

## 10.0 NOISE ASSESSMENT

### Introduction

- 10.1 This chapter of the ES assesses the likely significant effects of the Proposed Development in terms of environmental noise and incorporates a summary of the likely effects.
- 10.2 The chapter describes the assessment methodology; the baseline conditions currently existing at the Assessment Site and 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 these measures have been employed. This chapter has been prepared by ACIA Engineering Acoustics.

### Legislation, Planning Policy and Guidance

#### National Legislation

- 10.3 The principal legal control over environmental noise is based on the concept of 'nuisance', contained in Part III of the Environmental Protection Act 1990 (Ref. 10.1). 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, a Local Authority 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.
- 10.4 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 Method of rating industrial noise affecting mixed industrial and residential areas (Ref. 10.2), as described below.
- 10.5 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 (Ref. 10.3).

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 (Ref. 10.4). The Regulations restrict the permissible sound power emissions of, inter alia, excavators and wheeled backhoe loaders.

## Planning Policy Context

### *National Planning Policy*

#### National Planning Policy Framework (March 2012)

- 10.6 The National Planning Policy Framework (March 2012) (Ref. 10.5) states at paragraph 120 that planning policies and decisions should ensure that new development is appropriate for its location, and the effects of pollution on general amenity should be taken into account. Annex 2 (Glossary) to the NPPF states that pollution can arise from a range of emissions including noise.
- 10.7 Paragraph 123 is specific to issues of noise and states that planning policies and decisions should avoid noise giving rise to '*significant adverse impacts on health and quality of life*'. Policies and decisions should mitigate the adverse impacts through the use of conditions, but it is recognised that development will often create some noise. Areas of tranquillity which have remained relatively undisturbed by noise are to be identified by planning policies and decisions if they are prized for their recreational and amenity value for this reason.
- 10.8 Paragraph 147 describes the responsibilities of minerals planning authorities with regard to onshore oil and gas development. The three phases of development (exploration, appraisal and production) must be clearly distinguished. In noise terms this means that different limits for noise emissions may be appropriate for different phases of a project.
- 10.9 The Technical Guidance to the NPPF (March 2012) (Ref. 10.6) deals with noise emissions from mineral workings at paragraphs 28 and 29. Paragraph 30 defines noise standards for minerals sites as summarised below.
- 10.10 Subject to a maximum of 55dB  $L_{Aeq,1hr}$ , mineral planning authorities should aim to establish a noise limit that does not exceed the background noise level by more than 10dB. Recognising that this may impose unreasonable burdens on mineral operators, the daytime noise limit should be set as near that level as practicable (07.00h – 19.00h). Evening limits (19.00h – 22.00h) should not exceed background noise by more than 10dB, and night-time limits

should not exceed 42dB  $L_{Aeq,1h}$  (free field) at noise-sensitive dwellings. The night-time limit is identical to that in the superseded MPG11 (Ref. 10.7) and MPS2 (Ref. 10.8) guidance, and is also based on the assumption of permanent night-time working.

10.11 Annex 3 to the NPPF is a list of documents replaced by the Framework. It includes Planning Policy Guidance 24: *Planning and Noise* (3 October 1994) (Ref. 10.9), and Minerals Policy Statement 2: *Controlling and Mitigating the Environmental Effects of Minerals Extraction in England* which includes its Annex 2: Noise (23 May 2005) (Ref. 10.8).

#### Overarching National Policy Statement for Energy EN-1

10.12 The Overarching National Policy Statement for Energy EN-1 (Ref. 10.10) states that Government policy on noise is set out in the Noise Policy Statement for England (Ref. 10.11), which promotes good health and good quality of life through effective noise management. EN-1 goes on to say that factors determining the likely noise impact include *inter alia*:

- The inherent operational noise from the proposed development, and its characteristics;
- The proximity of the proposed development to noise sensitive premises and noise sensitive areas.

10.13 EN-1 sets out the requirements for an applicants' noise assessment at paragraph 5.11.4. Where noise impacts are likely to arise from the proposed development, the following points should be included:

- A description of the noise generating aspects of the development proposal leading to noise impacts, including the identification of and distinctive tonal, impulsive or low-frequency characteristics of the noise;
- Identification of noise sensitive premises and noise sensitive areas that may be affected;
- The characteristics of the existing noise environment;
- A prediction of how the noise environment will change with the proposed development:
  - In the shorter term such as during the construction period;
  - In the longer term during the operating life of the infrastructure;
  - At particular times of day, evening and night as appropriate;
  - An assessment of the effect of predicted changes in the noise environment on any noise sensitive premises and noise sensitive areas; and
  - Measures to be employed in mitigating noise.

- 10.14 The noise impact of ancillary activities associated with the development, such as increased road traffic movements, should also be considered.

British Standards

- 10.15 Operational and construction noise is to be assessed using the principles of the relevant British Standards, including BS.4142, BS.8233 and BS.5228 (Refs. 10.2, 10.12 and 10.13 respectively).

*Local Planning Policy*

North Yorkshire County Council Adopted Minerals Local Plan Saved Policies (1997) (Ref. 10.14)

- 10.16 Many of the policies forming part of the previous Minerals Local Plan have been saved, which means that they will continue to form part of the statutory development plan for North Yorkshire and provide the local policy framework for development control decisions until they are replaced by policies in the Minerals Core Strategy (Ref. 10.15). Chapter 4 – Environmental Protection has been saved in respect of several issues but none is relevant to noise assessment.
- 10.17 Chapter 7 of the previous Minerals Local Plan dealt with oil and gas, and all policies relating to issues other than transport and noise have been retained. The previous noise policy is no longer valid. This means that although the saved policy requires noise issues to be analysed (paragraph 7.2.5) the noise limits at noise-sensitive properties which neighbour exploration, appraisal and production wells (former Policy 7/1) will no longer apply to new applications.

North York Moors National Park Authority Core Strategy and Development Policies (2008) (Ref. 10.16)

- 10.18 The Core Strategy and Development Policies were formally adopted on 13 November 2008 following an Examination in Public by a Government-appointed Inspector. Environmental noise does not appear as an issue in these policies.

Ryedale Local Plan, March 2002 (Ref. 10.17)

- 10.19 Chapter 15 of the Ryedale Local Plan includes Policy ENV21, Noise-generating development. This states that development which would cause unacceptable levels of noise disturbance will

not be permitted. Development will be resisted which would lead to unacceptable levels of noise disturbance problems through the introduction of noise-generating development into a noise-sensitive area. However, where noise problems can be overcome using mitigation measures, these will be enforced through appropriate planning conditions and/or legal agreements.

The Ryedale Plan – Local Plan Strategy May 2012 (Submission Document) (Ref. 10.18)

- 10.20 The document submitted for scrutiny by a Planning Inspector appointed by the Secretary of State is expected to become part of the Local Planning Framework in due course. It is a strategic document and is not concerned with noise issues.

