

APPENDIX - D

**BACKGROUND NOISE SURVEY AND
NOISE PREDICTIONS**

Cuadrilla Resources Limited
July 2010



**Noise Impact Assessment
Beaconsall Exploration Site
Banks Enclosed Marsh,
Beaconsall, Lancashire**

Report ref.

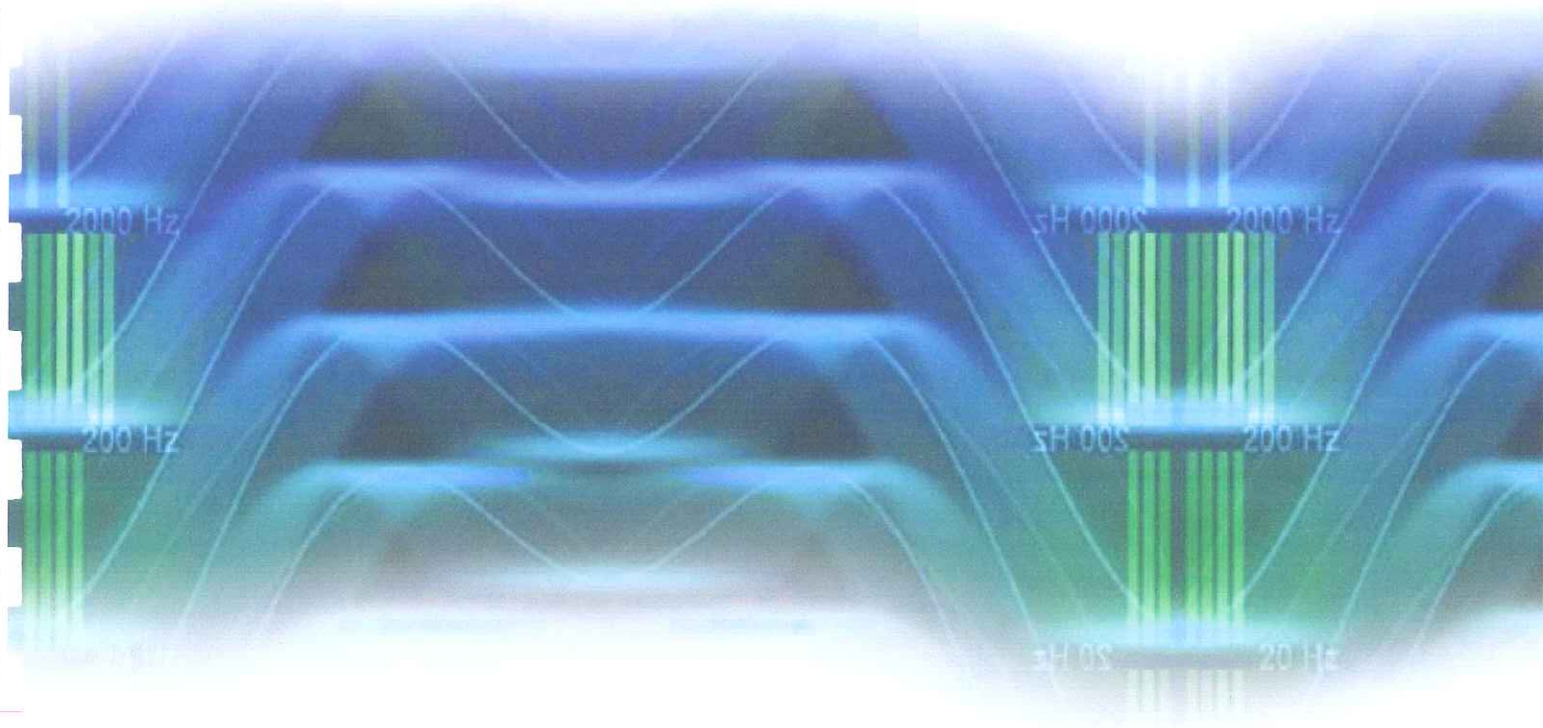
PJ2777/10017

Date

June 2010

Issued to

Cuadrilla Resources Limited



Issued by

Peter Jackson MSc MIOA
Principal Consultant



| SECTION | TITLE | PAGE |
|---------|--|------|
| 0. | SUMMARY | 1 |
| 1. | INTRODUCTION | 2 |
| 2. | AMBIENT NOISE SURVEY | 2 |
| 2.1 | GENERAL | 2 |
| 2.2 | NOISE SURVEY DETAILS | 2 |
| 2.3 | NOISE SURVEY PROCEDURE AND INSTRUMENTATION | 3 |
| 2.4 | NOISE SURVEY RESULTS | 4 |
| 3. | CONSTRUCTION NOISE | 6 |
| 3.1 | NOISE FROM CONSTRUCTION WORKS | 6 |
| 3.2 | ASSESSMENT OF CONSTRUCTION NOISE LEVELS | 7 |
| 4. | ENVIRONMENTAL NOISE FROM EXPLORATION WELL SITE | 8 |
| 4.1 | NOISE FROM DRILLING OPERATIONS | 8 |
| 4.2 | PROJECTED NOISE AT COMMUNITY LOCATIONS | 8 |
| 5. | ASSESSMENT OF NOISE FROM EXPLORATION WELL SITE | 9 |
| 5.1 | ASSESSMENT CRITERION | 9 |
| 5.2 | NOISE ASSESSMENT | 10 |
| 6. | CONCLUSIONS | 11 |

Appendix A: Figure 1 showing location of exploration well site and noise monitoring positions

Appendix B Tables B1 to B2 showing noise measurements at community locations 1 - 2

Appendix C Noise contour map (Figure 2)

Appendix D Photos showing views of background noise measurement positions



0. SUMMARY

A noise assessment has been completed to establish the noise impact of the proposed Becconsall exploration well site, to be situated on Banks Enclosed Marsh, near Becconsall, Lancashire. The sensitive reference positions for the assessment have been chosen as the nearest residential locations to the proposed site.

Measurement of the existing background noise environment has been made at the reference community locations. During the most sensitive early night time period (23:00-02:00), background noise levels in this rural location have been measured as being at a very low level of LA90 25dB(A).

Predictions of daytime noise from construction works associated with preparing the proposed exploration well site have been made, using sound power level data provided in BS 5228 Part 1, for the equipment proposed. The predictions indicate that construction activities will typically produce an LAeq(1hour) contribution of 53dB(A) at the nearest residential location. Construction noise will therefore be well within a typical range of acceptability for these works (LAeq 60-65dB(A)) and only marginally increase existing daytime ambient LAeq noise levels in the nearby community. Consequently adverse impact from the temporary construction works will be minor.

Environmental noise levels have been predicted for the drilling operations by use of computer noise modelling and based on the sound power level for the type of drilling rig being considered for use on the exploration well site. The predicted specific noise level from drilling operations, at the nearest residential locations to the exploration site, is at a moderately low level of between LAeq 36-40dB(A), due to the reasonable distance separation between the site and nearest houses.

An assessment of noise levels predicted for the drilling operations has been completed by comparing noise emission levels with measured background noise levels and also an absolute noise level of LAeq(1 hour) 42dB(A), defined as the night time limit in Minerals Policy Statement – 2: Noise (MPS-2). These assessment figures are shown in the following table.

| Residential Location (Ref. Figure 1) | Predicted LAeq level from drilling rig dB(A) | Mean night (2300- 0200) background noise LA90 dB(A) | Assessment Level (Background excess) Column 2 - Column 3 | Comparison with LAeq 42dB(A) free- field criterion |
|---|--|---|--|--|
| 1. Marshfield Farm | 36 | 25 | +11 | -6 |
| 2. Marsh Nursery | 40 | 25 | +15 | -2 |
| 3. Bonny Barn Farm | 31 | 25 | +6 | -11 |

Table 0: Predicted specific LAeq noise level from drilling operations, at residential positions, compared with early night time background LA90(2300-0200) and LAeq 42dB(A) night time criterion.

The study predicts that at the nearest sensitive properties to the Becconsall exploration well site, drilling rig noise emission will not meet a noise limit based on a background noise excess of +10dB(A). However, this is due to the very low night time background noise conditions, which, according to MPS-2 guidance, may provide an unreasonable burden, should noise limits be based on such a low level.

