APPENDIX 10.5

LOW FREQUENCY NOISE

Review of European Legislation and Standards

Authorities in Germany, Denmark, Holland, Sweden and Poland have acknowledged the problems associated with low frequency noise by publishing standards or guidance.

COMPARISON OF EUROPEAN STANDARDS AND GUIDANCE CRITERIA FOR LOW FREQUENCY NOISE

	Poland	**Germany**	**Netherlands**	**Denmark (night)**	**Sweden**	**ISO226**
Frequency (Hz)	**L_{A10} dB**	**DIN45680 dB**	**NSG dB**	**20dBA**	**dB**	**dB**
8		103				
10	80.4	95		90.4		
12.5	73.4	87		83.4		
16	66.7	79		76.7		
20	60.5	71	74	70.5		78.5
25	54.7	63	64	64.7		68.8
31.5	49.3	55.5	55	59.4	56	59.5
40	44.6	48	46	54.6	49	51.1
50	40.2	40.5	39	50.2	43	44
63	36.2	33.5	33	46.2	41.5	37.5
80	32.5	28	27	42.5	40	31.5
100	29.1	23.5	22	39.1	38	26.5
125	26.1			36.1	36	22.1
160	23.4			33.4	34	17.9
200	20.9				32	14.4
250	18.6					11.4

Low Frequency Guidance in the UK:

In February 2005, the University of Salford published a research paper which was prepared for Defra (Contract NANR45) entitled `Proposed criteria for the assessment of low frequency noise disturbance'.

The proposed criteria and procedure for assessing low frequency noise is as follows:

Measurement should be taken with the microphone in an unoccupied room where the complainant says the noise is present. (Note that the person taking the measurements may not be able to hear the sound).

Record L_{eq}, L_{10}, and L_{90} in the third octave bands between 10Hz and 1060Hz.

If the L_{eq}' taken over a time when the noise is said to be present, exceeds the values in Table 9 it may indicate a source of LFN that could cause disturbance. The character of the sound should be checked if possible by playing back an audio recording at amplified level.

If the noise occurs only during the day then 5dB relaxation may be applied to all third octave bands.

If the noise is steady then a 5dB relaxation may be applied to all third octave bands. A noise is considered steady if either of the conditions a. or b. below is met:

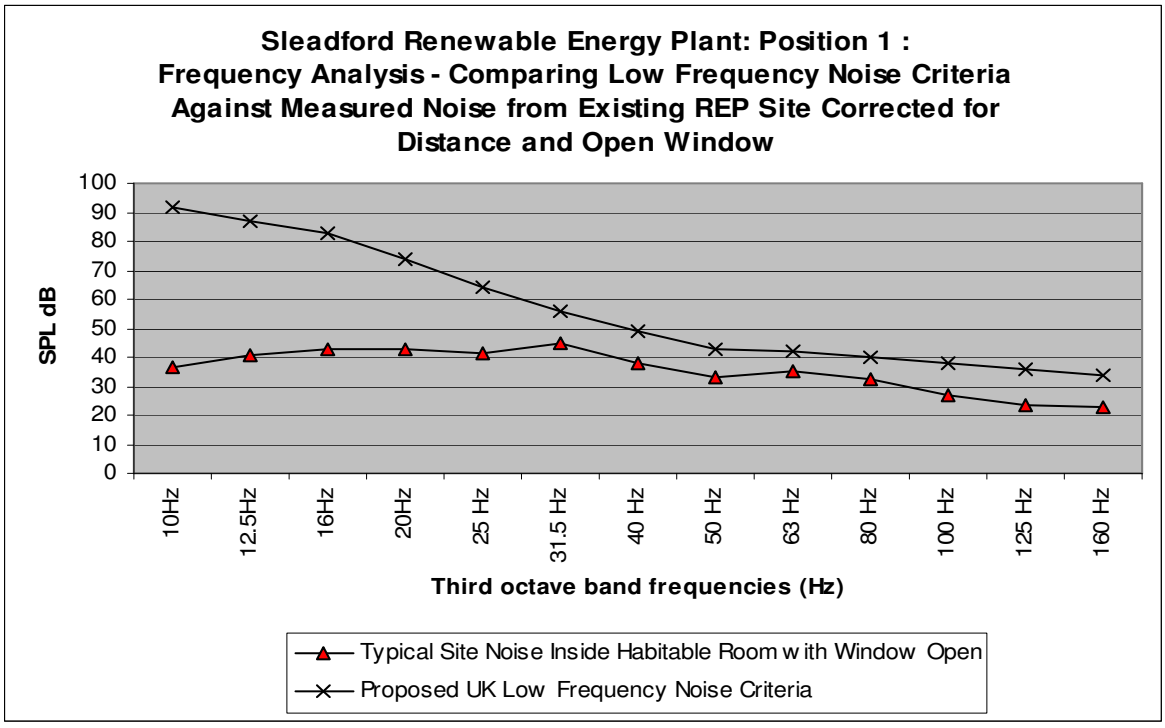
a. $L_{10} - L_{90} < 5dB$
b. The rate of change of sound pressure level (Fast time weighting) is less than 10dB per second.