### **Assessment Methodology**

#### Background Noise

- 10.21 The pre-existing background noise levels have been determined on previous occasions, with a four-hour night-time noise survey having been carried out in December 2004 as part of the planning submission for the Ebberston Moor 'A' Well Site (NYM/2005/0254/FL). These background noise levels were expected to be representative of present-day conditions and it was necessary only to verify this by means of brief checks of the minimum background noise levels at local noise-sensitive properties. The checks took place on 5 and 6 November 2012. An integrating data-logging sound level meter (Rion type NL-32) fitted with an outdoor microphone protection system (double windshield) was used, with the microphone positioned 1.2m above the ground. The meter was subject to field calibration checks using a suitable electronic calibrator and no drift was observed. The meter had been subject to a laboratory calibration traceable to national standards on 23 March 2012.

#### Noise from Knapton Generating Station

- 10.22 The noise levels currently emitted by plant in the Knapton Generating Station (KGS) have been measured on several occasions during the operational life of the facility, but in order that up-to-date information was available for use in the assessment of the Proposed Development, further surveys were undertaken around the perimeter fence of KGS and near neighbouring noise-sensitive locations (local dwellings). These surveys took place in June 2012.

### Assumptions for Calculations

- 10.23 Two different scenarios were used for noise prediction work: the first scenario is that the Eberston Moor 'A' Well Site is in its present form, with no further development having taken place. The second scenario is that the Eberston Moor Early Development Scheme (Eberston Moor EDS), the subject of a previous planning application (NYM/2013/0477/EIA), is given planning permission and is already in operation prior to commencement of construction on the Proposed Development. The cumulative effects of this second scenario are dealt with at paragraph 10.94.
- 10.24 If the Eberston Moor EDS proceeds all the structures and equipment on the Eberston Moor 'A' Well Site will already have been provided as part of that application and will not be constructed as part of this Proposed Development. If the Eberston Moor EDS does not go ahead prior to this Proposed Development then construction of the facilities on the well site as described in Chapter 4 will be undertaken as part of this Proposed Development.
- 10.25 The pipeline between the well site and KGS will be constructed as part of both scenarios. Any activities concerned with the proposed sidetrack from Eberston Moor – 1 Well are disregarded. These are subject to a separate planning application (NYM/2013/0068/FL) and drilling will be finished by the date of commencement of works on site in connection with the Proposed Development.
- 10.26 For the normal, operational phase at the Eberston Moor 'A' Well Site, whether this represents the Eberston Moor EDS or operational noise from the Proposed Development, all equipment is assumed to be operating continuously. Equipment designated for emergency use only is assumed not to be running.
- 10.27 During construction work at the Eberston Moor 'A' Well Site, up to three items of machinery — a backhoe loader, a 360° excavator, and a packaged generator set — are assumed to be in operation simultaneously. This will be the 'worst case' scenario and will apply when there is no wind, or a slight wind from the Proposed Development towards the noise receptor. A more typical scenario, where a generator will be operating continuously but the excavator and backhoe loader only for 25% of a given hour, has also been assessed using BS.5228-1:2009 Code of practice for noise and vibration control on construction and open sites (Ref. 10.13). There will also be sporadic use of other equipment and machinery including a portable compressor, fabrication equipment, cranes and mechanical handling equipment, and movements of heavy goods vehicles (HGVs) delivering materials to site.

- 10.28 In order to assess the noise emitted during pipeline construction, a group of three machines was assumed to be in operation simultaneously at the closest approach of the pipeline 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 pipeline 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.
- 10.29 Construction of any additional facilities at KGS will require minimal use of earthmoving equipment. Construction noise at KGS was therefore considered to be included in pipeline construction noise.
- 10.30 For short term temporary construction and long term/permanent operations, and for short term decommissioning and restoration 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:

$$L_{pr} = L_w - 20 \log r - 8 - \Sigma A \quad [dB].$$

Where  $\Sigma A$  is the sum of all excess attenuations resulting from ground effects, atmospheric absorption, and screening, all of which are frequency dependent. Pipework noise is a special case, because from some viewpoints there may effectively be a linear source rather than a point source, so a geometric attenuation of  $10 \log r$  was used instead of  $20 \log r$ .

#### Noise Source Locations

##### *Construction and Decommissioning and Restoration: Eberston Moor 'A' Well Site*

- 10.31 If the Eberston Moor EDS is not already in operation, the potential noise sources during construction and decommissioning and restoration will move around the main Assessment Site and will vary from time to time. For prediction purposes the sources were lumped together at a reference location (489907 E, 489687 N) between the existing well (Eberston Moor – 1) and well cellar on the existing Eberston Moor 'A' Well Site.
- 10.32 In view of the separation distances involved between the noise sources and any receptor, 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 construction it has been assessed on the assumption that the noise emissions are typical of the large diesel engines used in construction machinery.

- 10.33 If the Eberston Moor EDS is already in operation, construction activities at the main Assessment Site will be more limited in scope, but noise from the operational plant will still be present during construction of the Proposed Development.

#### *Construction of pipeline*

- 10.34 Noise from pipeline 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) at any one location. In addition, from time to time a 50T mobile crane may 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. Roads, railways and the River Derwent will be traversed using an augering process, which requires the use of a diesel-driven rig with hydraulic pumps.

#### *Operation*

- 10.35 The OS grid coordinates adopted for noise prediction purposes for each item of plant on the Assessment Site that is a potential noise source are shown in **Table 10.1** and **Figure 10.1**. Where there is more than one similar noise source, all are lumped together for prediction purposes. The separation distances between the Proposed Development and the nearest noise-sensitive receptors are sufficiently great that no significant inaccuracy will result from this approximation.

**Table 10.1: Operational noise source locations for predictive work**

Reference	Location	Easting	Northing
P1	between wellheads	489907	489687
P2	transfer pumps	489919	489710
P3	ground-level pipework	489941	489720
P4	metering skid	489942	489687
P5	gas-fuelled 1000kW generator	489953	489698

- 10.36 In view of the separation distances involved between the noise sources and any receptor, there will be additional attenuation of sound as it passes over soft ground. This additional attenuation is dependent on frequency. In the case of gas processing equipment, small



pumps and pipework, the additional attenuation of sound as it passes over soft ground depends on the assumption of a source height applicable to each particular source. There will not be significant additional noise from operations at the KGS end of the pipeline.

- 10.37 There are no noise implications from operation of the pipeline other than those arising at the Assessment Site.

#### *Road traffic noise*

- 10.38 The assumed additional road traffic movements during the pipeline construction phase are shown in **Table 10.2**.

**Table 10.2: Estimated construction traffic movements**

Project Activity	Vehicle Movements (no.)		Time period
	HGV	Others	
Eberston Moor 'A' Well Site	6	35	Weekly
	2	7	Daily
Pipeline	64	225	Weekly
	18	48	Daily

- 10.39 Noise from road traffic movements is usually predicted with reference to the Department of Transport's 1988 document Calculation of Road Traffic Noise (CRTN) (Ref. 10.19) 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, because it relates to the noise resulting from steady traffic flows rather than sporadic vehicle movements, 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 Proposed Development, so the only potential changes in noise level from the road network are those arising from increases in the numbers of vehicle movements during the construction phase. During operation there will be normally be no heavy goods vehicles visiting the Assessment Site.

#### Noise-sensitive receptors

- 10.40 The only potential noise-sensitive receptors identified in this study are private residential 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 Proposed Development to require consideration in terms of noise. In general, only residential dwellings within 1 km of the Assessment Site were considered to be within the scope of the noise prediction.