The projected noise levels from drilling operations meet the MPS-2 additional guidance criterion of achieving a night time noise limit of LAeq(1hour) 42dB(A), at all residential locations. The assessment has therefore indicated that there is likely to be a moderate, but temporary, adverse impact upon the residential community from the aspect of noise.



1. INTRODUCTION

Cuadrilla Resources Limited has commissioned Spectrum Acoustic Consultants to undertake an environmental noise impact assessment in support of the planning application for the proposed Becconsall Exploration site, to be situated on Banks Enclosed Marsh, near Becconsall, Lancashire.

To establish the current neighbourhood background noise level the report presents the results of an ambient noise survey completed over representative daytime and night time periods at the closest community positions to the proposed exploration site.

Using measured noise data from the types of drilling rig being considered for use on the exploration well site the report provides an assessment of the potential impact of this development, by comparing the predicted noise levels from drilling operations with background noise levels measured at the nearest residential locations to the site and also absolute noise limits taken from guidance provided in Minerals Planning Statement - 2: Noise

Daytime noise levels during construction works associated with the preparation of the exploration site have been predicted using equipment noise data provided in BS5228-1:2009 'Noise and Vibration Control on Construction and Open Sites'. Part 1: Noise.

The information provided in this report is intended to supplement the planning application for the proposed exploration site development, to be submitted to the Local Planning Authority

2. AMBIENT NOISE SURVEY

2.1 GENERAL

To assess the environmental noise impact of a proposed industrial related development it is generally accepted that predicted noise levels from the development need to be compared with existing background noise levels, or defined absolute noise limits, at the nearest sensitive residential locations to the site.

Except under the circumstances where the background noise environment is very low, i.e. below LA90 30dB(A), the difference between the specific development noise level and the background level generally correlates with likelihood of complaint and associated adverse impact. There are also recommended absolute noise limits that may be used to assess impact, particularly in the circumstances where the background environment is at a low level.

Detail on the recognised Standards and planning guidelines, which have been applied to the assessment of noise from this exploration site development, is provided in Section 5.1 of the report.

2.2 NOISE SURVEY DETAILS

A description of the residential receptor positions chosen for the noise impact assessment is provided in the following listing. These positions were chosen as being representative of the nearest community locations to the proposed exploration site:



| | |
|---|--|
| <p>Position 1: Marshfield Farm</p> | <p>This position is situated some 475m north of the exploration site and is representative of the nearest residential property to the north of the site. Background noise measurements were recorded at the west boundary of the farm behind the caravan storage compound.</p> |
| <p>Position 1: Marsh Nursery</p> | <p>This position is situated some 350m west of the proposed exploration site and represents the nearest house to this site. Background noise measurements were recorded in the side garden of the house.</p> |
| <p>Position 3: Bonny Barn Farm, Marsh Road</p> | <p>This position is situated some 750m south of the exploration site and is representative of several farm houses situated on or close to Marsh Road. No background noise measurements were recorded at this position, under the assumption that in this rural location these would be similar to those recorded at positions 1 and 2.</p> |

There are no residential properties at sensitive distance to the north of the exploration well site location.

The land topography on each aspect of the exploration site comprises flat, cultivated farmland. A plan showing the exploration well site and the residential receptor positions is illustrated in Figure 1, included in Appendix A of the report.

For the purpose of establishing the typical background noise levels in the locality of the exploration site noise measurements have been recorded at positions 1 and 2. For the purpose of the noise assessment the background noise measured at these positions has been used as being representative of background noise at position 3 (Bonny Barn Farm, on Marsh Road).

2.3 NOISE SURVEY PROCEDURE AND INSTRUMENTATION

Instrumentation used to measure noise levels included the following items. All equipment is calibrated annually, using equipment referenced to the British Calibration Service and the National Physical Laboratory:-

- Bruel & Kjaer Type 2260 Sound Level Meter s/n 1772232
- Bruel & Kjaer Type 4189 Microphone s/n 2469838
- Bruel & Kjaer Type 4231 Acoustic Calibrator s/n 1234621
- Bruel & Kjaer Outdoor microphone kit

With the drilling rig at the proposed exploration site having a 24-hour operation, continuous background noise measurements were recorded at positions 1 and 2 over consecutive daytime (0700-2300) and night time (23:00-07:00) intervals over a period of 4 days.

Noise measurements were recorded during the period 23-26 April 2010, to include 2 weekdays and a weekend in the survey. Weather conditions over the period were dry, with light wind, presenting acceptable conditions for noise monitoring purposes.

Noise samples of 15 minutes duration were recorded to provide information on prevailing ambient noise levels. All measurements were recorded in accordance with procedures outlined in BS4142: 1997 "Method of Rating Industrial Noise Affecting Mixed Residential and Industrial Areas".



Noise samples were recorded, in terms of the following parameters:

- LAeq, the equivalent continuous noise level
- LA90 percentile level
- LAm_{ax}

Briefly, LAeq the equivalent continuous noise level is used as the measure of total ambient noise or noise from a specific source. LA90 is defined in BS4142, as the measure of background noise, when it is applied to the residual noise level (the noise in the absence of the specific noise being assessed). LAm_{ax} represents the maximum sound pressure levels recorded over the sample period.

2.4 NOISE SURVEY RESULTS

The results of the ambient noise measurements recorded at community receptor position 1 (Marshfield Farm) and position 2 (Marsh Nursery) are detailed in tables B1 and B2, included in Appendix B of the report. Charts 1 and 2 below illustrate the data recorded at each measurement position.

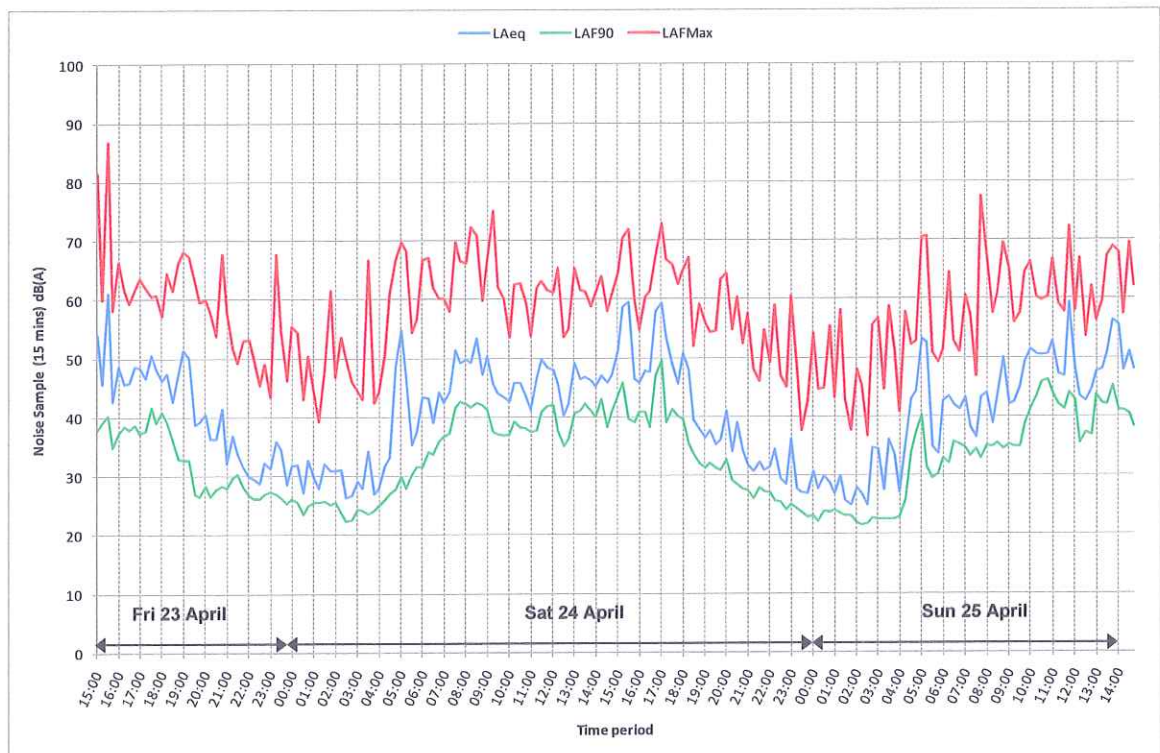


Chart 1: Ambient noise measurements at Position 1 (Marshfield Farm)

