
10.0 NOISE

Introduction

10.1 This Chapter of the ES assesses the likely significant effects of the Proposed Development in terms of the noise emitted during construction and operation. In particular, the likely significant effects associated with the Proposed Development include:

- Noise arising from plant and activities associated with the construction works (*eg* the excavation of trenches);
- Other noise associated with the construction of the Proposed Development, including HGV traffic;
- Noise effects which may arise as a result of traffic generation from the completed phase of the Proposed Development; and
- Noise associated with the construction and operation of the proposed Gas Processing Facility at Hurrell Lane.

10.2 The Chapter describes the assessment methodology, the baseline conditions currently existing at the Assessment Site and its surroundings, the likely significant environmental effects, the mitigation measures required to prevent, reduce or offset any significant adverse effects, and the likely residual effects after such measures have been implemented.

Planning Policy Context

10.3 This sub-section presents the national legislation, national planning policy, regional planning policy and local planning policy relevant to the Proposed Development. Compliance of the Proposed Development with environmental noise policy and legislation is discussed in the Residual Effects section below.

National Legislation

10.4 The principal legal control over environmental noise is based on the concept of 'nuisance', contained in Part III of the Environmental Protection Act 1990. The Act empowers local authorities to deal with noise from premises such as homes, pubs, and factories, and from machinery, equipment and vehicles in the street. Before action can be taken, an environmental health professional has to establish that the noise

constitutes a statutory nuisance. This means that they have to prove that the noise is causing an unreasonable interference with someone's use of their land or material discomfort to the population at large.

- 10.5 If the environmental health professional is satisfied that a statutory nuisance exists, an Abatement Notice may be served on the person responsible for the problem. Where the notice requires work, a period of time will be given to allow it to be carried out. Failure to comply with the notice after that time is a criminal offence, and the person could be prosecuted. Compliance with the legal requirements not to cause a statutory nuisance is normally dealt with by assessing a development proposal using BS.4142:1997, as described below.
- 10.6 In the special case of construction equipment, there has for some years been a European Directive restricting the permissible noise emissions from certain types of machinery. The current Directives are 2000/14/EC, which was later amended by 2005/88/EC. These were enacted into UK law by Statutory Instrument 2001 no.1701 as amended, *The Noise Emission into the Environment by Equipment for Use Outdoors Regulations* 2001. The regulations restrict the permissible sound power emissions of, *inter alia*, excavators and tracked dozers.
- 10.7 The maximum sound power from a 360° excavator is determined from the expression $80 + 11 \log P$, where P is the rated power output of the machine in kW. Similarly, the maximum sound power from a tracked dozer is $86 + 11 \log P$ (a sideboom pipelayer is a special modification of such a machine). These noise limits will be used later in this Chapter as the maximum noise levels from construction machinery for predictive work.

National Planning Policy

- 10.8 The statutory planning guidance in relation to noise in England is contained in Planning Policy Guidance Note 24: Planning and Noise (PPG24). The guidance states that wherever practicable, noise-sensitive developments should be separated from major sources of noise such as road, rail and air transport and certain types of industrial development. New development involving noisy activities should, if possible, be sited away from noise-sensitive land uses.
- 10.9 Where it is not possible to achieve such a separation of land uses, local planning authorities should consider whether it is practicable to control or reduce noise levels, or

to mitigate the impact of noise, through the use of conditions or planning obligations. PPG24 is due to be revised in the context of a forthcoming National Noise Strategy.

Development Plan

- 10.10 The North York Moors Core Strategy and Development Policies (2008) was adopted in November 2008. It supersedes the policies in the North York Moors Local Plan (2003). Development Policy 1, Environmental Protection, states that development will only be permitted where there will be no adverse effects arising from sources of pollution which would impact on the health, safety and amenity of the public and users of the development, and where it will not generate unacceptable levels of noise or vibration.
- 10.11 The Ryedale Local Plan was adopted in March 2002. The Secretary of State issued a Direction in September 2007, identifying those policies which have been 'saved' and therefore remain in force. Policy ENV24 (Noise-generating development) was not saved and therefore, does not apply.

