

**Proposed Drilling Site
Llandow Industrial Estate (site 2)**

**Noise Impact Assessment
3123/ENS1**

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1.0 Introduction

Coastal Oil & Gas Ltd is proposing to drill at a site located on the southern part of the Llandow Industrial Estate, Llandow. Drilling is proposed to take place 24 hours a day for approximately 6 weeks.

Hunter Acoustics have been commissioned to propose noise limits at critical noise sensitive premises. These are based on background noise monitoring (carried out in May 2011) and current planning guidance.

Appendix A explains acoustic terminology used in this report.

2.0 Planning Guidance

2.1 Minerals Technical Advice Note (Wales) 1

The Minerals Technical Advice Note (Wales) 1 (MTAN1) document gives the following guidance on noise limits for mineral extraction including gas:

- Daytime (0700-1900hrs) noise limits at noise-sensitive properties should be established at 10dB(A) above background levels* (subject to a maximum of 55dB(A) LAeq,1h).;
- Evening (1900-2200hrs) noise limits at NSPs should be established at 10dB(A) above background levels;
- Night-time noise limits at noise-sensitive dwellings should not exceed 42dB(A) LAeq,1h.

* Where it will be difficult not to exceed the background level by more than 10dB(A) without imposing unreasonable burdens on the mineral operator, the limit should be set as near that level as practicable and should not exceed 55dB(A)

MTAN1 also recognises that when developing noise limits, some noisy short-term activities, which may otherwise be regarded as unacceptable, are unavoidable to facilitate minerals extraction.

2.2 World Health Organisation Guidance (residential receivers)

The World Health Organisation (WHO) 'Guidelines for Community Noise – 1999' quotes sleep disturbance limits in bedrooms at night of $L_{Aeq,8hr}$ 30dB(A). This equates to an external level of around 45dB(A) taking a 15dB loss through a partially open window.

2.3 Bat Roost

We have not found any guidance on specific noise criteria for bat roosts however we would make the following observations;

- a) High frequency/ultrasound noise emission is not likely to be an issue, bearing in mind the roost is 525m north of the proposed drilling site, and air/ground absorption effects at frequencies above 8kHz would be at least

1dB per meter. Ultrasound levels at the bat roost 525m away are therefore not indicated to be an issue.

- b) A report from Dr Feltwell of Wildlife Matters refers to research showing that “the noise produced by tree branches or rustling reed beds produces the same levels of noise in the bat’s acoustic environment and that they can differentiate between natural and man-made noises. Researchers found *“that noise does interfere with bat’s ability to locate prey and feed, but no more than naturally occurring noises that the bats regularly encounter.”* (Schaub A, Ostwald J, Siemers BM. 2008. Foraging bats avoid noise. The Journal of Experimental Biology, 211(Pt 19):3174-80)
- c) It also appears likely that bats roost around working quarries and industrial sites across the country. This roost is near an existing recycling centre and we would therefore expect lorries to pass relatively close on most days, generating noise levels well in excess of emissions from the proposed drill site.

2.4 Noise Predictions

Noise levels at residential receivers and the bat roost have been predicted under light winds according to *“The Propagation of Noise from Petroleum and Petrochemical Complexes to Neighbouring Communities”* - report No.4/81 published by the Oil companies international group for CONservation of Clean Air and Water - Europe known as the CONCAWE model.