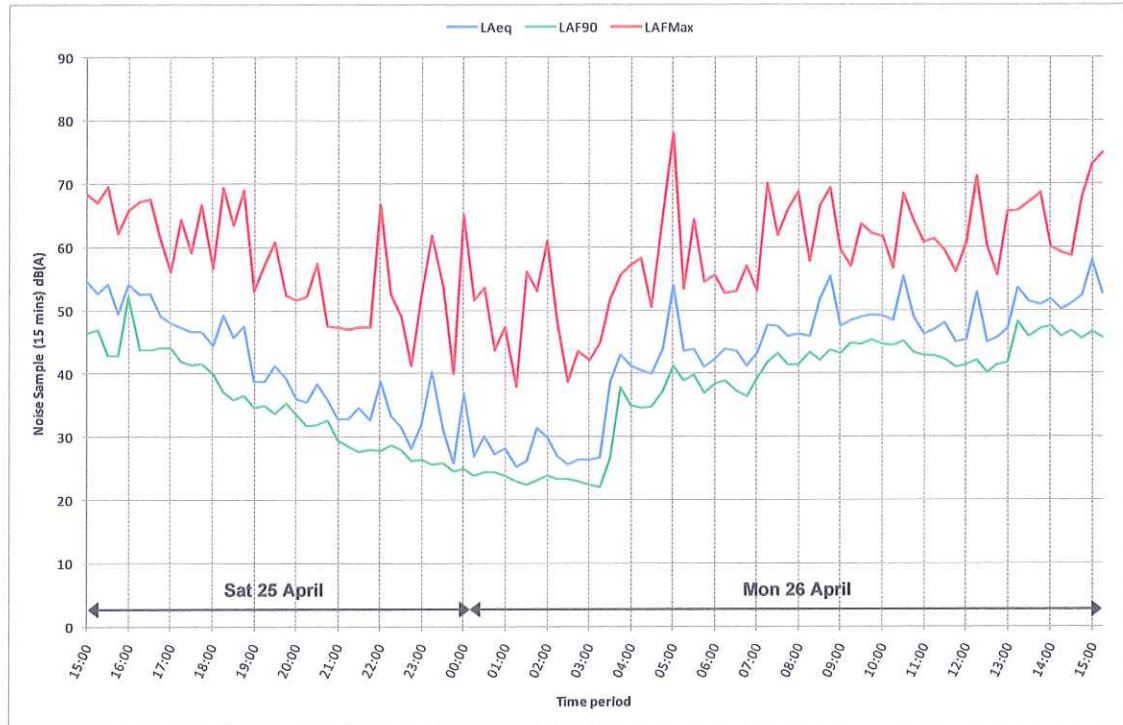


Chart 2: Ambient noise measurements at Position 2 (Marsh Nursery)

A summary of the overall mean LAeq and LA90 noise levels taken from the daytime and night time periods at both position 1 and 2 is included in table 1 below.

The LA90(3 hour) night time level shown in the seventh column of the table shows the mean of the LA90(15 min) levels taken over the most sensitive early night time period 23:00 – 02:00 and which will be used in the assessment of specific drilling operation noise against background level.

| Measurement Position | Date | Sample Time | | Mean of Measured Noise Samples (15 min) | | | | |
|----------------------|-------------|-------------|--------|---|-----------|------------|----------------|-----------|
| | | Start | Finish | Night time (2300-0700) | | | Daytime(07-23) | |
| | | | | LAeq | LA90 | LA90(3 hr) | LAeq | LA90 |
| 1. Marshfield Farm | 23 April | 15:00 | 23:00 | | | | 49.1 | 33.1 |
| | 24 April | 23:00 | 23:00 | 42.2 | 26.9 | 25.7 | 49.6 | 37.0 |
| | 25 April | 23:00 | 14:45 | 42.3 | 26.6 | 23.7 | 50.3 | 39.1 |
| | Mean | | | 42 | 27 | 25 | 50 | 36 |
| 2. Marsh Nursery | 25 April | 15:00 | 23:00 | | | | 48.0 | 36.7 |
| | 26 April | 23:00 | 15:00 | 41.9 | 29.5 | 24.8 | 50.8 | 43.8 |
| | Mean | | | 42 | 29 | 25 | 49 | 40 |

Table 1: Summary of measured ambient noise measurements at positions 1 and 2

As indicated by the results, mean early night time (23:00-02:00) background LA90 noise levels at the nearest community locations to the proposed exploration site are at a very low level of 25dB(A).



Noise levels during the early night time period are largely produced by both local and distant road traffic. As illustrated on the results charts, background noise during the early night time is lower than over the complete night time period, as noise levels increase after 04:00, reflecting the commencement of farm activity and increasing traffic noise.

Under windier conditions, vegetation noise (grass and tree rustle etc) would be expected to provide a significant increase to the very low night time background levels of below 30dB(A) recorded during this survey under calm wind conditions.

Night time background noise levels were found to be similar at positions 1 and 2, so it would be reasonable to assume that similar levels would prevail at position 3 (Bonny Barn Farm, Marsh Road).

Daytime ambient L_{Aeq} noise levels in this rural area, measured at a mean value of 50dB(A), are produced by distant and local road traffic together with noise associated with farming activity.

3. CONSTRUCTION NOISE

3.1 NOISE FROM CONSTRUCTION WORKS

Preliminary construction works are required for ground levelling, preparation of the site foundation and drainage. Any excavated earth may be utilised for the preparation of a temporary earth-bund along selected sections of the site perimeter.

The preparation works would commonly involve use of excavators, bulldozers and gravel compacting rollers. In order to provide a preliminary assessment of construction noise impact, noise level predictions have been made, based on the typical noise levels produced by the operation of this type of construction plant.

Predictions have been made in accordance with guidelines and procedures contained in BS5228-1:2009 'Noise and Vibration Control on Construction and Open Sites. Part 1: Noise'. The procedure involves identifying the main items of plant and equipment and then assigning a sound power level, based on equipment noise data included in an appendix of the Standard. Where a number of sound power levels are given for similar plant, or activities, an average of the data is used.

Predictions of community noise levels are made by applying corrections to the sound power of each equipment source, to account for the following operational and environmental factors: -

- Typical periods of operation of plant
- Separating distances from source to receiver
- Presence of natural land topography screening or artificial barriers.

Overall $L_{Aeq}(1 \text{ hour})$ and $L_{Aeq}(16 \text{ hour})$ dB(A) noise levels have been predicted at the closest residential location to the exploration site, at receptor position 2 (Marsh Nursery), 350m to the west of this site. The results are summarised in table 2 below.



| Plant Type | Sound Power Lw | Adjustments dB(A) | | Result Lp dB(A) | On time % | Activity LAeq(1hr) | Operating Period (hrs) | LAeq 16 hr |
|-------------|----------------|-------------------|-----------|-----------------|-----------|--------------------|------------------------|------------|
| | | Dist. | Screening | | | | | |
| Excavator | 112 | -59 | - | 53 | 30 | 48 | 10 | 46 |
| Bulldozer | 114 | -59 | - | 55 | 30 | 50 | 10 | 48 |
| Rollers | 108 | -59 | - | 49 | 30 | 44 | 10 | 42 |
| Total Plant | | | | | | 53 | | 51 |

Table 2: Predicted noise levels from construction works at position 2, Marsh Nursery.

The predictions indicate that the noisiest construction activities will typically produce an LAeq(1 hour) contribution of 53dB(A) at the most sensitive community locations, resulting in an overall daytime level of LAeq(16 hour) 51dB(A).

3.2 ASSESSMENT OF CONSTRUCTION NOISE LEVELS

Construction site noise is assessed differently to noise from permanent installations, as it is recognised that construction noise is an inevitable by-product of required works and that the construction works are a transient operation.

Whilst local considerations and circumstances need to be taken into account a typical range of acceptability for daytime construction noise is LAeq(1 hour) 60-65dB(A). In support of this statement, annex E of BS5228-1:2009 'Noise and Vibration Control on Construction and Open Sites'. Part 1: Noise, defines the 'threshold of significant effect' from construction noise as LAeq 65dB(A) for the daytime (0700-1900) period.

The predictions have demonstrated that during the typical site preparation construction operations at the exploration site, noise levels of LAeq(1 hour) 53dB(A) will be produced at the nearest residential location.

In relation to the current ambient noise in the environment around the exploration site, construction works will produce a temporary increase of around +4dB(A) to typical daytime noise levels, measured as LAeq 49dB(A) at position 2 (Marsh Nursery).