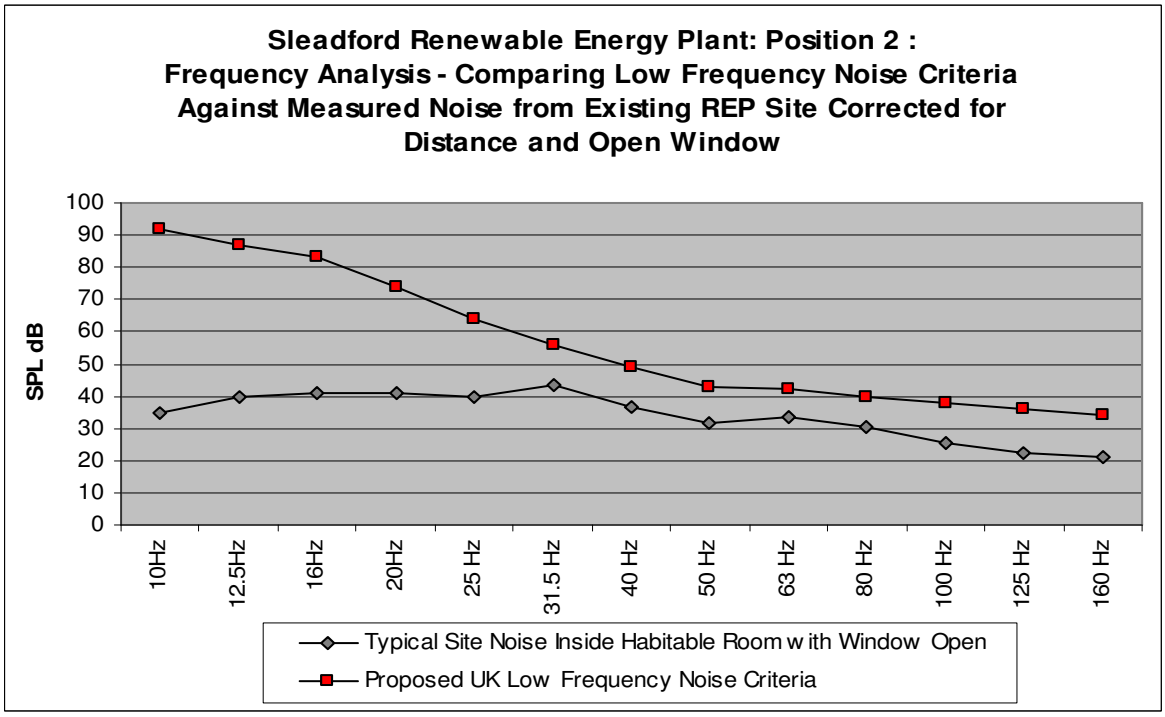
Where the parameters are evaluated in the third octave band which exceeds the reference curve values (Table 9) by the greatest margin.