Relevant Standards

- 10.12 In order that the requirements of the Environmental Protection Act and PPG24 can be met (where relevant) it is usual practice to use BS.4142:1997 to make an assessment of the likely noise nuisance resulting from a proposed noise-emitting development. This British Standard, '*Method for rating industrial noise affecting mixed residential and industrial areas*' provides a methodology for comparing the noise from an industrial undertaking with the pre-existing background noise, and the likelihood that complaints will be precipitated from the local community. The probability that justifiable complaints about noise will arise is taken to be an indication that a noise nuisance will exist. It is based on calculating the excess of the 'rating' noise level over the typical minimum background noise level. The previous version of the standard (dated 1990) is referenced in PPG24. To summarise, complaints from local residents are only considered likely where a development gives rise to noise levels that exceed the previous ambient noise by 10dB or more. Where the 'new' noise is 10dB quieter than the present ambient noise levels, this is to be taken as a positive indication that justifiable complaints will not occur. Differences of 5dB are regarded as being of marginal significance. In practical terms this means that there is a band of uncertainty at least 10dB wide, and probably nearer 20dB wide, within which neither developers nor the enforcement authorities have clear guidance on which they may rely. Nevertheless, BS.4142:1997 remains the established method of environmental noise assessment in this context.

- 10.13 Where noise from construction activities needs to be considered, BS.5228-1:2009 '*Code of practice for noise and vibration control from construction and open sites*' gives recommendations for basic methods of noise control on a construction site. It applies to work activities and operations that generate significant noise levels, and includes industry-specific guidance. The legislative background to noise control is described and recommendations are given regarding procedures for establishing effective liaison between developers, site operators and local authorities. BS.5228-1 provides guidance concerning methods of predicting and measuring noise and assessing its impact on those exposed to it.
- 10.14 Noise from road traffic movements is usually predicted with reference to the Department of Transport's 1988 document *Calculation of Road Traffic Noise* (CRTN) which is designed to assess the changes in road traffic noise arising from a new road or a modified carriageway. Its usefulness in the present project is limited, but equations are given in CRTN which relate the resulting noise levels at housing to the number of vehicle movements expected. No changes in the highway layout are proposed as part of the Ryedale Gas Project, so the only potential changes in noise level from the road network are those arising from increases in the numbers of vehicle movements.

Assessment Methodology

- 10.15 The following scenarios were assumed for noise prediction work. For the normal, operational phase at the Ebberston Well site, all equipment is assumed to be operating continuously. For the normal operational mode at Hurrell Lane Gas Processing Facility, each package of equipment is assumed to be running as normal (for example, this would mean that for a pair of pumps of the same designation, one would be running, one on standby). Equipment designated for emergency use only is assumed not to be running.
- 10.16 In order to assess the noise emitted during the pipelines construction, a group of three machines was assumed to be in operation simultaneously at the closest approach of the pipelines route to each of the nearest sensitive receptors (residential properties). This will be the 'worst case' scenario and will apply when there is no wind, or a slight wind from the pipelines route towards the noise receptor. In windier conditions the background noise level can safely be assumed to be higher because of rustling of vegetation and the noise of light objects being blown around.
- 10.17 For both the permanent sites and the temporary pipeline construction works, the noise levels were calculated from first principles, whereby the sound pressure level L_{pr} at a

known distance r metres from a source is found from the sound power level L_w using the relationship $L_{pr} = L_w - 20 \log r - 8$ [dB].

- 10.18 In view of the separation distances involved between each group of noise sources and any receiver, there will be additional attenuation of sound as it passes over soft ground. This additional attenuation is dependent on frequency, so in the case of the pipelines construction it was assessed on the assumption that the noise emissions are typical of large diesel engines as used in construction machinery. In the case of the gas processing facility, no such assumption can be made, so only a small amount of additional attenuation was assumed.