Preliminary calculations showed that no noise whatsoever would be audible above background at greater separation distances even at the quietest times of night. The OS grid coordinates of the noise-sensitive receptors to the well site (where most of the noise will potentially be generated) are shown in **Table 10.3**. The grid references shown are within the curtilage of each property, typically on the side facing the Proposed Development, as shown on **Figure 10.2**. The typical minimum separation distances between site construction plant and each location are also shown in **Table 10.3**.

**Table 10.3: Noise-sensitive receptors for construction and decommissioning and restoration noise calculations for the well site**

Ref.	Receptor Location for construction and decommissioning and restoration noise:	Easting	Northing	Closest approach
R1	Ebberston Common Farm	490077	489434	304m
R2	South Moor Farm	490451	490328	775m
R3	Jingleby Thorn	489370	489546	555m

10.41 **Table 10.4** shows the separation distances between each item of operational equipment (**Table 10.1**) and the same three noise receptor locations.

**Table 10.4: Separation distances for operational noise calculations**

Ref.	Receptor Location for operation noise	Closest approach distance				
		to P1	to P2	to P3	to P4	to P5
R1	Ebberston Common Farm	304m	318m	317m	286m	292m
R2	South Moor Farm	775m	750m	727m	749m	735m
R3	Jingleby Thorn	555m	573m	597m	590m	602m

10.42 **Table 10.5** and **Figures 10.2(a), 10.2(b) and 10.2(c)** show all noise-sensitive locations within 500m of the pipeline route, together with the perpendicular distance from the centreline of the pipeline to each residential dwelling. Location R2 is omitted because it lies outside the study area, some 650m from the pipeline route. **Table 10.5** also shows the closest approach between any pipeline crossing (road, railway or river) by augering (horizontal boring), directional drilling or a suitable alternative installation technique, and the noise-sensitive receptor, where this is less than 500m.

**Table 10.5: Closest noise-sensitive receptors to pipeline route**

Ref.	Receptor location for pipeline construction noise	Distance, m, from construction	Distance, m, from augering/directional drilling process
R1	Ebberston Common Farm	221	-

Ref.	Receptor location for pipeline construction noise	Distance, m, from construction	Distance, m, from augering/directional drilling process
R3	Jingleby Thorn	387	-
R4	Givendale Head Farm	276	-
R5	High Scamridge	398	-
R6	Warren House Farm	122	-
R7	Cliff Edge Farm	271	280
R8	Wilton Carr House	481	-
R9	Grange Farm	177	180
R10	New House	199	210
R11	Crake Hall Cottage	265	305
R12	Newstead Grange	365	365
R13	Wath House Farm	210	-
R14	Knapton Lodge	287	350
R15	Difford Farm	370	390

### Significance Criteria

10.43 An individual's sensitivity and reaction to external noise varies according to the perceived loudness of the noise, its character, and the context in which it is heard. In terms of the present study, noise could affect residential amenity, meaning that the enjoyment of property is adversely affected, or could affect sleep, either because noise is audible in bedrooms at night or because sudden noise 'events' wake up a sleeper. A permanent development that was expected to increase the existing background noise level so as to affect amenity would not in general be permitted. The number of properties likely to be affected is also a consideration, and the planning process seeks to balance loss of amenity against the wider public interest. **Table 10.6** shows the definitions of significance applied in this assessment, ranging from 'critical' to 'none'.

**Table 10.6: 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 impacts 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

Significance	Criterion
	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.

#### Noise limits

- 10.44 The public response to noise arising from the Proposed Development depends on the pre-existing level of background noise, the amount by which the 'new' noise exceeds it, and the duration of any increase in noise levels. Noise from short-term activities is more acceptable than noise at the same level from more permanent activities. Noise during the evening and at night is less acceptable than the same noise occurring during the normal working day.

#### *Construction noise*

- 10.45 No fixed limits apply to construction noise in the UK. BS.5228-1:2009 *Code of practice for noise and vibration control on construction and open sites* (Ref. 10.13) is the usual source of guidance on construction noise. It is usual to establish a daytime noise limit of 55dB  $L_{Aeq,1h}$  outside neighbouring residential property but much stricter limits outside normal working hours (07.00h – 19.00h daily). Short-term increases over this level can be acceptable.
- 10.46 BS.5228-1 requires that all available techniques should be used to minimise the levels of noise to which site neighbours are exposed, as far as is appropriate. These techniques include planned hours of working, taking into account the likely consequence of any lengthening of the work periods; the use of quiet working methods including the use of the most suitable plant, and economy and speed of operations; the control of noise at source where practicable; and on-site noise monitoring to an agreed method. It is open to Local Planning Authorities to specify site noise limits and working hours. Moreover, the Local Planning Authority has powers under Section 60 of the Control of Pollution Act 1974 (Ref. 10.20) and the Environmental Protection Act 1990 (Ref. 10.1) to control noise (and vibration) from construction sites.

*Operational noise*

- 10.47 The North York Moors Core Strategy and Development Policies (2008) (Ref. 10.16) states that development would only be permitted where there would 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 would not generate unacceptable levels of noise or vibration. In this context, 'unacceptable' levels of noise from a facility operating 24 hours a day, seven days a week can be regarded as synonymous with 'audible' level of noise. In other words, the Proposed Development should be designed so as not to increase the levels of continuous noise outside noise-sensitive receptors.
- 10.48 In terms of noise limits, this objective presents a problem because the noise levels arising from the Proposed Development in normal production will not be measurable above background noise at the relevant receptor locations. It is therefore considered appropriate to impose a noise limit at the site boundary. Such a limit may be derived taking as a starting point an acceptable noise level at the nearest receptor location, and determining by calculation what the corresponding noise level would be at the site boundary. This point is discussed later in the Chapter.

*Decommissioning and Restoration*

- 10.49 The provisions of BS.5228-1(Ref. 10.13) will also apply to the decommissioning phase of operations on site and to site restoration activities. A first approximation of the noise levels at the nearest noise-sensitive receptors is that decommissioning and restoration noise will be comparable with construction noise. It is open to Local Planning Authorities to specify site noise limits and working hours or to use its powers under Section 60 of the Control of Pollution Act 1974 (Ref. 10.20) and the Environmental Protection Act 1990 (Ref. 10.1) to control noise (and vibration) from demolition and site reinstatement.

*Vibration*

- 10.50 Given the separation distances between the Proposed Development and the nearest residential properties, a brief qualitative assessment was conducted. There will be no sources of significant ground vibration during the construction, operational or decommissioning and restoration phases of the Proposed Development. There are no known instances where the construction, operation or decommissioning and restoration of this type of project give rise to discernible vibration at a dwelling hundreds of metres distant. If no vibration is discernible

to a human observer, there is no possibility of any physical damage to property. No further assessment was therefore made.