3.0 Environmental Noise Survey

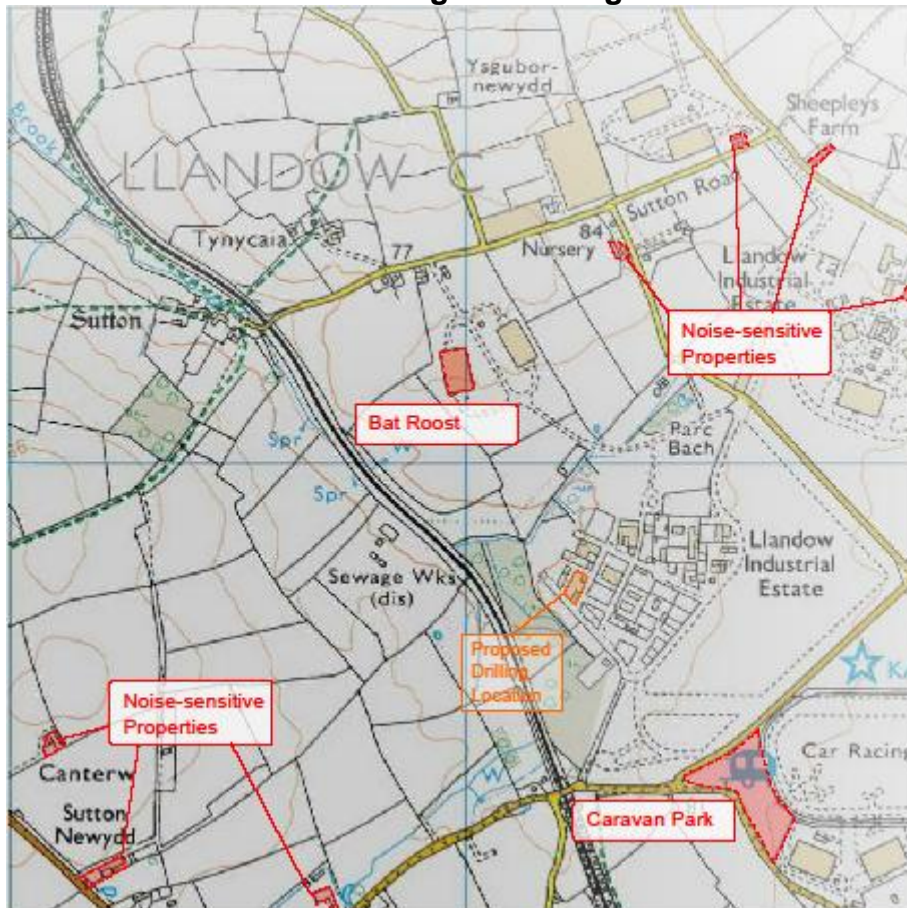
3.1 Procedure

Continuous noise monitoring was carried out between 1600hrs on 19th May and 1035hrs on 20th May 2011 to determine existing background noise levels. Data including L_{max} , L_{eq} & L_{90} was logged at 5-minute intervals over the monitoring period.

Site plan 3123/SP1 shows the development site and the measurement position used;

Position A Located north of proposed drilling site, approximately 1.2 - 1.5m above local ground level. Background noise levels at this location deemed representative of those at the nearest NSPs.

3123/SP1 - Site Plan Showing Monitoring Position



3.2 Equipment Used

The following equipment was used:

Larson Davis 820 Sound Level Meter (Type 1) Position A

Norsonic Acoustic Calibrator Type 1251

Windshields

The measurement systems were calibrated before and after the survey. No variation occurred.

3.3 Weather Conditions

Weather conditions were mainly dry throughout the monitoring period with no significant winds.

4.0 Results

Time history graph 3123/TH1 shows L_{max} , L_{eq} & L_{90} sound pressure levels measured over consecutive 5-minute periods at position 1.

Period	Minimum Consistent L_{90}	Proposed Noise Limit
Daytime (0700-1900)	37.5dB(A)	47.5dB(A)
Evening (1900-2200)	34.8dB(A)	44.8dB(A)
Night (2200-0700)	20.8dB(A)	42.0dB(A)

Period	Average L_{eq}
Entire survey period	46.2dB(A)

Time history graph 3123/TH1 shows L_{max} , L_{eq} & L_{90} sound pressure levels measured over consecutive 5-minute periods at position A.

As the drill rig is proposed to operate 24 hrs/day during the 6 week period, night-time is the critical period when setting noise limits at residences.

5.0 Noise Predictions

5.1 Noise Sensitive Properties

Locations of critical residential noise properties are shown in site plan 3123/SP1.

The critical noise sensitive premises appear to be houses and farms located approximately,

- 375m south (Sutton Newydd)
 - 750m north (house south of Sutton Rd)
 - 800m – 1km west/south-west (Sutton Newydd)
 - 900m north-east (Six Wells Cottage, Llandow Ind. Estate)
- of the proposed drill site.