Noise-sensitive Receptors

- 10.19 The only class of potential noise-sensitive receptors identified in this study is that of dwellings. Agricultural and industrial buildings are not regarded as noise-sensitive in this context, and there are no schools or hospitals close enough to the pipeline route or the Proposed Gas Processing Facility to require consideration in terms of noise. In general, only dwellings within 1km of the pipeline route were considered to be within the scope of the noise prediction, but the nearest properties to the proposed Hurrell Lane Gas Processing Facility lie approximately 1120m to the north of the site, to the east of Hurrell Lane as it leaves the village of Thornton-le-Dale, and these were included. A small number of properties in Wilton lie within a 1km radius of the pipelines route, and two representative properties were selected. The OS grid coordinates of the noise-sensitive receptors are shown in **Table 10.1** and **Figure 10.1**. The grid references shown are those of the nearest façade of a residential building to the pipeline

Table 10.1: Noise-sensitive Receptors for Predictive Work

Location	Easting	Northing	Closest Approach, m
Givendale Head Farm	489443	487585	910 from Wellsite, 350 from pipelines
Pheasant Hill	489019	485122	1010 from pipelines
Warren House	487446	484557	120 from pipelines
Hollies Farm, Coulby Lane	486049	483072	700 from pipelines
Springfield, Wilton	485824	483015	560 from pipelines
Hurrell Lane, Thornton-le-Dale	484378	483050	1120 from Gas Processing Facility, 710 from pipelines

Significance Criteria

10.20 **Table 10.2** shows the definitions of significance applied in this assessment, ranging from 'critical' to 'none'.

Table 10.2: Significance Criteria

Significance	Criterion
CRITICAL	These effects are generally, but not exclusively, associated with sites and features of national or regional importance. A change in a regional or district scale feature may also enter this category. Mitigation measures are unlikely to remove such effects. It is inconceivable that noise impact would ever fall within this category.
MAJOR	These effects are likely to be important considerations at a local or district scale, but if adverse, are potential concerns to the project, depending upon the relative importance attached to the issue during the decision-making process. Mitigation measures and detailed design work are unlikely to remove all of the effects upon the affected communities or interests.
MODERATE	These effects, if adverse, while important at a local scale, are not likely to be key decision-making issues. Nevertheless, the cumulative effect of such issues may lead to an increase in the overall effects on a particular area or on a particular resource. They represent issues where effects would be experienced but mitigation measures and detailed design work would ameliorate/enhance some of the consequences upon affected communities or interests. Some residual effects would still arise.
MINOR	These effects may be raised as local issues but are unlikely to be of importance in the decision-making process. Nevertheless, they are of relevance in enhancing the subsequent design of the proposed development and consideration of mitigation or compensation measures.
NONE	No effects or those which are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

Assessment of Noise from Construction Site Plant

- 10.21 Noise arising at the Ebberston Wellsite during construction will be sporadic. The relevant noise sources will be a power generator, fabrication equipment, the occasional use of other diesel powered plant such as cranes and offloading plant, and movements of HGVs delivering materials to site.
- 10.22 The construction of the Hurrell Lane Gas Processing Facility will occupy a much longer period of some 20 weeks, during which the relevant noise sources will be a power generator, deliveries and offloading of materials and equipment (during daytime working hours only), ancillary lifting equipment, fabrication equipment and contractors' plant.

Assessment of Pipeline Construction Noise

- 10.23 Noise from the pipelines construction will typically arise from the operation of three types of machine: a 360° excavator, a sideboom pipelaying machine (a modification of a tracked dozer), and a single HGV (either a low-loader or an articulated goods vehicle). In addition, from time to time a 50T mobile crane will be deployed instead of the pipelaying machine, but it is unlikely that both types of machine would be at their closest approach to any given residential property at the same time. For the great majority of pipeline construction work (trenching, pipelaying and joining, and backfilling) the separation distances between operational equipment and noise-sensitive properties will be much greater, and fewer machines will be in operation at a given location.
- 10.24 The aggregate noise levels from these machines, operating simultaneously at the nearest approach of the pipeline to the noise-sensitive receptors, are shown in **Table 10.3**.