Table 9 Proposed reference curves

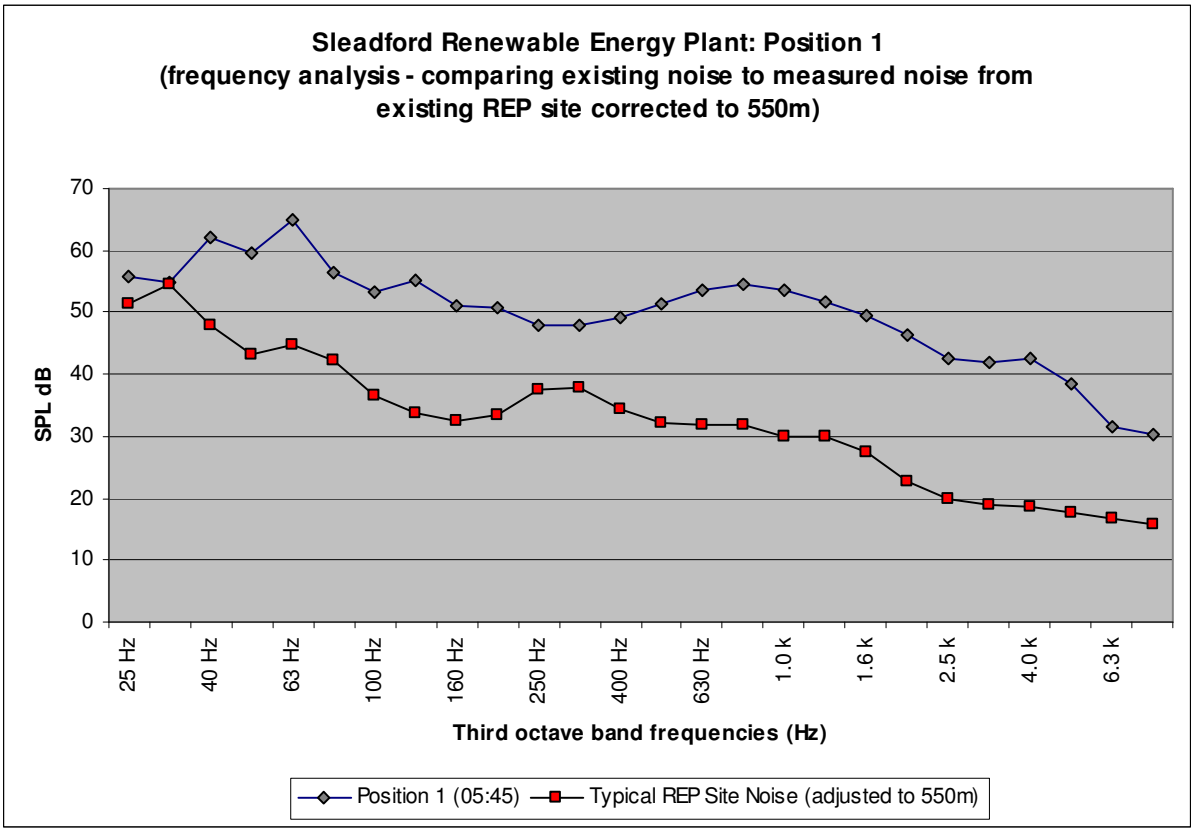
Hz	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB, Leq	92	87	83	74	64	56	49	43	42	40	38	36	34

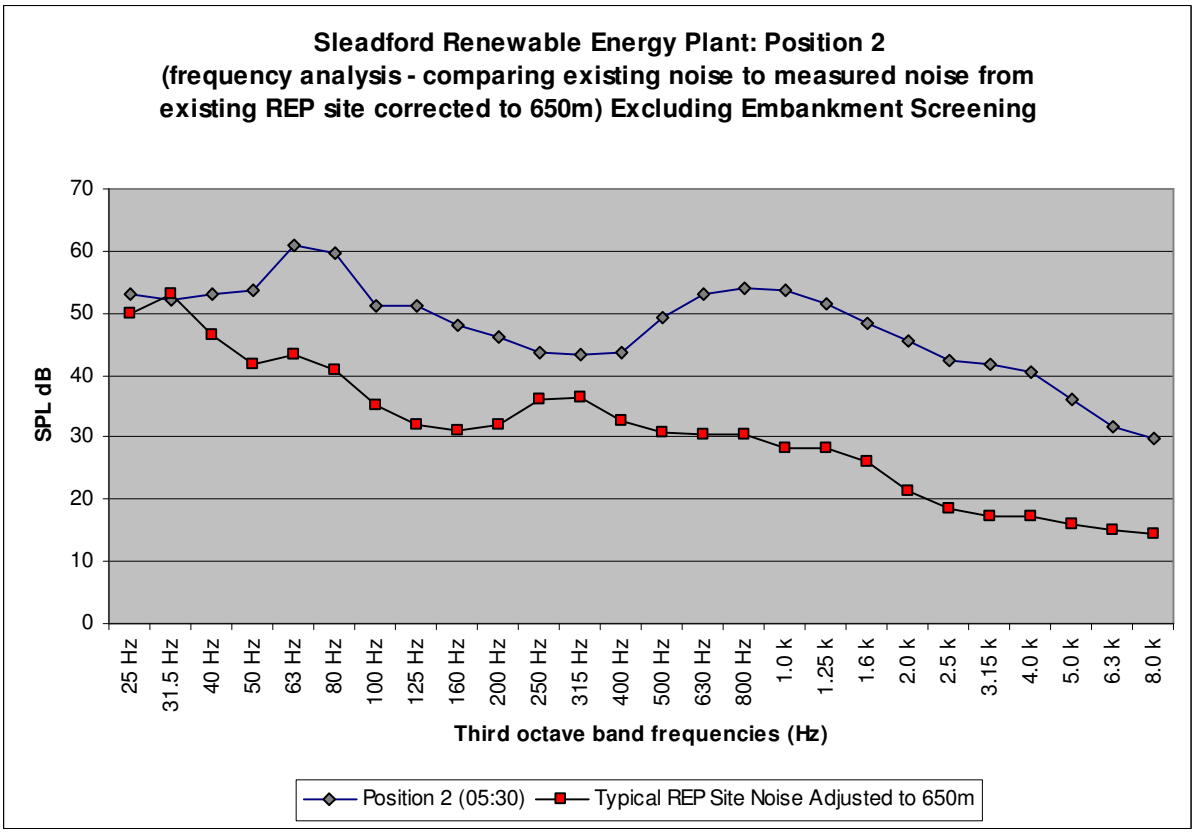
Predicted Internal Noise Measurements Corrected for Distance and Open Window at each receptor