Further noise-sensitive locations have been identified as follows, located approximately:

- 475m south (caravan park)
 - 525m north (Bat roost)
- of the proposed drill site.

5.2 Predicted Noise Levels

The proposed drill rig has a typical noise level of 79 dB(A) at 1m – based on data included in an email from Oliver Taylor dated 21/01/2011 with manufacturer's specifications for a similar drill rig and our own measurements of a similar drill rig.

Noise levels have been predicted using the CONCAWE model. At residential NSPs and the caravan park:

- 375m south, the noise level of the drill rig at the residence is predicted to be approximately 35.6dB(A) L_{Aeq} .
- 475m south, the noise level of the drill rig at the caravan park is predicted to be approximately 32.8dB(A) L_{Aeq} .
- 750m north, the noise level of the drill rig at the residence is predicted to be approximately 27.2dB(A) L_{Aeq} .
- 800m west/south-west, the noise level of the drill rig at the residence is predicted to be approximately 26.4dB(A) L_{Aeq} .
- 900m north-east, the noise level of the drill rig at the residence is predicted to be approximately 24.9dB(A) L_{Aeq} .

These levels meet the night-time limits set in MTAN1.

Allowing for a 15dB loss through a partially open window should result in noise levels in bedrooms below the World Health Organisation (WHO) night-time sleep disturbance noise criteria of 30dB(A).

Noise levels from the drill rig at the bat roost are predicted to be approximately 32.0dB(A) L_{Aeq} .

Comparing 32dB(A) with the time varying noise climate at position 1 shown in time history graph 3123/TH1, noise levels from the drill rig are not indicated to be significant.

6.0 Good Practice Guide

The following advice is given with the aim of minimising noise emissions from drilling operations.

- Avoid unnecessary revving of engines and switch off equipment when not required.
- Ensure plant and vehicles are properly maintained, check silencers and bearings.
- If the noise is directional, point the source away from noise-sensitive locations – e.g. exhausts.
- Limit the use of particularly noisy plant or vehicles.
- Start up plant sequentially rather than together.
- Ensure plant is operated with noise control hoods closed.

7.0 Conclusion

Coastal Oil & Gas Ltd is proposing to drill at a site located on the southern part of the Llandow Industrial Estate, Llandow. Drilling is proposed to take place 24 hours a day for approximately 6 weeks.

Critical noise sensitive premises have been identified as shown on Site Plan 3123/SP1. Background noise levels have been measured at a location assessed representative of the critical noise sensitive premises.

Noise limits have been proposed based on measured background noise levels and current planning guidance.

Predicted noise levels at residential properties and the caravan park fall below MTAN1 night-time noise limits and the World Health Organisation (WHO) night-time sleep disturbance threshold criteria of 30dB(A) within bedrooms.

Predicted noise levels at the bat roost are only 32dB(A) L_{eq} , and are therefore not assessed significant compared with existing noise sources around the roost; including those associated with the neighbouring waste recycling centre, or wind/rain in trees.

Noise limits and criteria should be confirmed acceptable with the local planning authority/EHO.