Table 10.3: Maximum Noise Levels at Noise-sensitive Receptors

Location	Distance, m	L _{Aeq} , dB
Givendale Head Farm	350	57
Pheasant Hill	1010	45
Warren House	120	69
Hollies Farm, Coulby Lane	700	49
Springfield, Wilton	560	51
Hurrell Lane, Thornton-le-Dale	710	48

Assessment of Road Traffic Noise

10.25 The additional road traffic movements expected per week during the construction phase of the Proposed Development are shown in **Table 10.4**.

Table 10.4: Weekly Construction Traffic Movements

Site	Weekly HGV movements	Weekly light goods vehicle movements	Weekly total
Ebberston Wellsite	6	35	41
Pipelines	68	204	272
Hurrell Lane Gas Processing Facility	31	119	150

10.26 Noise from road traffic movements is usually predicted with reference to Calculation of Road Traffic Noise, which relates the noise level at a roadside property to the number and types of vehicles flowing along it, the average speed of such movements, and the proportion of 'heavy' vehicles (*ie* HGVs) in the flow. Table 10.4 can be used to show that the daily increase in traffic, all assumed to be travelling along the A170, will be 1.5% compared with the annual average daily traffic. It is known that the daily traffic on the A170 primary route increases by approximately 33% in the summer (see Chapter 11), and a temporary increase of 1.5% is very small in comparison. The noise level from traffic flowing on the road in terms of the $L_{A10,18h}$ value, taking into account the increase resulting from the project in comparison with the annual average daily flow, would increase by 0.06dB, which is so small as to be undetectable.

Assessment of Noise Emissions from Operational Plant

10.27 The estimated noise levels on-plant of each item of permanent equipment are shown in **Table 10.5** (for both the Ebberston Wellsite and the Hurrell Lane Gas Processing Facility). At the time of writing no frequency spectrum information was available for any individual item of plant, and the detail design had not advanced sufficiently to make reliable estimates of the likely frequency content of the noise emitted to atmosphere. However, the overall noise emissions in dB (A) were estimated, and the noise level resulting from the operation of each was calculated at appropriate distances.

Table 10.5: Noise Levels from Operational Plant

Plant description	Estimated Noise Level at 1m, dB(A)
Hurrell Lane Gas Processing Facility	
regeneration gas cooler	70
pressure reduction valve	85
produced water and condensate pumps	70
hydrate inhibitor recovery package	70
flash gas recycle compressor house	70
nitrogen package	70
instrument air package	70
compressor inter/aftercooler fans	70
compressor lube oil cooling fans	70
compressor motor and VSD cooling fans	70
compressor building	70
backup diesel firewater pump	85
backup diesel generator	85
ground flare	70
regeneration gas heater	85
cooling tower	70
flash gas aftercooler	70
Ebberston Wellsite	
hydrate inhibitor injection pump	70
corrosion inhibitor injection pump	70
choke valve	85

- 10.28 The aggregate noise levels from the Ebberston Wellsite under normal operational conditions will be less than 10dB(A) overall at Givendale Head Farm, the nearest residential property to the site.
- 10.29 The noise levels from the Hurrell Lane Gas Processing Facility under normal operational conditions will be approximately 21dB(A), when measured at the nearest residential properties to the north, on Hurrell Lane. This figure assumes that that temporary or emergency-use equipment is not running. Occasional testing of emergency equipment such as the standby generator and fire pump will take place during normal working hours only, and this will potentially increase the noise level at the same location to 25dB(A).