- 10.51 The pipeline route passes within a few tens of metres of some dwellings. This means that slight groundborne vibration may be detectable by persons within their own homes, depending on the construction of the building in question, when construction is at its closest to the property. Vibration may be detected by a human observer at levels several orders of magnitude lower than the levels at which even minor cosmetic damage may occur, as stated in BS.7385: Part 2 1993 (Ref. 10.21). Cracking in plasterwork, for example, frequently occurs in buildings whether or not they are exposed to vibration. However, where a new source of vibration occurs, occupants of buildings can be disturbed and may assume that damage is being caused. Any minor architectural cracks which had not previously been noticed may then be attributed to the new source of vibration. A peak particle velocity of 15mm/s at 4Hz, rising to 20mm/s at 15Hz and 50mm/s at 40Hz must be exceeded before cosmetic damage occurs. These levels are unlikely at distances of more than 20m from the machinery expected to be used for pipeline construction, although ground conditions and individual building configurations make accurate predictions impossible.
- 10.52 BS.6472: Part 1 2008 (Ref. 10.22) deals with the assessment of vibration as it affects humans. It sets out vibration dose values below which there is a low probability of adverse comment, as well as levels which make adverse comments possible or probable. The range of dose values above which adverse comments become possible is around  $0.4\text{m/s}^{1.75}$  for daytime exposure. Doses at these levels are unlikely to occur, or if they do, the vibration will only occur whilst construction is at its closest approach to the property in question. There is no guidance in planning terms as to whether no adverse comments, low adverse comments, or possible adverse comments constitutes the appropriate acceptable level of disturbance.

### **Baseline Conditions**

Background noise levels

#### *Previous noise surveys*

- 10.53 During the course of gas exploration and development in North Yorkshire over the past 25 years, several surveys have been conducted of the background noise levels outside local residential properties. Whilst the results are to some extent dependent on the exact location of the survey, the common findings are that the night-time background noise levels at local residential properties can be very low indeed, with measured  $L_{A90,5\text{min}}$  values below 20dB.

- 10.54 A noise survey specific to the Assessment Site was conducted between midnight and 04.00h on 2 December 2004 in connection with the previous planning application (Ref. NYM/2005/0254/FL) for drilling at Ebberston Moor 'A' Well Site. Background noise levels were measured at the farm entrance to Ebberston Moor Farm and the results were consistently in the range 17 to 20 dB  $L_{A90,5min}$  for the entire four-hour period. The equivalent continuous noise level  $L_{Aeq,5min}$  varied from 20 to 27 dB over the same period, with a median value of 24dB.
- 10.55 Brief noise surveys were conducted on 5 and 6 November 2012 in connection with the Proposed Development, with the intention of confirming the presence or absence of any significant noise sources which would otherwise have been undetected. No such sources were found. The typical daytime noise levels at Ebberston Moor Farm, South Moor Farm and Jingleby Thorn were in the range 30 to 35 dB  $L_{A90,5min}$ , and the typical night-time noise levels on a calm dry night were again in the range 18 to 20 dB  $L_{A90,5min}$ . It was therefore confirmed that the minimum noise levels previously measured had not changed in the intervening period and were indeed representative of the quietest conditions likely to occur.
- 10.56 Noise surveys were also conducted near residential properties to the west and north of KGS and at a few readily accessible locations along the pipeline. The general levels of daytime noise in summertime on a dry and reasonably calm day were in the range 30 to 40 dB  $L_{A90,5min}$  depending on proximity to major roads and the volume of traffic. Daytime noise levels vary according to the time of year, weather, the activities of wildlife and farm animals, and events resulting from human activity including sporadic road vehicle movements, aircraft over-flights and agricultural operations. In windy or wet conditions the background noise level can safely be assumed to be higher because of rustling of vegetation, the noise of light objects being blown around, and the sound of rainfall. Wet weather generally increases the levels of background noise as a result of traffic on wet roads, but the great majority of the pipeline route is far enough from the major road network for this not to be a factor.

*Other considerations*

- 10.57 Ebberston Lane and Ebberston Common Lane are subject to occasional large vehicle traffic movements associated with the operation of a recycling/composting facility at Givendale Head Farm. Refuse lorries bring material northwards along Ebberston Lane and Ebberston Common Lane for recycling at the farm, and return empty. The numbers of such lorry movements are variable, but from casual observation they average about one lorry (two movements) an hour on weekdays. The residential property at Givendale Head (R4,

489444E, 487593N) about 2 km south of the well site, is the only dwelling that will be subject to regular additional movements of HGV traffic at close quarters. Individual lorry movements will always more than 200m away from the three potentially noise-sensitive locations listed in **Table 10.2**, and the farmhouse at High Scamridge Farm (R5, 498636E, 487712N

### Likely Significant Effects

#### Construction

- 10.58 The noise levels resulting from construction activities on the Assessment Site, which would normally occur only during daytime working hours (07:00 to 18:00 Monday to Friday and 07:00 to 13.00 on Saturdays), are shown in **Table 10.7**. The predictions are based on typical sound power levels for construction machinery: a backhoe loader emits an equivalent continuous sound power level of 112dB(A); a 360° excavator 114dB(A); and a 'silenced' package diesel generator 97dB(A).

**Table 10.7: Predicted noise levels during construction,  $L_{Aeq,1h}$  dB**

Ref	Source Location (continuous)	Source Location (allowing for on-time)
R1	51	46
R2	38	33
R3	43	37

- 10.59 The levels in **Table 10.7** are comfortably within the 55dB limit level suggested by the Technical Guidance to the NPPF (Ref. 10.6), and the limit for construction noise in BS.5228 part 1:2009 (Ref. 10.13).
- 10.60 The predicted construction noise levels are of moderate adverse significance in terms of their effect on the amenity of local residents. The limits in BS.5228-1 are not intended to result in zero significance, since the transient nature of construction noise is understood and taken into account.
- 10.61 If the Eberston Moor EDS has already been brought into operation, the duration and scope of the construction works will be greatly reduced at the well site. However, the worst-case scenario for noise at local dwellings remains valid.
- 10.62 The noise levels resulting from pipeline construction activities along its route, which would normally occur only during daytime working hours (07:00 to 18:00 Monday to Friday and 07:00 to 13.00 on Saturdays), are shown in **Table 10.8**. The predictions are based on typical



sound power levels for pipelaying machinery: the 360° excavator envisaged for these works has a sound power level of 110dB(A); a sideboom pipelayer a sound power level of 110dB(A), and a typical HGV dumper truck a sound power level of 102dB(A). The noise emissions of a 50T crane are similar to those of an excavator.

- 10.63 The noise levels from an auger rig are similar, since the machinery includes a diesel engine and hydraulic pumps. An overall sound power level of 113dB(A) is typical for one hour of normal operation.
- 10.64 The levels in **Table 10.8** are the maximum hourly noise levels occurring as a result of the excavations, pipelaying machinery and a goods vehicle (only one at any given time) at a location representing the closest approach of the route to the property in question. The maximum levels from pipeline crossings, where appropriate, are also shown.