Consequently, construction noise levels are expected to be well within a reasonable acceptability range for these works (LAeq 60-65dB(A) daytime) and, as such, will provide a temporary minor adverse affect with respect to noise impact, at the nearest residential positions to the exploration well site.

For the majority of construction works, which, as in this case, have no particular sensitivity from a long-term contract period, night time works, or very close proximity to houses, Local Authorities commonly set no specific noise limits, but rely on the contractor to ensure that works are completed in accordance with the 'best practice' guidelines outlined in the various parts of BS5228. A typical general requirement set by the Local Authority would be as follows:

To ensure that noise levels produced by the noisiest activities, are adequately controlled, such works will be completed in accordance with the guidelines provided in BS5228-1:2009 'Noise and Vibration Control on Construction and Open Sites, with particular reference to Part 1: Codes of Practice for basic information and Procedures for Noise Control.



4. ENVIRONMENTAL NOISE FROM EXPLORATION WELL SITE

4.1 NOISE FROM DRILLING OPERATIONS

At this stage the specific type of drilling rig to be used at the exploration site has not been finalised. This is common procedure, as choice of drilling rig is largely dependent on which rigs are available at the time and until all consents are granted such decisions cannot be made.

However, an accurate prediction of noise from the exploration site can be made, based on measured noise levels from the typical range of drilling rigs that operate in the UK. Spectrum has completed sound power tests on several different types of operating rigs, for a range of contractors. Example noise data from four drilling rigs are included in Table 3.

| Drilling Rig | Sound Power level Lw | Octave Band Sound Power Levels (dB) | | | | | | | | |
|----------------|-------------------------|-------------------------------------|------------|------------|------------|------------|-----------|-----------|-----------|-----------|
| | | 31 | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k |
| Rig A | 106 | 116 | 114 | 108 | 103 | 102 | 102 | 98 | 93 | 86 |
| Rig B | 104 | 114 | 112 | 109 | 104 | 100 | 99 | 96 | 92 | 84 |
| Rig C | 106 | 118 | 116 | 110 | 104 | 101 | 100 | 100 | 96 | 90 |
| Rig D | 103 | 115 | 117 | 110 | 103 | 102 | 96 | 92 | 86 | 79 |
| Average | 105 | 116 | 115 | 109 | 104 | 101 | 99 | 97 | 92 | 85 |

Table 3: Drilling rig sound power level data

As shown in the table, drilling rig noise levels are commonly in the sound power level range Lw 103-106 dB(A).

4.2 PROJECTED NOISE AT COMMUNITY LOCATIONS

To accurately evaluate the overall effect of the proposed exploration well site development, at the nearby community locations, it is necessary to consider the additional noise that is likely to be generated by the drilling operations, at these residential locations.

The overall drilling rig mean sound power level of 105dB(A), is used as the starting point for the purpose of predicting noise levels in the surrounding environment and at specified community receptor locations around the site, using an environmental noise propagation model.

For the purpose of this study a proprietary noise model, the Bruel and Kjaer, 'Predictor', has been used. This model is based upon noise propagation corrections (including distance attenuation, ground effects and atmospheric absorption), as advised in ISO 9613, to determine numeric results. This model calculates levels around a site simultaneously and allows the reporting of the results visually through the construction of noise contours.

The noise map, showing noise contours produced by the drilling operations is provided in Figure 2, included in Appendix C of the report. Specific receptor co-ordinates can be specified in the noise propagation model, to get results at example locations. Predicted levels at the specific receptor locations are provided in table 4 below.



| Measurement Position | dB(A) | A-weighted octave band sound pressure Levels (dB) | | | | | | | | |
|----------------------|-------|---|----|-----|-----|-----|----|----|----|----|
| | | 31 | 63 | 125 | 250 | 500 | 1k | 2k | 4k | 8k |
| 1. Marshfield Farm | 35.6 | 17 | 29 | 22 | 22 | 27 | 31 | 29 | 15 | - |
| 2. Marsh Nursery | 39.6 | 20 | 32 | 26 | 25 | 31 | 35 | 33 | 23 | - |
| 3. Bonny Bam Farm | 30.9 | 14 | 26 | 16 | 18 | 22 | 26 | 22 | 5 | - |

Table 4: Predicted specific noise level from drilling rig at community locations 1 - 3

As indicated in the table, projected noise levels at the nearest community locations to the exploration site (positions 1 and 2) are in the range L_{Aeq} 36–40 dB(A). Specific noise levels are moderately low due to the reasonable separation distance between the exploration site and the nearest residential locations.

It should be noted that drilling rigs exhibit a degree of source directivity (slightly noisier on one side than others) however this does vary with rig type, equipment layout and position of the perimeter earth bund.

For the purpose of the predictions, non-directional hemispherical noise propagation, under 'worst-case', receptor downwind conditions has been assumed. However, the current proposal for positioning the 3m high earth-bund along the north-west perimeter of the site, extending partially down the south west perimeter, will provide beneficial noise reduction, typically of between 3–5dB(A) at the closest residential positions (1 and 2), situated to the north and west of exploration site.

5. ASSESSMENT OF NOISE FROM EXPLORATION WELL SITE

5.1 ASSESSMENT CRITERION

The impact of noise from industrial developments, or operations, on the surrounding residential community, is dependent upon several factors and there are a number of references and Standards available, which discuss in detail what these factors are, together with their relative importance.

Relevant guidelines for assessing environmental noise associated with minerals extraction operations are included in Minerals Policy Statement 2 (MPS-2): Controlling and Mitigating the Environmental Effects of Minerals Extraction in England. Annex 2: Noise – March 2005, issued by ODPM.

This guidance document states that 'where appropriate' planning conditions should be used to ensure that minerals operations are carried out in such a way that noise emissions are minimised and controlled to acceptable levels. Accordingly, planning conditions may be used to apply controls on noise emissions by setting noise limits, preferably at the nearest noise sensitive properties.

MPS-2 suggests that Mineral Planning Authorities (MPA's) should aim to set noise limits in accordance with the following criteria:

First aim: Background noise level (L_{A90}) + 10dB(A), for all periods

However, in the cases where this noise limit restriction imposes an unreasonable burden on operations, the following limits to be applied:



Daytime 0700-1900

Increase over background LA90 to be as near to + 10dB(A) as is practicable, subject to an upper limit of 55dB(A) LAeq(1 hour) free-field

Evening 1900-2200

Background LA90 + 10dB(A).

Night time 2200-0700

42dB(A) LAeq(1 hour) free-field.

The 'unreasonable burden' situation would generally occur in situations where background levels are very low (below about 45dB(A) daytime and 32dB(A) night time), when raising such low background levels, even by as much as 10dB(A), would still only result in modest absolute levels.

For this exploration site application, continuous drilling operations are required so the assessment will be provided for the worst-case night time period. Accordingly, noise levels will be assessed against noise limits based on background LA90 + 10dB(A) and 42dB(A) LAeq(1 hour) free-field.

5.2 NOISE ASSESSMENT

Table 5 shows a comparison of the predicted noise level from the drilling rig operations, against measured LA90 background levels at night and the LAeq(1 hour) 42dB(A) absolute night time criteria, at the three residential locations covered by the assessment.

For the purpose of assessing operational noise emission against background noise level, the mean LA90 taken over the most sensitive early night time period (2300-0200) has been used.

| Residential Location (Ref. Figure 1) | Predicted LAeq level from drilling rig dB(A) | Mean night (2300-0200) background noise LA90 dB(A) | Assessment Level (Background excess) Column 2 - Column 3 | Comparison with LAeq 42dB(A) free-field criterion |
|--------------------------------------|--|--|--|---|
| 1. Marshfield Farm | 36 | 25 | +11 | -6 |
| 2. Marsh Nursery | 40 | 25 | +15 | -2 |
| 3. Bonny Barn Farm | 31 | 25 | +6 | -11 |

Table 5: Predicted specific LAeq noise level from drilling operations, at residential positions, compared with early night time background LA90(2300-0200) and LAeq 42dB(A) night time criterion.

There are not expected to be significant tonal, or impulsive, characteristics to the predicted noise from the drilling operations. The rating level, as defined in BS4142, will therefore numerically be the same as the predicted specific LAeq noise level contribution from the drilling rig.