Baseline Conditions

- 10.30 Studies of the background noise typical of the area of the Proposed Development have been undertaken by ACIA staff on a number of occasions in recent years. In view of the absence of significant developments apart from those associated with the gas exploration and development, there is no reason to suppose that the daytime or night-time background noise levels have changed. A brief survey of background noise at a number of key locations was therefore undertaken during March 2010 during suitable weather. The weather conditions were characterised by little or no wind, and no precipitation, and (during the daytime) an absence of extraneous noise sources which might temporarily increase the background levels.
- 10.31 Rather than make noise measurements close to houses, which can be unrepresentative because of extraneous noise from heating systems, domestic animals and other sources, locations were chosen for noise measurements on the public road network or on rights of way.
- 10.32 Night-time noise levels were measured near the locations shown in **Table 10.6** on the night of Thursday/Friday 3 and 4 March 2010. A Type 1 (precision) integrating sound level meter to IEC 60651 was used to make measurements over five-minute sample periods, and the equivalent continuous noise level $L_{Aeq,5min}$ and the $L_{A90,5min}$ percentile exceedance level were measured. The microphone was always positioned 1.5m above ground level and a proprietary windshield was fitted for all measurements. The calibration of the instrument was checked before and after the sequence of measurements using an appropriate electronic calibrator, and no drift was observed.
- 10.33 Daytime noise levels were measured near the locations shown in Table 10.6 on Thursday 11 March 2010 using the same instrumentation, and following exactly the same method. Occasionally the readings were affected by distant agricultural activity, birdsong or animal noise, and these sources were eliminated from the measurements whenever practicable by use of the meter's 'pause' function.

Table 10.6: Background Noise Monitoring Locations

	Location	Easting	Northing
1	entrance to Ebberston Wellsite	489615	487173
2	Pheasant Hill	484734	485018
3	near Warren House	487523	484267
4	north of Wilton village	486020	483140
5	future pipeline crossing of A170	485106	483052
6	proposed Hurrell Lane site	484794	481807

10.34 The night of 3 and 4 March 2010 was particularly calm and quiet, and can be taken to represent the minimum likely ambient noise levels in the area of the Proposed Development. The minimum night-time air temperature was -3°C and there was no precipitation. Only occasional distant road traffic movements were audible at any location.

10.35 The afternoon of 11 March was also very calm, with no significant wind and 7/8 cloud cover. The air temperature was 8°C, there was no rainfall, and road surfaces were dry.

10.36 The results of the background noise surveys are summarised in **Table 10.7**.

Table 10.7: Summary of Background Noise Levels

	Date	Time	Minimum $L_{A90,5min}$ dB	Minimum $L_{Aeq,5min}$ dB	Comments
1	5 March 2010	0130-0135	20	27	
2	5 March 2010	0140-0145	18	21	
3	5 March 2010	0210-0215	19	22	
4	5 March 2010	0235-0240	21	24	
5	5 March 2010	0250-0255	24	33	sporadic traffic
6	5 March 2010	0305-0310	19	23	
1	11 March 2010	1335-1340	22	27	
2	11 March 2010	1350-1355	24	28	
3	11 March 2010	1425-1430	28	39	lambs bleating, birds
4	11 March 2010	1455-1500	26	30	distant farm machinery
5	11 March 2010	1510-1515	46	58	road traffic
6	11 March 2010	1530-1535	23	26	

10.37 It is clear from the results of the background noise survey that the Proposed Development is in a very quiet rural area.

Likely Significance of Effects

10.38 **Table 10.8** summarises the significance of the noise from construction plant, road traffic and operational sources at the Ebberston Moor Wellsite, the Hurrell Lane gas processing facility, and along the pipeline construction route. It is implicit in this significance matrix that construction activities will occur only during well-defined daytime periods (0700 – 1900 seven days a week, to be agreed with the planning authority).

Table 10.8: Significance of Effects: Noise at Local Residential Properties

Source	Receptor	Significance
wellsite construction	Givendale Head Farm	minor
wellsite operation	Givendale Head Farm	none
pipelines construction	Givendale Head Farm	minor/none
pipelines construction	Pheasant Hill	none
pipelines construction	Warren House	minor
pipelines construction	Hollies Farm, Coulby Lane	none
pipelines construction	Springfield, Wilton	none
pipelines construction	Hurrell Lane housing	minor
road traffic during construction	all locations near A170	none
pipelines operation	all locations	none
Hurrell Lane construction	Hurrell Lane housing	minor/moderate
road traffic during construction	Hurrell Lane housing	minor
Hurrell Lane operation	Hurrell Lane housing	minor
road traffic during operation	all locations	none