**Table 10.8: Worst-case noise levels at receptors close to pipeline route**

Ref.	Receptor location for pipeline construction noise	$L_{Aeq,1h}$ dB from construction	$L_{Aeq,1h}$ dB from augering
R1	Eberston Common Farm	55	
R3	Jingleby Thorn	50	
R4	Givendale Head Farm	53	
R5	High Scamridge	50	
R6	Warren House Farm	60	
R7	Cliff Edge Farm	53	56
R8	Wilton Carr House	48	
R9	Grange Farm	57	60
R10	New House	56	59
R11	Crake Hall Cottage	54	55
R12	Newstead Grange	51	54
R13	Wath House Farm	56	
R14	Knapton Lodge	53	54
R15	Difford Farm	51	53

- 10.65 The maximum hourly noise levels are generally within the suggested limit in the Technical Guidance to the NPPF (55dB  $L_{Aeq,1h}$ ) except that at Warren House Farm, Grange Farm, New House and Wath House Farm, the pipeline route is close enough that a maximum level of up to 60dB  $L_{Aeq,1h}$  can be expected during the course of no more than a day or two. The properties mentioned above are in working farmland and noise from diesel engines (tractors and other agricultural machinery) will often be present. Noise levels of the same order as the maximum pipeline construction noise are commonplace.

10.66 Short-term increases over the suggested limit can in any case be acceptable: temporary daytime noise limits of up to 70dB  $L_{Aeq,1h}$  for periods up to eight weeks can be considered for essential site preparation and restoration work, so a matter of days with possible noise levels of 55 to 60 dB would fall well within this concession.

*Road traffic noise*

10.67 During the construction phase there will be an increase in vehicular traffic along Eberston Lane and Eberston Common Lane and some noise from heavy goods vehicles travelling on the public highway is unavoidable. At this stage it is not possible to state exact numbers, because the construction programme cannot be determined until the front-end engineering design (FEED) study has been completed. There are likely to be no more than two or three additional vehicle movements per hour during the normal working day and on Saturday mornings during the construction period.

10.68 Each vehicle will pass along Eberston Lane and Eberston Common Lane past Givendale Head Farm, 2km to the south of the well site. The increase in traffic noise in terms of  $L_{Aeq,16h}$  (the usual parameter) resulting from these movements past Givendale Head Farm cannot readily be calculated because the overall traffic flows are very low. Individual vehicle movements will give rise to localised increases in noise level for a matter of seconds. The noise levels from lorry movements received at the three noise-sensitive receptors identified in **Table 10.4** will have a negligible effect on the daytime ambient noise levels because of the effects of intervening distance.

10.69 There will also be increased numbers of goods vehicle using the local road network along the length of the pipeline route. The increase in traffic noise in terms of  $L_{Aeq,16h}$  (the usual parameter) resulting from these movements past any of the receptor locations R5 to R15 cannot readily be calculated because the overall traffic flows are very low. Individual vehicle movements will give rise to localised increases in noise level for a matter of seconds. The noise levels from lorry movements received at the noise-sensitive receptors identified in **Table 10.5** will have a negligible effect on the daytime ambient noise levels because of the effects of intervening distance.

Operation

10.70 The noise levels resulting from the normal operation of the Proposed Development were calculated assuming that all equipment runs continuously, 24 hours a day, seven days a week. In fact, subject to gas production and demand, there may be times of little or no activity and the noise levels would then be considerably lower.

10.71 The sound power levels from operational plant will depend on the chosen vendors for individual items. The exact models of rotating machinery will be the subject of a competitive bid process and will be informed by the results of the FEED study. For present purposes the assumed sound pressure levels at a distance of 1m are shown in **Table 10.9**. It is quite usual in the oil, gas and petrochemicals industry for a plant to be designed to meet specific noise limits — either at the site boundary, or at local noise-sensitive locations — because it is not possible to compute the noise levels under operational conditions unless good quality noise input data are available. Such data are received by the engineering team during the course of the enquiry and procurement stage, and maximum noise levels from individual packages can be written into supply contracts. It is common for noise witness tests to take place during acceptance testing of equipment.

**Table 10.9: Assumed noise emissions from plant**

Reference	Location	L <sub>Aeq,t</sub> dB at 1m	Notes
P1	Wellheads	25	based on existing N Yorkshire wellhead sites
P2	transfer pumps	55	each pump (one runs at a time)
P3	ground-level pipework	50	typical value
P4	metering skid	45	based on similar installations
P5	gas-fuelled generator	70	typical noise-reduced containerised unit

10.72 The typical continuous noise levels at the sensitive receptors resulting from the operation of all plant in **Table 10.9** are shown in **Table 10.10**.

**Table 10.10: Operational noise levels at receptors**

Reference	Location	L <sub>Aeq,t</sub> dB
R1	Eberston Common Farm	19
R2	South Moor Farm	12
R3	Jingleby Thorn	14

10.73 The levels in **Table 10.10** are at or below the minimum levels of background noise expected in the locality. They are therefore of no significance in terms of their effect on the amenity of local residents.

10.74 People passing the Proposed Development on Eberston Common Lane as part of leisure activities, whether on foot, horseback or bicycle, will be subject to noise at levels not exceeding 60dB(A) at their closest approach to the well site. There is no reason to suppose this will detract from the leisure experience, and there are no health implications. In terms of these activities the operation of the Proposed Development is of minor adverse significance.

- 10.75 There are no noise implications for locations along the pipeline route as there will be no discernible or measurable noise from gas flow within the buried pipeline, even for a listener directly above it.
- 10.76 There will be no change in operational noise levels at KGS, other than the normal variation already occurring as a result of changes in energy demand. The introduction of the new pipeline will make no significant difference to the noise levels on plant, and thus there will be no change to the environmental noise levels experienced by residential neighbours.

#### *Road traffic noise*

- 10.77 During normal production the well site and pipeline will be unattended, so any vehicle movements that do occur will be infrequent and sporadic.
- 10.78 There are no road traffic noise implications during operation of the pipeline, since no additional vehicle movements will be generated along the pipeline route or at KGS.

#### Decommissioning and Restoration

- 10.79 The levels of noise arising during decommissioning (dismantling and removal of plant) and site restoration (primarily earthworks) for either scenario as described in Chapter 6 will at worst be no greater than those arising during site construction, with earthmoving machinery being the greatest sources of sound power. The values in **Table 10.8** also represent the maximum  $L_{Aeq,1h}$  from levelling and grading the site after operational equipment has been removed. The predicted noise levels are of moderate adverse significance in terms of their effect on the amenity of local residents.
- 10.80 During the decommissioning phase there will be an increase in vehicular traffic along Eberston Lane and Eberston Common Lane and some noise from heavy goods vehicles travelling on the public highway is unavoidable. At this stage it is not possible to state exact numbers, because the programme of decommissioning, dismantling and site works is unknown. However, the worst case scenario would occur if planning permission for the future use of Eberston Moor 'A' Well Site is not secured before the end of the life of this Proposed Development: in that case the numbers of heavy goods vehicles using Eberston Lane and Eberston Common Lane will be comparable with the numbers during the construction phase assuming that the Eberston Moor EDS is not constructed prior to this Proposed Development, with similar temporary effects on environmental noise.