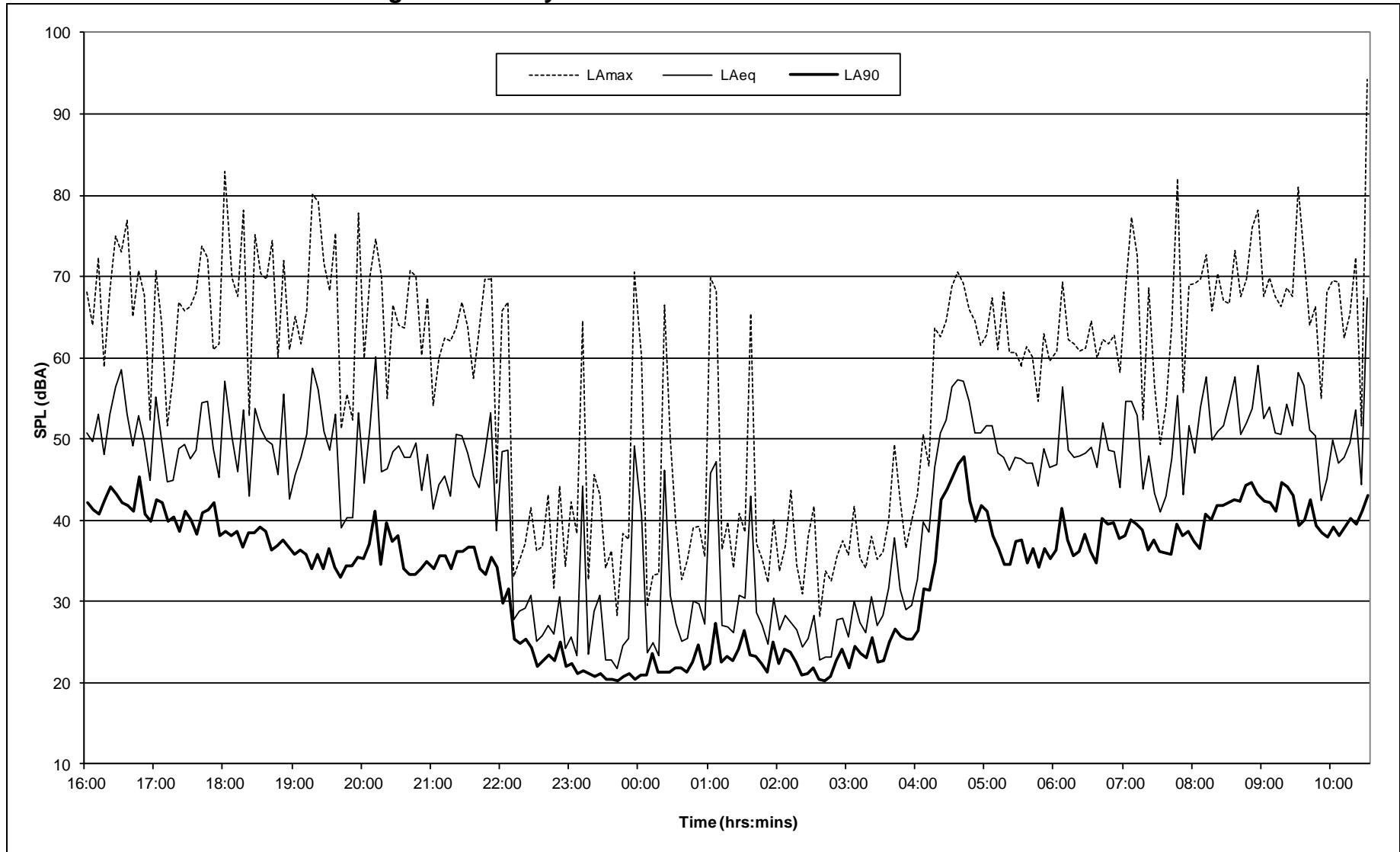
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3123/TH1 - Continuous Monitoring Time History at Position A



Appendix A

Acoustic Terminology

Human response to noise depends on a number of factors including; Loudness, Frequency content, and variations in level with time. Various frequency weightings and statistical indices have been developed in order to objectively quantify 'annoyance'. The following units have been used in this report:

dB(A): The sound pressure level weighted to correspond with the frequency response of the human ear, and therefore a persons subjective response to frequency content.

L_{eq}: The Equivalent continuous sound level is a notional steady state level which over a quoted time period would have the same acoustic energy content as the actual fluctuating noise measured over that period.

L₉₀: The sound level which is exceeded for 90% of the measurement period. i.e. The level exceeded for 54 minutes of a 1-hour measurement. It is often used to define the background noise level.

L₁₀: The sound level which is exceeded for 10% of the measurement period. i.e. The level exceeded for 6 minutes of a 1-hour measurement

SEL: 'Sound Exposure Level', The dB(A) level which, if it lasted 1 second, would produce the same sound energy as the event in question (e.g. a train pass-by).

L_{Ar,Tr}: Rating noise level is the specific noise level plus any adjustment for the characteristic features of the noise