The study predicts that at the nearest sensitive properties to the Beconsall exploration site, drilling rig noise emission will provide a background excess of up between +11 to +15dB(A), during the night time period. This assessment level does not meet the MPS-2 first aim of achieving a noise limit of background noise (LA90) + 10dB(A), for all periods.

With the planned favourable positioning of the 3m high perimeter earth-bund, the assessment level at positions 1 and 2 is likely to be reduced, typically by between 3-5dB(A).



However, the very low background levels in this situation do provide the 'unreasonable burden' conditions noted in the MPS-2 and under these circumstances the less onerous night time noise limit of $L_{Aeq}(1\text{hour}) 42\text{dB(A)}$ may be applied. The projected noise level from drilling operations is within this limit at all residential receptor positions.

In further consideration of the fact that the exploration site would be a temporary, rather than a permanent, installation (i.e. more akin to a temporary construction site) the noise assessment has indicated that there is likely to be a moderate adverse impact upon the nearby residential community from the aspect of noise.

6. CONCLUSIONS

The potential impact of noise from drilling operations at the proposed Becconsall Exploration Site has been assessed and the following conclusions may be drawn from the study.

- Existing mean night time background noise levels in the environment around the exploration site are at a very low level of $L_{A90} 25\text{dB(A)}$.
- Daytime noise from site preparation construction works has been predicted as $L_{Aeq} (1 \text{ hour}) 53\text{dB(A)}$, at the nearest individual residential location to the exploration site. This noise level is well within a typical acceptability range for construction works (60–65dB(A)), but will marginally increase existing daytime ambient noise levels of $L_{Aeq} 49\text{dB(A)}$ by around 4dB(A) at the nearest house position (Marsh Nursery). Accordingly, the adverse impact of temporary construction works will be low.
- The predicted specific noise level from drilling operations, at the nearest individual residential locations to the exploration site (receptor positions 1 and 2), is at a moderately low level of between $L_{Aeq} 36\text{--}40\text{dB(A)}$, as there is reasonable distance separation between the exploration site and the nearest houses.
- The study predicts that at the nearest sensitive properties to the Becconsall exploration well site, drilling rig noise emission will not meet a noise limit based on a background noise excess of +10dB(A). However, this is due to the very low night time background noise conditions ($L_{A90} 25\text{dB(A)}$), which, according to MPS-2 guidance, may provide an unreasonable burden on operations, should noise limits be based on such a low level.
- The projected noise levels from drilling operations meet the MPS-2 additional guidance criterion of achieving a night time noise limit of $L_{Aeq}(1\text{hour}) 42\text{dB(A)}$, at all residential locations. The assessment has therefore indicated that there is likely to be a moderate, but temporary, adverse impact upon the residential community from the aspect of noise.
- The planned mitigation measure of favourably positioning the 3m high perimeter earth-bund along the north-west and part of the south west boundaries of the exploration site, will reduce the specific noise level and the associated assessment level at positions 1 and 2, typically by between 3-5dB(A).

Report Code: E/DR/EX



APPENDIX A

Figure 1 showing location of exploration well site and noise monitoring positions



APPENDIX B

Tables B1 and B2 showing noise measurements at community locations 1 and 2



| Time | 15 minute Noise Level Samples dB(A) | | | Time | 15 minute Noise Level Samples dB(A) | | |
|----------------|-------------------------------------|------|--------|--------------|-------------------------------------|-------------|-------------|
| | LAeq | LA90 | LAFmax | | LAeq | LA90 | LAFmax |
| Daytime | | | | 19:15 | 50.1 | 32.6 | 67.4 |
| 7:00 | | | | 19:30 | 38.7 | 27.0 | 62.9 |
| 7:15 | | | | 19:45 | 39.2 | 26.6 | 59.6 |
| 7:30 | | | | 20:00 | 40.4 | 28.4 | 60.0 |
| 7:45 | | | | 20:15 | 36.3 | 26.6 | 57.7 |
| 8:00 | | | | 20:30 | 36.3 | 27.8 | 53.8 |
| 8:15 | | | | 20:45 | 41.4 | 28.4 | 67.7 |
| 8:30 | | | | 21:00 | 32.2 | 28.0 | 57.9 |
| 8:45 | | | | 21:15 | 36.9 | 29.8 | 51.8 |
| 9:00 | | | | 21:30 | 33.9 | 30.4 | 49.3 |
| 9:15 | | | | 21:45 | 31.5 | 28.2 | 53.1 |
| 9:30 | | | | 22:00 | 30.0 | 26.8 | 53.2 |
| 9:45 | | | | 22:15 | 29.5 | 26.2 | 49.9 |
| 10:00 | | | | 22:30 | 28.8 | 26.2 | 45.5 |
| 10:15 | | | | 22:45 | 32.4 | 27.0 | 49.1 |
| 10:30 | | | | Mean | 49.1 | 33.1 | 60.6 |
| 10:45 | | | | | | | |
| 11:00 | | | | Night | | | |
| 11:15 | | | | 23:00 | 31.4 | 27.4 | 43.5 |
| 11:30 | | | | 23:15 | 35.9 | 27.0 | 67.8 |
| 11:45 | | | | 23:30 | 34.5 | 26.4 | 54.6 |
| 12:00 | | | | 23:45 | 28.5 | 25.4 | 46.3 |
| 12:15 | | | | 0:00 | 31.8 | 26.2 | 55.4 |
| 12:30 | | | | 0:15 | 31.9 | 25.6 | 54.4 |
| 12:45 | | | | 0:30 | 27.1 | 23.6 | 43.0 |
| 13:00 | | | | 0:45 | 32.7 | 25.0 | 50.4 |
| 13:15 | | | | 1:00 | 29.8 | 25.6 | 44.0 |
| 13:30 | | | | 1:15 | 28.0 | 25.6 | 39.3 |
| 13:45 | | | | 1:30 | 32.1 | 25.8 | 48.1 |
| 14:00 | | | | 1:45 | 31.0 | 25.2 | 61.5 |
| 14:15 | | | | 2:00 | 30.9 | 25.6 | 46.8 |
| 14:30 | | | | 2:15 | 31.1 | 23.8 | 53.6 |
| 14:45 | | | | 2:30 | 26.3 | 22.4 | 50.0 |
| 15:00 | 53.9 | 37.8 | 81.5 | 2:45 | 26.7 | 22.6 | 46.0 |
| 15:15 | 45.7 | 39.0 | 59.9 | 3:00 | 29.1 | 24.4 | 44.5 |
| 15:30 | 61.1 | 40.2 | 86.9 | 3:15 | 28.0 | 24.2 | 43.1 |
| 15:45 | 42.7 | 34.8 | 58.1 | 3:30 | 34.2 | 23.6 | 66.8 |
| 16:00 | 48.6 | 37.2 | 66.3 | 3:45 | 27.0 | 24.2 | 42.5 |
| 16:15 | 45.6 | 38.4 | 61.6 | 4:00 | 28.0 | 25.0 | 44.2 |
| 16:30 | 45.8 | 37.8 | 59.4 | 4:15 | 31.8 | 26.0 | 50.7 |
| 16:45 | 48.7 | 38.6 | 61.8 | 4:30 | 33.1 | 27.0 | 60.9 |
| 17:00 | 48.5 | 37.2 | 63.5 | 4:45 | 48.7 | 27.8 | 66.7 |
| 17:15 | 46.7 | 37.6 | 62.0 | 5:00 | 54.7 | 30.0 | 69.7 |
| 17:30 | 50.6 | 41.6 | 60.6 | 5:15 | 46.6 | 28.0 | 68.4 |
| 17:45 | 48.3 | 39.0 | 60.8 | 5:30 | 35.2 | 30.4 | 54.3 |
| 18:00 | 46.3 | 40.8 | 57.2 | 5:45 | 37.4 | 31.6 | 56.5 |
| 18:15 | 47.5 | 39.2 | 64.5 | 6:00 | 43.4 | 31.6 | 66.8 |
| 18:30 | 42.6 | 36.0 | 61.5 | 6:15 | 43.3 | 34.0 | 67.1 |
| 18:45 | 47.4 | 32.8 | 66.3 | 6:30 | 39.1 | 33.6 | 61.9 |
| 19:00 | 51.4 | 32.6 | 68.2 | 6:45 | 44.3 | 35.8 | 60.2 |
| | | | | Mean | 42.2 | 26.9 | 54.0 |