## Mitigation Measures

### Construction

- 10.81 No mitigation measures are necessary beyond the usual good practice recommended in BS.5228-1:2009 (Ref. 10.13), which states that good relations with people living and working in the vicinity of site operations are of paramount importance. People will be kept informed of progress by the appointment of a responsible person to liaise with the public. In general, the longer the duration of on-site activities, the more likely noise is to be an issue. Good public relations are important, as local residents are often willing to accept higher levels of noise if they know that such levels will only last for a short time.
- 10.82 Quiet working methods will be adopted and implemented through the Construction Environmental Management Plan (CEMP). They will include the use of the most suitable plant and reasonable hours of working for noisy operations. Noise will be controlled at source and on-site noise levels monitored regularly. The local authority may consider it appropriate to lay down or agree work programmes and periods of use of certain equipment which will be specified prior to construction.
- 10.83 General measures to reduce noise levels at source include the avoidance of unnecessary revving of engines, switching off equipment when it is not required, minimising the drop height of materials, and starting up plant and vehicles sequentially rather than all together. Audible reversing alarms should be of types that have a minimum noise effect on persons outside the site.
- 10.84 Noise from construction, both at the well site and along the pipeline route, will be controlled primarily by the restriction of working hours. It would be usual practice to allow potentially noisy activities only during the normal working week and on Saturday mornings, subject to local requirements. In this case, 07.00 to 18.00, Monday to Friday and 07.00 to 13.00 Saturday would be appropriate working hours as discussed in Chapter 6.

### Operation

- 10.85 The noise limit necessary to achieve the predicted contribution from the Proposed Development (i.e. to ensure that there is no audible noise above background) at the nearest noise-sensitive receptor to the well site, Eberston Common Farm, is 60dB  $L_{Aeq,5min}$  at any point on the Assessment Site boundary. This limit was derived from consideration of the

resulting contribution of the Proposed Development to the overall noise level (plant plus background) at that location, and can therefore be achieved by the proposed design.

- 10.86 No additional mitigation measures are necessary, but at the equipment procurement stage the design team will confirm that all plant operating together can achieve the proposed noise limits. The most significant contributor to environmental noise is the gas-fuelled generator package, and particular attention will be paid to the noise control equipment fitted to this unit. The assumed sound power output is approximately 90dB(A) and this must be considered the maximum acceptable. Lower levels are desirable in order to ensure that the suggested boundary noise limit is met.

#### Decommissioning and Restoration

- 10.87 As is the case for construction, quiet working methods will be adopted and implemented through the CEMP for decommissioning and restoration for either scenario. Measures will include the use of the most suitable plant and reasonable hours of working for noisy operations. Noise will be controlled at source and on-site noise levels monitored regularly. It may be appropriate to lay down or agree work programmes and periods of use of certain equipment, but since these cannot be specified at present such programmes should be subject to discussion and agreement with the local authority when the time comes.

### **Residual Effects**

#### Construction

- 10.88 There will be no residual noise effects as a result of construction activities.

#### Operation

- 10.89 Residual noise effects resulting from the operation of the Proposed Development will be of minor adverse significance. Members of the public passing the well site on foot, by bicycle or on horseback along Dalby Forest Drive may be aware of noise emissions from the gas pipework, but in the daytime and daylight evenings, noise will only be audible above the normal ambient noise levels within a few of metres of the well site boundary. Resident neighbours will not be affected by noise from the operational facility at any time and residual noise effects are of no significance.
- 10.90 There will be no residual noise effects resulting from the operation of the buried pipeline.

- 10.91 There will be no change in operational noise levels at KGS other than the normal variation already occurring as a result of changes in energy demand.
- 10.92 Traffic noise emissions associated with the operation of the Proposed Development are negligible, as there will only be small numbers of vehicles associated with the operational phase.

#### Decommissioning and Restoration

- 10.93 There will be no residual noise effects as a result of decommissioning and site restoration activities.

#### Cumulative Effects

- 10.94 In the event that the Eberston Moor EDS has received planning permission and is operational when construction of the Proposed Development commences, operation of the EDS will continue during additional construction works: the operational noise levels are expected to be subject to noise limits imposed by planning conditions such that no additional contribution is made to the daytime noise levels at R1, R2 and R3.
- 10.95 There will be a maximum of two vehicles each day visiting the EDS when it is operational (four movements). These vehicle movements will not be readily audible at any of the three noise receptors identified in the present study. Each vehicle will pass along Eberston Lane and Eberston Common Lane past Givendale Head Farm and will cause a brief temporary increase in the noise level there while they pass. The addition of four HGV movements a day will have no material cumulative noise effect, and is of no significance.
- 10.96 Once the Proposed Development is operational, the EDS will cease to operate and decommissioning and reinstatement will take place within the Lockton Compound. This will necessitate a relatively brief period of activity on site in which the flare, and redundant equipment on the Lockton Compound, are removed and the site restored to its original condition, but the wellhead and other equipment on the Eberston 'A' Well Site is retained for re-use. The major noise sources during this process will be earthmoving machines, as stone is removed and the earth bunds levelled. This will cause a temporary increase in total noise received during the normal working day at local noise-sensitive properties neighbouring the well site. It will be mitigated by restricting decommissioning activities on-site to the normal working day.

10.97 There are no cumulative noise effects as a result of the possible construction and operation of the Ryedale Gas Project whilst the Proposed Development is in operation. None of the three residential properties close to the Proposed Development, and listed in **Table 10.5**, are likely to be affected in any way by noise from the Ryedale Gas Project. There will be no noise along the pipeline route arising from operation of the Ryedale Gas Project pipeline.

### Summary

10.98 Construction noise may be audible at the nearest noise-sensitive receptors in some circumstances. However, the levels of such noise will be completely acceptable with regard to the usual standards, and the recommendations of BS.5228-1 (Ref. 10.13) can be implemented to reduce noise levels to a minimum. Working hours will be restricted by planning conditions or by mutual agreement in order to ensure that construction noise only occurs during the working day, and never in the evening or at night.

10.99 The noise arising from the operation of the Proposed Development at Ebberston Moor 'A' Well Site will have no significant effect on the residential amenity at local dwellings. Noise limits will be set so that the ambient noise levels outside all existing dwellings are not increased by normal operations on the well site. Items of noise-emitting plant will be specified and purchased following the FEED study so that the Proposed Development operates within these limits.

10.100 There is no noise associated with the operation of the pipeline along its route.

10.101 **Table 10.11** contains a summary of the likely significant effects of the Proposed Development.



**Table 10.11: Table of Significance – Noise**

Potential Effect	Nature of Effect (Permanent/ Temporary)	Significance (Major/Moderate/Minor) (Beneficial/Adverse/ Negligible)	Mitigation / Enhancement Measures	Geographical Importance*							Residual Effects (Major/Moderate/ Minor) (Beneficial/Adverse/ Negligible)
				I	UK	E	R	C	D / N P	L	
<b>Construction</b>											
Noise nuisance at noise-sensitive properties local to Ebberston Moor 'A' Well Site	Short term temporary	Moderate adverse	Restriction of operating hours							*	None
Noise nuisance at noise-sensitive properties within 500m of pipeline route	Short term temporary	Moderate adverse	Restriction of operating hours							*	None
Increased road traffic noise at local noise-sensitive properties	Short term temporary	Negligible	Restriction of operating hours							*	None
<b>Operation</b>											
Noise nuisance and loss of amenity at noise-sensitive properties local to Ebberston Moor 'A' Well Site	Long term temporary	Negligible	Limit noise levels by planning condition							*	Negligible
Increased road traffic noise at local noise-sensitive properties	Short term temporary	Negligible	Restriction of operating hours							*	Negligible
Increased noise for passers-by	Short term temporary	Minor adverse	None							*	Negligible
Noise nuisance and loss of amenity at noise-sensitive properties within 500m of pipeline route	Long term temporary	Negligible	None							*	None
<b>Decommissioning and Restoration</b>											
Noise nuisance at local noise-sensitive properties	Short term temporary	Moderate adverse	Restriction of operating hours							*	None