Noise Emissions during Construction of Production Equipment at Wellsite and the Construction of the Gas Processing Facility

10.39 Construction of the production equipment at the Ebberston Wellsite, and the introduction of the new wellhead and related equipment, will be a relatively short-term project, the noise from which will affect only a single noise-sensitive location. During the normal working day, Givendale Head Farm is visited by numbers of HGVs bringing

materials for recycling, and the noise from the recycling operation itself, albeit intermittent, is at significantly higher levels than the likely noise from Wellsite construction.

- 10.40 Construction of the Gas Processing Facility may be audible for some of the time at the nearest residential properties on Hurrell Lane. At worst, a moderate impact is predicted, but there would be no residual effects as a result of construction noise. Mitigation measures to control noise emissions will be implemented.

Noise during the Pipelines Construction

- 10.41 The pipelines construction works will, for the most part, be completely inaudible at distant locations, or will be subjectively unnoticeable because the noise emissions are similar in character to those from agricultural machinery. The hours of operation will be strictly limited, whereas normal agriculture has no such restrictions. Where the pipelines excavation, installation and trench backfilling occurs at or near its closest approach to noise-sensitive properties, it will be clearly audible, but given its temporary nature the noise impact will be, at worst, minor, with only a few properties possibly affected.

Road Traffic Noise

- 10.42 There will be no detectable changes in the daily average noise level from road traffic on the A170 primary route. The noise levels from road traffic at all residential properties within earshot of the road are subject to substantial seasonal variation, but when compared with the average annual traffic flows (as opposed to the maximum, summertime flows) the increase in traffic as a result of the Proposed Development is not measurable.
- 10.43 Noise from individual vehicle movements on minor roads will be clearly heard by casual observers, but the increase in noise will be limited to single events as the vehicle passes. There will not be large numbers of additional private car movements, compared with the normal baseline traffic flows, and movements of HGVs will take place only during the working hours defined herein.

Assessment of Noise Emissions during Operations

- 10.44 Noise from the operational Ebberston Wellsite will not be discernible at Givendale Head Farm, the nearest noise-sensitive receptor.

10.45 Predictive calculations using the information currently available indicate that noise from the operational Gas Processing Facility at Hurrell Lane may just be detectable at the nearest residential properties at times of extreme quiet. For the great majority of the time, the pre-existing background noise will significantly exceed any noise emissions from the plant. However, careful design and specification of noise control equipment where necessary will enable the acoustical model to be refined as the detail design progresses.

Mitigation Measures

10.46 Because the actual noise emissions from the Gas Processing Facility depend on the detail design of the site and disposition of equipment on individual 'skid' packages, some mitigation of noise emissions may be necessary. This can be designed into the facility by limiting the individual noise emissions from each scope of supply, and imposing a requirement for maximum noise levels on equipment vendors.

10.47 The possibility that further noise control measures may be required, such as on-plant screening or additional landscaping, cannot yet be eliminated completely, but given that the worst-case scenario was modelled, such measures are unlikely to be necessary.

10.48 Construction noise is best mitigated by careful implementation of BS.5228-1, *Code of Practice for noise and vibration control from construction and open sites*. This ensures that the maximum noise levels from construction and fabrication activities remain within acceptable limits (normally 55dB $L_{Aeq, 1hr}$ at the nearest noise-sensitive properties) and only arise during 'social' hours: this means that evening and night-time work on noise-making activities is eliminated. Liaison will be established and maintained with local residents, and a point of contact provided, so that should the noise received by a resident be unacceptable, steps can quickly be taken to establish the cause and prevent recurrence.

Residual Effects

10.49 Traffic noise emissions associated with the operation of the pipeline, Hurrell Lane Gas Processing Facility and Ebberston Wellsite are negligible, as there will only be small numbers of vehicles associated with the operational phase of the Proposed Development.