Table B1: Ambient noise measurements at position 1: 23-24 April 2010.



| Time | 15 minute Noise Level Samples dB(A) | | | Time | 15 minute Noise Level Samples dB(A) | | |
|----------------|-------------------------------------|------|--------|--------------|-------------------------------------|-------------|-------------|
| | LAeq | LA90 | LAFmax | | LAeq | LA90 | LAFmax |
| Daytime | | | | | | | |
| 7:00 | 42.5 | 36.6 | 60.1 | 19:15 | 37.6 | 32.2 | 54.3 |
| 7:15 | 44.2 | 37.2 | 58.0 | 19:30 | 35.2 | 31.4 | 54.6 |
| 7:30 | 51.4 | 41.6 | 69.8 | 19:45 | 36.1 | 31.0 | 63.3 |
| 7:45 | 49.2 | 42.6 | 66.5 | 20:00 | 41.1 | 32.6 | 64.3 |
| 8:00 | 49.8 | 42.2 | 66.2 | 20:15 | 34.0 | 29.2 | 54.7 |
| 8:15 | 49.2 | 41.6 | 72.4 | 20:30 | 39.0 | 28.6 | 60.3 |
| 8:30 | 53.4 | 42.4 | 70.9 | 20:45 | 34.2 | 27.8 | 52.4 |
| 8:45 | 47.2 | 42.0 | 59.8 | 21:00 | 31.9 | 27.6 | 57.6 |
| 9:00 | 50.5 | 41.2 | 66.5 | 21:15 | 30.8 | 26.2 | 48.1 |
| 9:15 | 45.6 | 37.4 | 75.1 | 21:30 | 32.4 | 28.0 | 46.0 |
| 9:30 | 44.1 | 37.0 | 62.2 | 21:45 | 30.9 | 27.4 | 54.8 |
| 9:45 | 43.4 | 36.8 | 60.1 | 22:00 | 31.5 | 27.2 | 49.2 |
| 10:00 | 42.7 | 37.0 | 53.7 | 22:15 | 34.5 | 25.8 | 58.9 |
| 10:15 | 45.9 | 39.2 | 62.6 | 22:30 | 29.5 | 25.6 | 47.1 |
| 10:30 | 45.9 | 38.2 | 62.7 | 22:45 | 28.6 | 24.2 | 45.0 |
| 10:45 | 43.5 | 38.0 | 59.4 | Mean | 49.6 | 37.0 | 60.7 |
| 11:00 | 41.3 | 37.4 | 53.8 | Night | | | |
| 11:15 | 46.7 | 37.6 | 62.0 | 23:00 | 36.3 | 25.2 | 60.6 |
| 11:30 | 49.9 | 40.8 | 63.1 | 23:15 | 27.8 | 24.4 | 48.5 |
| 11:45 | 48.5 | 41.8 | 61.6 | 23:30 | 27.1 | 23.8 | 37.6 |
| 12:00 | 48.0 | 42.0 | 61.2 | 23:45 | 26.9 | 23.0 | 42.4 |
| 12:15 | 45.6 | 37.6 | 65.4 | 0:00 | 30.8 | 23.2 | 54.1 |
| 12:30 | 40.3 | 35.0 | 53.6 | 0:15 | 27.7 | 22.2 | 44.6 |
| 12:45 | 42.3 | 36.2 | 55.0 | 0:30 | 29.9 | 24.0 | 44.8 |
| 13:00 | 49.3 | 40.6 | 65.4 | 0:45 | 28.7 | 23.8 | 55.3 |
| 13:15 | 46.4 | 41.0 | 61.5 | 1:00 | 27.0 | 24.2 | 43.3 |
| 13:30 | 46.9 | 42.2 | 61.4 | 1:15 | 29.9 | 23.6 | 58.1 |
| 13:45 | 46.3 | 41.0 | 58.8 | 1:30 | 25.8 | 23.2 | 42.9 |
| 14:00 | 45.2 | 40.0 | 61.2 | 1:45 | 25.0 | 23.2 | 37.7 |
| 14:15 | 47.0 | 43.0 | 63.9 | 2:00 | 27.9 | 22.0 | 48.1 |
| 14:30 | 45.9 | 38.2 | 58.0 | 2:15 | 26.9 | 21.6 | 45.4 |
| 14:45 | 47.2 | 41.0 | 60.9 | 2:30 | 25.0 | 21.8 | 36.7 |
| 15:00 | 51.5 | 43.6 | 64.6 | 2:45 | 34.7 | 22.8 | 55.6 |
| 15:15 | 58.7 | 45.8 | 70.5 | 3:00 | 34.4 | 22.6 | 56.7 |
| 15:30 | 59.5 | 39.6 | 72.0 | 3:15 | 27.5 | 22.6 | 44.7 |
| 15:45 | 46.4 | 39.0 | 59.9 | 3:30 | 36.1 | 22.6 | 58.8 |
| 16:00 | 45.8 | 40.8 | 54.8 | 3:45 | 33.5 | 22.6 | 51.4 |
| 16:15 | 47.9 | 40.8 | 60.3 | 4:00 | 27.2 | 23.0 | 40.8 |
| 16:30 | 47.7 | 38.2 | 61.4 | 4:15 | 35.2 | 25.8 | 57.7 |
| 16:45 | 57.9 | 47.0 | 67.3 | 4:30 | 43.0 | 33.8 | 52.3 |
| 17:00 | 59.4 | 49.6 | 73.0 | 4:45 | 44.2 | 37.2 | 52.8 |
| 17:15 | 53.5 | 39.0 | 66.8 | 5:00 | 53.2 | 40.2 | 70.5 |
| 17:30 | 49.0 | 41.2 | 65.9 | 5:15 | 52.7 | 31.6 | 70.7 |
| 17:45 | 45.7 | 40.0 | 62.6 | 5:30 | 34.8 | 29.6 | 50.8 |
| 18:00 | 50.9 | 39.6 | 64.9 | 5:45 | 33.7 | 30.4 | 49.3 |
| 18:15 | 48.1 | 35.4 | 67.2 | 6:00 | 42.7 | 32.8 | 51.5 |
| 18:30 | 39.5 | 33.6 | 52.1 | 6:15 | 43.5 | 32.2 | 64.6 |
| 18:45 | 37.8 | 32.2 | 59.2 | 6:30 | 42.0 | 35.6 | 52.8 |
| 19:00 | 36.5 | 31.4 | 56.0 | 6:45 | 41.2 | 35.2 | 51.0 |
| | | | | Mean | 42.3 | 26.6 | 51.0 |

Table B1: Ambient noise measurements at position 1: 24-25 April 2010.