Potential Effect	Nature of Effect (Permanent/ Temporary)	Significance (Major/Moderate/Minor) (Beneficial/Adverse/ Negligible)	Mitigation / Enhancement Measures	Geographical Importance*							Residual Effects (Major/Moderate/ Minor) (Beneficial/Adverse/ Negligible)
				I	U K	E	R	C	D / N P	L	
<b>Cumulative Effects</b>											
Cumulative noise from EDS	Long term temporary	Negligible	None							*	
Increased noise from concurrent operation of Ryedale Gas Project	Long term temporary	Negligible	None						*		None
Increased road traffic noise	Long term temporary	Negligible	None						*		Negligible

**\* Geographical Level of Importance**

I = International; UK = United Kingdom; E = England; R = Regional; C = County; D = District; NP = National Park; L = Local



Project  
Ebberston Moor 'A' Well Site  
to Knapton Gas Pipeline  
Drawing Title  
Location of Potential Noise Sources

Date	Scale	Drawn by	Check by
02.08.2013	1:2,000 @A4	MK	MC
Project No	Drawing No	Revision	
19819	E0011		

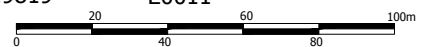
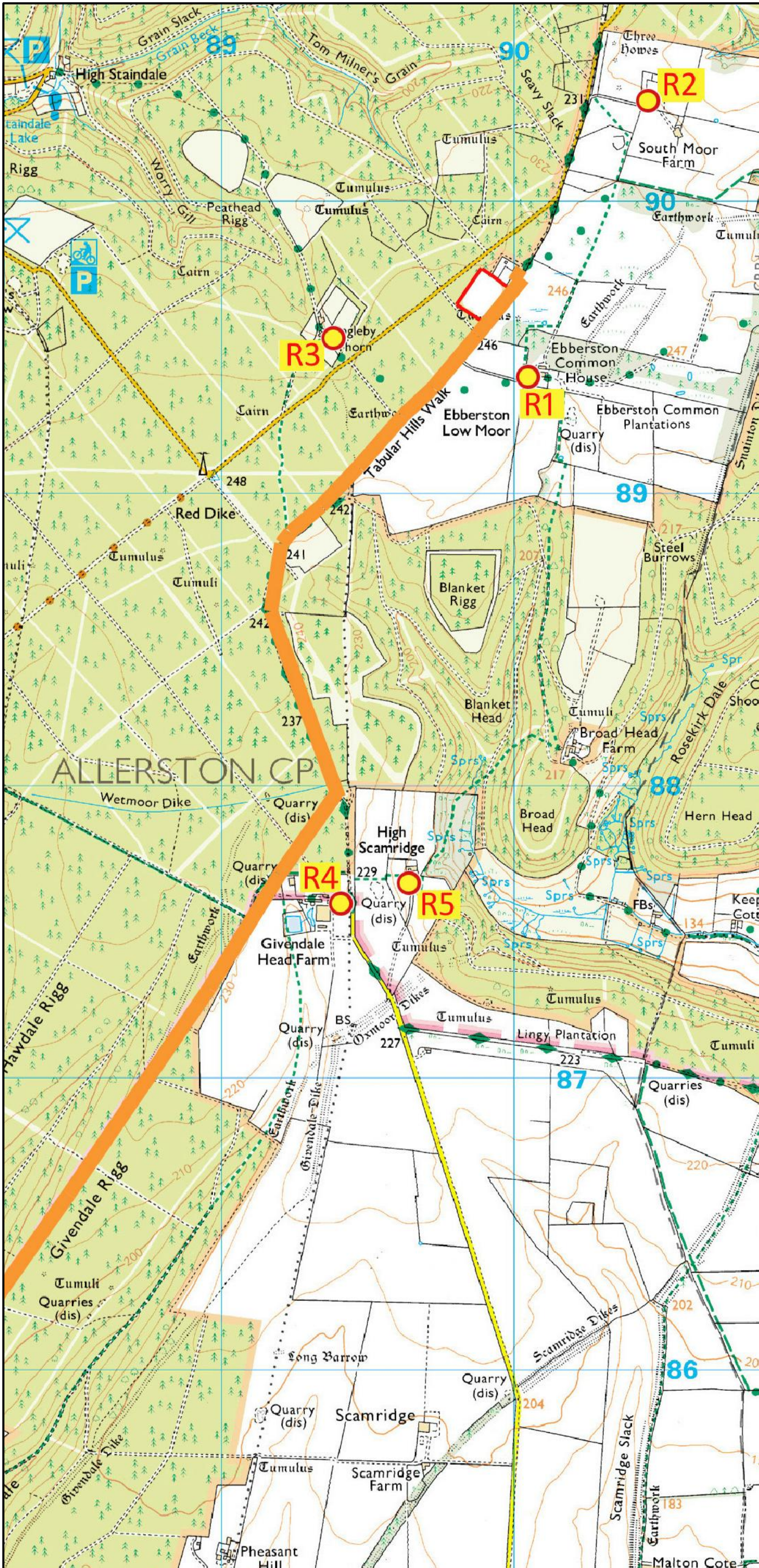


