire.	Potential cumulative effects could arise during the construction of this development, if it occurs within the

<b>Developments Considered in Stage 2</b>		
<b>Development</b>	<b>Description</b>	<b>Comments</b>
	Development brief adopted by Denbighshire in July 2014 for a mixed use development.	<p>same timescales. Construction effects would however would be short term and temporary.</p> <p>This development is not at a stage where it has been assessed in detail, No cumulative effects are anticipated due to the potentially timing of the works.</p>
Application for residential development at former H M Stanley Hospital site, Upper Denbigh Rd, St Asaph	Conversion of former St Asaph hospital into a housing development (85 homes)	<p>Potential cumulative effects could arise during the construction of this development, if it occurs within the same timescales. Construction effects would however would be short term and temporary.</p> <p>No cumulative effects are anticipated due to the differing nature and scale of development.</p>

## 13.10 Summary of Residual Effects

- 13.10.1 For those locations where specific noise mitigation measures are recommended, the latter would minimise the noise exposures but will not be able to make construction noise inaudible. Therefore, there will be some residual and audible noise from the construction works but this will only be present for the relatively short periods when construction plant will be operating close to affected premises. Due to the linear nature of the work and the relatively rapid rate of progress, the durations of these periods will only amount to a very few days, these effects would therefore be negligible.
- 13.10.2 No residual effects are anticipated relating to air quality or waste.