| Time | 15 minute Noise Level Samples dB(A) | | | Time | 15 minute Noise Level Samples dB(A) | | |
|----------------|-------------------------------------|------|--------|--------------|-------------------------------------|-------------|-------------|
| | LAeq | LA90 | LAFmax | | LAeq | LA90 | LAFmax |
| Daytime | | | | 19:15 | | | |
| 7:00 | 43.2 | 34.6 | 60.5 | 19:30 | | | |
| 7:15 | 38.2 | 33.2 | 57.3 | 19:45 | | | |
| 7:30 | 36.5 | 34.4 | 46.9 | 20:00 | | | |
| 7:45 | 43.2 | 32.8 | 77.5 | 20:15 | | | |
| 8:00 | 44.0 | 35.0 | 67.9 | 20:30 | | | |
| 8:15 | 38.9 | 34.8 | 57.5 | 20:45 | | | |
| 8:30 | 43.9 | 35.4 | 60.9 | 21:00 | | | |
| 8:45 | 50.0 | 34.4 | 69.6 | 21:15 | | | |
| 9:00 | 42.0 | 35.2 | 65.2 | 21:30 | | | |
| 9:15 | 42.5 | 34.8 | 56.0 | 21:45 | | | |
| 9:30 | 45.1 | 34.8 | 57.6 | 22:00 | | | |
| 9:45 | 49.3 | 38.6 | 64.6 | 22:15 | | | |
| 10:00 | 51.4 | 41.2 | 66.3 | 22:30 | | | |
| 10:15 | 50.7 | 43.4 | 60.3 | 22:45 | | | |
| 10:30 | 50.4 | 45.8 | 59.8 | Mean | 50.3 | 39.1 | 62.3 |
| 10:45 | 50.7 | 46.2 | 60.3 | Night | | | |
| 11:00 | 52.9 | 44.0 | 66.8 | 23:00 | | | |
| 11:15 | 47.2 | 42.0 | 59.1 | 23:15 | | | |
| 11:30 | 46.9 | 41.2 | 57.7 | 23:30 | | | |
| 11:45 | 59.4 | 44.0 | 72.3 | 23:45 | | | |
| 12:00 | 48.3 | 42.8 | 57.9 | 0:00 | | | |
| 12:15 | 43.5 | 35.4 | 66.9 | 0:15 | | | |
| 12:30 | 42.6 | 37.2 | 53.7 | 0:30 | | | |
| 12:45 | 44.7 | 36.8 | 62.2 | 0:45 | | | |
| 13:00 | 47.7 | 43.6 | 56.3 | 1:00 | | | |
| 13:15 | 48.0 | 42.2 | 59.6 | 1:15 | | | |
| 13:30 | 50.9 | 42.0 | 67.4 | 1:30 | | | |
| 13:45 | 56.3 | 45.2 | 68.9 | 1:45 | | | |
| 14:00 | 55.6 | 41.0 | 68.0 | 2:00 | | | |
| 14:15 | 47.9 | 41.0 | 57.4 | 2:15 | | | |
| 14:30 | 51.0 | 40.4 | 69.6 | 2:30 | | | |
| 14:45 | 48.1 | 38.2 | 62.1 | 2:45 | | | |
| 15:00 | | | | 3:00 | | | |
| 15:15 | | | | 3:15 | | | |
| 15:30 | | | | 3:30 | | | |
| 15:45 | | | | 3:45 | | | |
| 16:00 | | | | 4:00 | | | |
| 16:15 | | | | 4:15 | | | |
| 16:30 | | | | 4:30 | | | |
| 16:45 | | | | 4:45 | | | |
| 17:00 | | | | 5:00 | | | |
| 17:15 | | | | 5:15 | | | |
| 17:30 | | | | 5:30 | | | |
| 17:45 | | | | 5:45 | | | |
| 18:00 | | | | 6:00 | | | |
| 18:15 | | | | 6:15 | | | |
| 18:30 | | | | 6:30 | | | |
| 18:45 | | | | 6:45 | | | |
| 19:00 | | | | Mean | | | |

Table B1: Ambient noise measurements at position 1: 25 April 2010.



| Time | 15 minute Noise Level Samples dB(A) | | | Time | 15 minute Noise Level Samples dB(A) | | |
|----------------|-------------------------------------|------|--------|--------------|-------------------------------------|-------------|-------------|
| | LAeq | LA90 | LAFmax | | LAeq | LA90 | LAFmax |
| Daytime | | | | 19:15 | 38.8 | 35.0 | 57.2 |
| 7:00 | | | | 19:30 | 41.3 | 33.8 | 60.7 |
| 7:15 | | | | 19:45 | 39.2 | 35.4 | 52.4 |
| 7:30 | | | | 20:00 | 36.0 | 33.6 | 51.7 |
| 7:45 | | | | 20:15 | 35.6 | 31.8 | 52.1 |
| 8:00 | | | | 20:30 | 38.3 | 32.0 | 57.4 |
| 8:15 | | | | 20:45 | 35.8 | 32.6 | 47.5 |
| 8:30 | | | | 21:00 | 32.8 | 29.4 | 47.4 |
| 8:45 | | | | 21:15 | 32.8 | 28.6 | 46.9 |
| 9:00 | | | | 21:30 | 34.6 | 27.6 | 47.3 |
| 9:15 | | | | 21:45 | 32.7 | 28.0 | 47.4 |
| 9:30 | | | | 22:00 | 38.7 | 27.8 | 66.7 |
| 9:45 | | | | 22:15 | 33.4 | 28.8 | 52.6 |
| 10:00 | | | | 22:30 | 31.6 | 28.0 | 49.2 |
| 10:15 | | | | 22:45 | 28.2 | 26.2 | 41.3 |
| 10:30 | | | | Mean | 48.0 | 36.7 | 58.3 |
| 10:45 | | | | | | | |
| 11:00 | | | | Night | | | |
| 11:15 | | | | 23:00 | 32.2 | 26.4 | 52.4 |
| 11:30 | | | | 23:15 | 40.4 | 25.6 | 61.9 |
| 11:45 | | | | 23:30 | 31.1 | 25.8 | 53.8 |
| 12:00 | | | | 23:45 | 25.8 | 24.6 | 40.0 |
| 12:15 | | | | 0:00 | 37.0 | 25.0 | 65.1 |
| 12:30 | | | | 0:15 | 27.0 | 23.8 | 51.6 |
| 12:45 | | | | 0:30 | 30.2 | 24.4 | 53.6 |
| 13:00 | | | | 0:45 | 27.3 | 24.4 | 43.7 |
| 13:15 | | | | 1:00 | 28.1 | 23.8 | 47.4 |
| 13:30 | | | | 1:15 | 25.3 | 23.0 | 38.1 |
| 13:45 | | | | 1:30 | 26.2 | 22.4 | 56.1 |
| 14:00 | | | | 1:45 | 31.4 | 23.2 | 53.0 |
| 14:15 | | | | 2:00 | 30.0 | 23.8 | 61.0 |
| 14:30 | | | | 2:15 | 26.9 | 23.4 | 47.8 |
| 14:45 | | | | 2:30 | 25.7 | 23.4 | 38.7 |
| 15:00 | 54.5 | 46.4 | 68.3 | 2:45 | 26.3 | 23.0 | 43.6 |
| 15:15 | 52.8 | 47.0 | 67.1 | 3:00 | 26.4 | 22.4 | 42.2 |
| 15:30 | 54.1 | 42.8 | 69.6 | 3:15 | 26.7 | 22.0 | 44.9 |
| 15:45 | 49.5 | 42.8 | 62.2 | 3:30 | 38.7 | 26.8 | 51.8 |
| 16:00 | 54.2 | 52.2 | 65.8 | 3:45 | 43.0 | 37.8 | 55.5 |
| 16:15 | 52.6 | 43.8 | 67.2 | 4:00 | 41.2 | 35.0 | 57.2 |
| 16:30 | 52.8 | 43.8 | 67.6 | 4:15 | 40.5 | 34.6 | 58.2 |
| 16:45 | 49.2 | 44.2 | 61.4 | 4:30 | 40.0 | 34.8 | 50.6 |
| 17:00 | 48.0 | 44.2 | 56.2 | 4:45 | 43.9 | 37.4 | 65.1 |
| 17:15 | 47.3 | 42.0 | 64.4 | 5:00 | 53.9 | 41.2 | 77.9 |
| 17:30 | 46.7 | 41.4 | 59.1 | 5:15 | 43.5 | 39.0 | 53.4 |
| 17:45 | 46.7 | 41.6 | 66.7 | 5:30 | 44.0 | 39.8 | 64.3 |
| 18:00 | 44.5 | 40.0 | 56.7 | 5:45 | 41.0 | 37.0 | 54.5 |
| 18:15 | 49.4 | 37.2 | 69.4 | 6:00 | 42.3 | 38.4 | 55.6 |
| 18:30 | 45.7 | 35.8 | 63.4 | 6:15 | 43.9 | 39.0 | 52.7 |
| 18:45 | 47.5 | 36.6 | 69.0 | 6:30 | 43.5 | 37.4 | 53.0 |
| 19:00 | 38.8 | 34.6 | 53.1 | 6:45 | 41.3 | 36.4 | 57.0 |
| | | | | Mean | 41.9 | 29.5 | 53.2 |

Table B2: Ambient noise measurements at position 2: 25-26 April 2010.