Figure 10.1





**Figure 10.2(a)**

Project  
**Eberston Moor 'A' Well Site  
 to Knaption Gas Pipeline**

Drawing Title  
**Location of  
 Potential Noise Receptors**

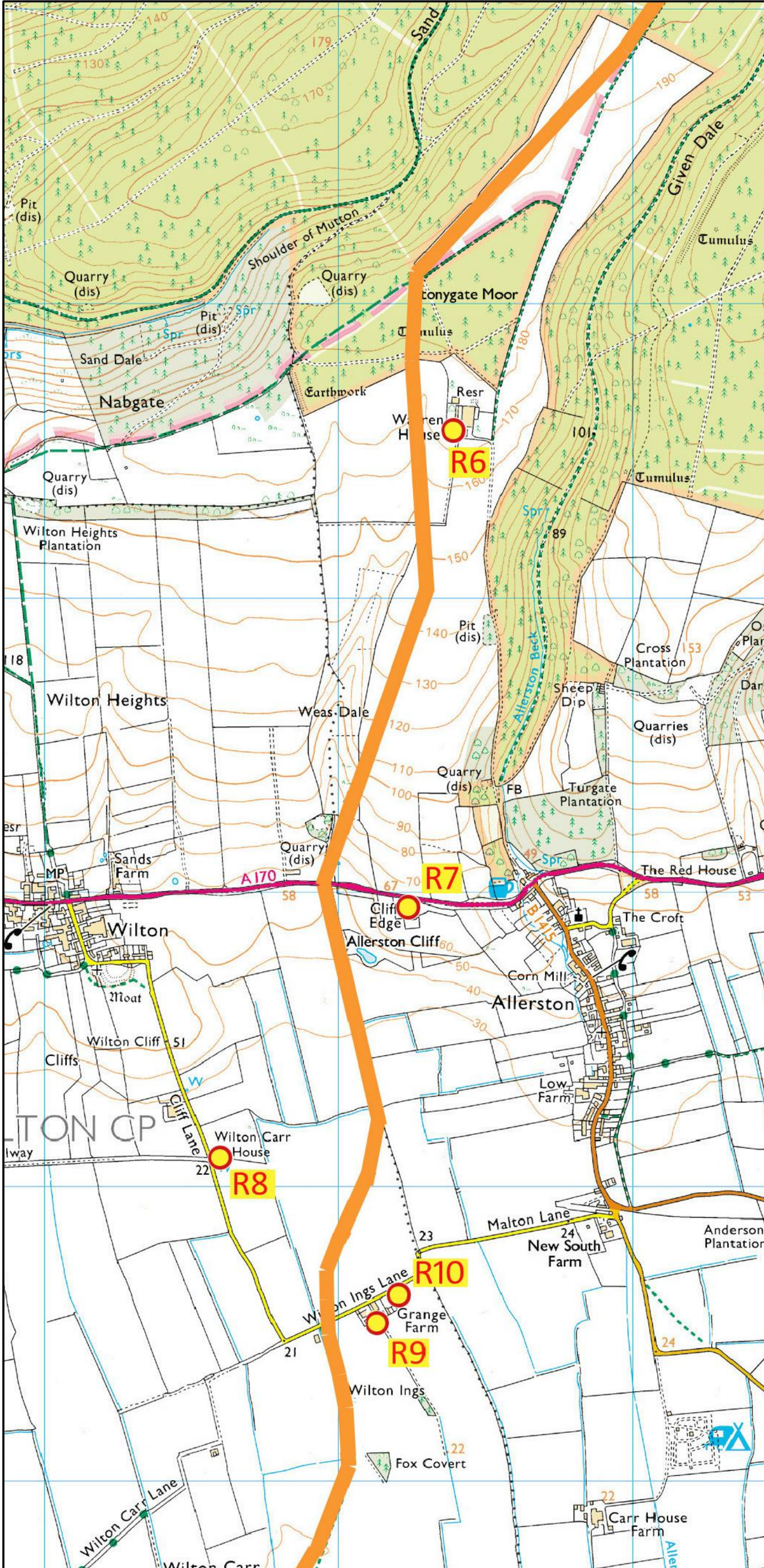
Date	Scale	Drawn by	Check by
02.08.2013	NTS	MK	MC
Project No	Drawing No	Revision	
19819	E0012		

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**Figure 10.2(b)**

Project  
**Ebberston Moor 'A' Well Site  
 to Knapton Gas Pipeline**

Drawing Title  
**Location of  
 Potential Noise Receptors**

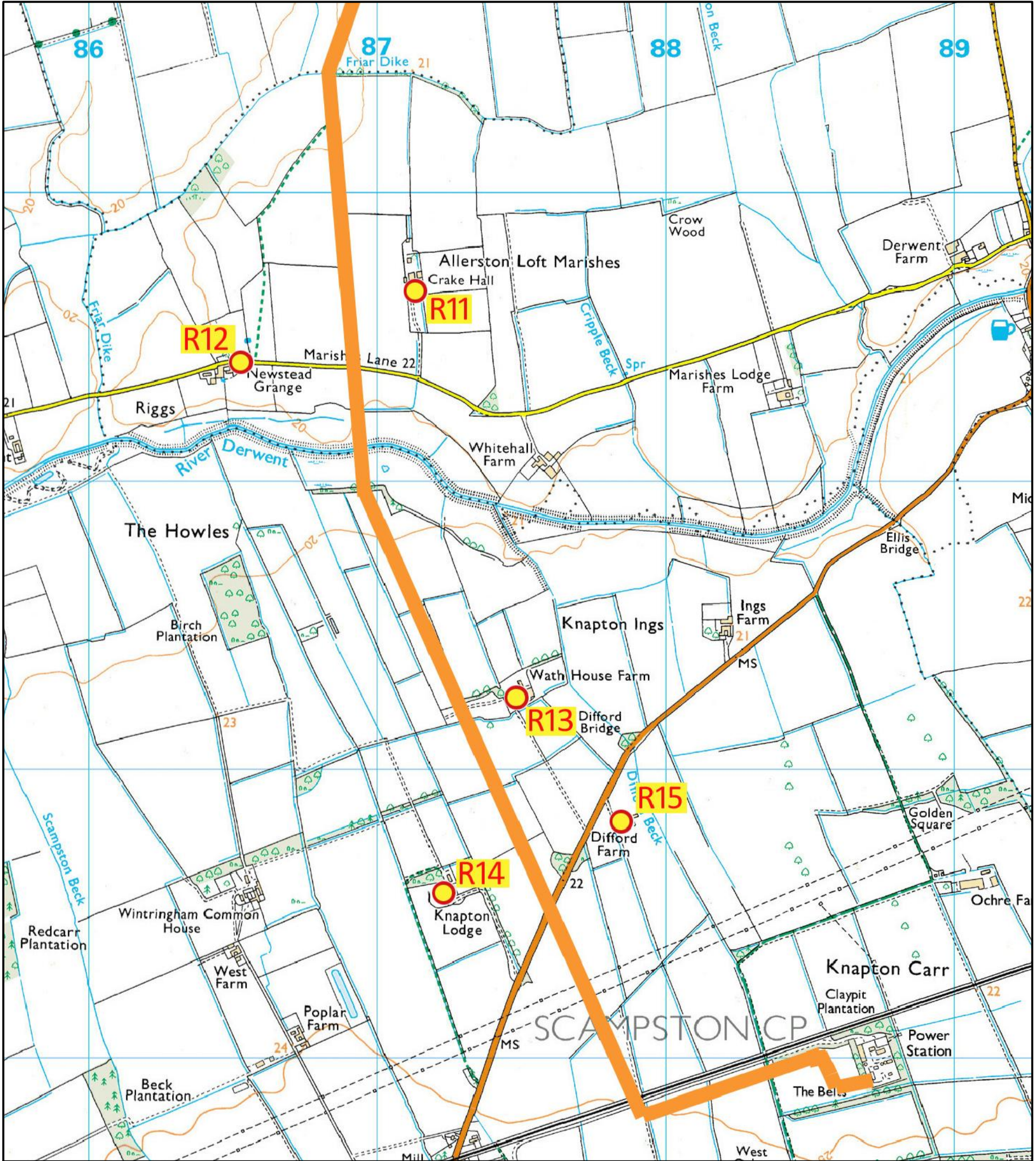
Date	Scale	Drawn by	Check by
02.08.2013	NTS	MK	MC
Project No	Drawing No	Revision	
19819	E0013		



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Project  
**Eberston Moor 'A' Well Site  
 to Knapton Gas Pipeline**

Drawing Title  
**Location of  
 Potential Noise Receptors**

Date	Scale	Drawn by	Check by
02.08.2013	NTS	MK	MC
Project No	Drawing No	Revision	
19819	E0014		

**Figure 10.2(c)**

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