| Time | 15 minute Noise Level Samples dB(A) | | | Time | 15 minute Noise Level Samples dB(A) | | |
|----------------|-------------------------------------|------|--------|--------------|-------------------------------------|-------------|-------------|
| | LAeq | LA90 | LAFmax | | LAeq | LA90 | LAFmax |
| Daytime | | | | 19:15 | | | |
| 7:00 | 43.2 | 39.2 | 53.0 | 19:30 | | | |
| 7:15 | 47.7 | 41.8 | 70.1 | 19:45 | | | |
| 7:30 | 47.5 | 43.2 | 61.8 | 20:00 | | | |
| 7:45 | 46.0 | 41.4 | 66.0 | 20:15 | | | |
| 8:00 | 46.2 | 41.4 | 68.6 | 20:30 | | | |
| 8:15 | 46.0 | 43.4 | 57.8 | 20:45 | | | |
| 8:30 | 51.8 | 42.2 | 66.5 | 21:00 | | | |
| 8:45 | 55.4 | 43.8 | 69.4 | 21:15 | | | |
| 9:00 | 47.5 | 43.2 | 59.5 | 21:30 | | | |
| 9:15 | 48.5 | 44.8 | 57.1 | 21:45 | | | |
| 9:30 | 49.0 | 44.6 | 63.7 | 22:00 | | | |
| 9:45 | 49.3 | 45.4 | 62.3 | 22:15 | | | |
| 10:00 | 49.2 | 44.6 | 61.7 | 22:30 | | | |
| 10:15 | 48.5 | 44.4 | 56.6 | 22:45 | | | |
| 10:30 | 55.4 | 45.2 | 68.5 | Mean | 50.8 | 43.8 | 63.3 |
| 10:45 | 49.0 | 43.4 | 64.1 | Night | | | |
| 11:00 | 46.2 | 42.8 | 60.8 | 23:00 | | | |
| 11:15 | 46.9 | 42.8 | 61.4 | 23:15 | | | |
| 11:30 | 48.0 | 42.4 | 59.6 | 23:30 | | | |
| 11:45 | 45.1 | 41.0 | 56.1 | 23:45 | | | |
| 12:00 | 45.3 | 41.4 | 60.6 | 0:00 | | | |
| 12:15 | 52.9 | 42.2 | 71.1 | 0:15 | | | |
| 12:30 | 45.1 | 40.2 | 60.3 | 0:30 | | | |
| 12:45 | 45.8 | 41.4 | 55.5 | 0:45 | | | |
| 13:00 | 47.2 | 41.8 | 65.6 | 1:00 | | | |
| 13:15 | 53.6 | 48.2 | 65.8 | 1:15 | | | |
| 13:30 | 51.5 | 46.0 | 67.0 | 1:30 | | | |
| 13:45 | 51.0 | 47.2 | 68.7 | 1:45 | | | |
| 14:00 | 51.8 | 47.6 | 60.0 | 2:00 | | | |
| 14:15 | 50.2 | 46.0 | 59.1 | 2:15 | | | |
| 14:30 | 51.1 | 46.8 | 58.6 | 2:30 | | | |
| 14:45 | 52.4 | 45.6 | 67.9 | 2:45 | | | |
| 15:00 | 58.0 | 46.6 | 73.1 | 3:00 | | | |
| 15:15 | 52.8 | 45.8 | 74.9 | 3:15 | | | |
| 15:30 | | | | 3:30 | | | |
| 15:45 | | | | 3:45 | | | |
| 16:00 | | | | 4:00 | | | |
| 16:15 | | | | 4:15 | | | |
| 16:30 | | | | 4:30 | | | |
| 16:45 | | | | 4:45 | | | |
| 17:00 | | | | 5:00 | | | |
| 17:15 | | | | 5:15 | | | |
| 17:30 | | | | 5:30 | | | |
| 17:45 | | | | 5:45 | | | |
| 18:00 | | | | 6:00 | | | |
| 18:15 | | | | 6:15 | | | |
| 18:30 | | | | 6:30 | | | |
| 18:45 | | | | 6:45 | | | |
| 19:00 | | | | Mean | | | |

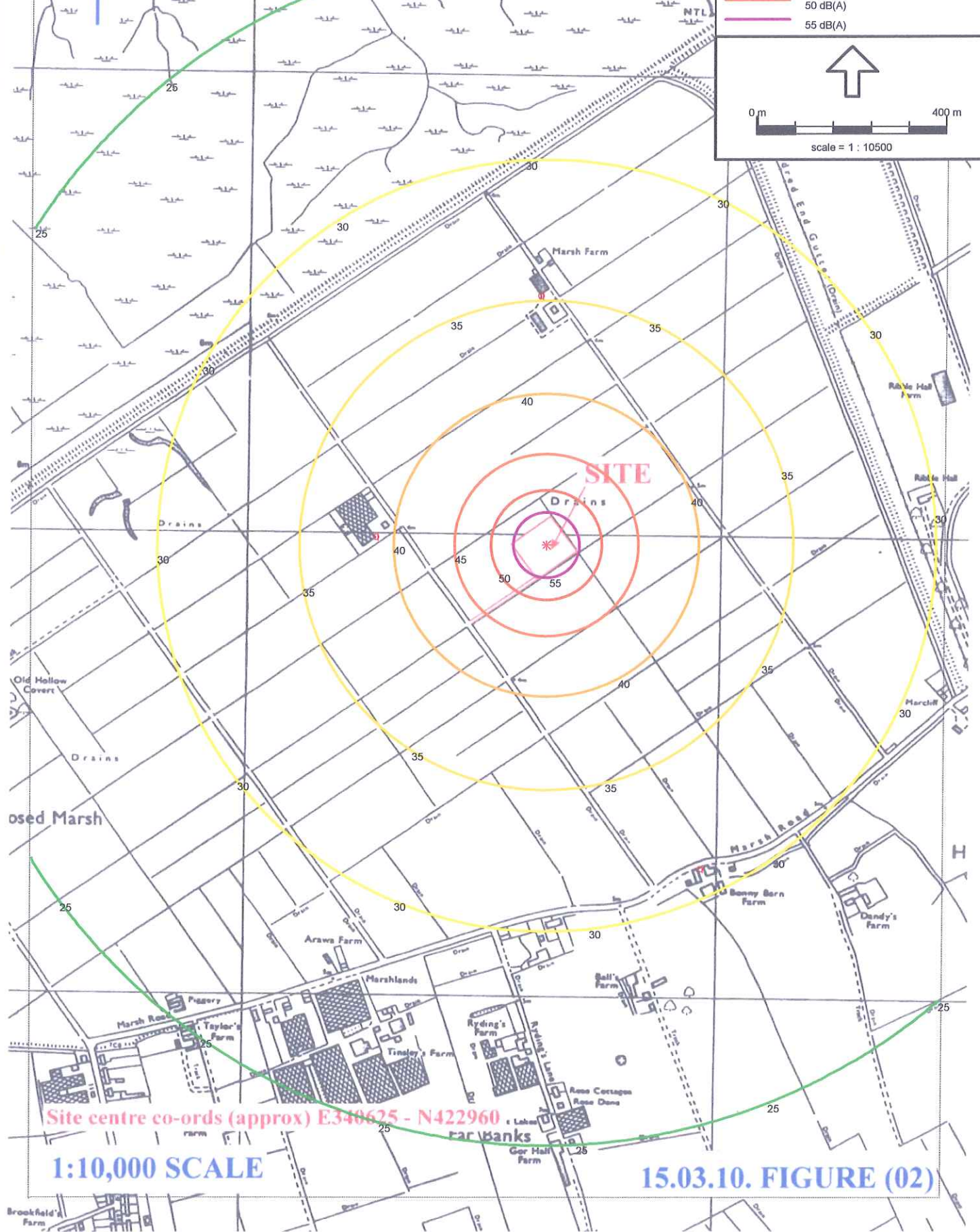
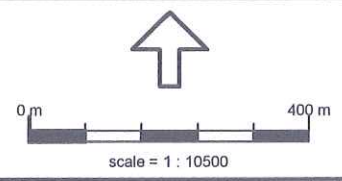
Table B2: Ambient noise measurements at position 2: 26 April 2010.

APPENDIX C

Noise Contour Map (Figure 2)

CUADRILLA RESOURCES LIMITED BECCONSALL EXPLORATION SITE LOCATION PLAN

| period: | Day Period |
|---------|------------|
| | 25 dB(A) |
| | 30 dB(A) |
| | 35 dB(A) |
| | 40 dB(A) |
| | 45 dB(A) |
| | 50 dB(A) |
| | 55 dB(A) |



Site centre co-ords (approx) E348625 - N422960

1:10,000 SCALE

15.03.10. FIGURE (02)



APPENDIX D

Photographs showing views of background noise measurement positions



Photo 1 View of noise measurement Position 1, at southwest boundary of Marshfield Farm, behind caravan park



Photo 2 View south from measurement position 1, across farmland towards exploration site location



Photo 3 View of noise measurement position 2, at Marsh Nursery



Photo 4 View east from position 2, across farmland towards exploration site location