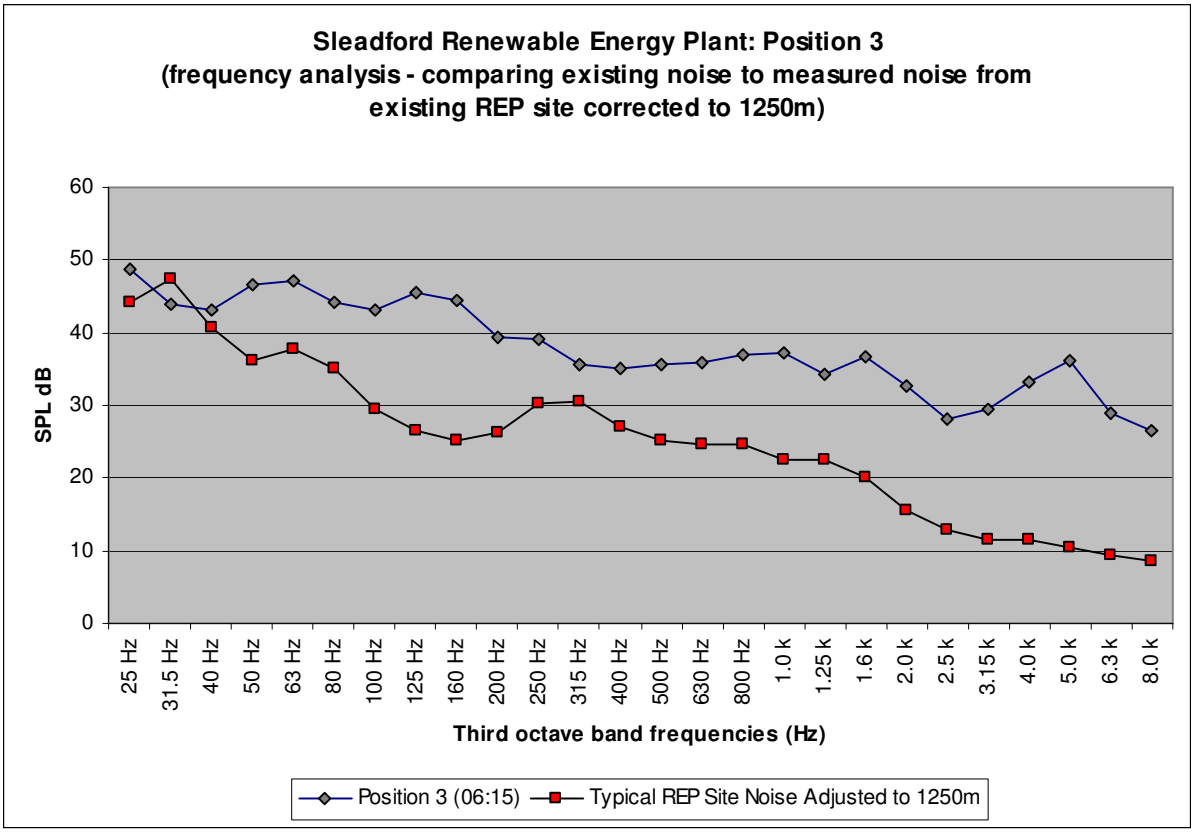


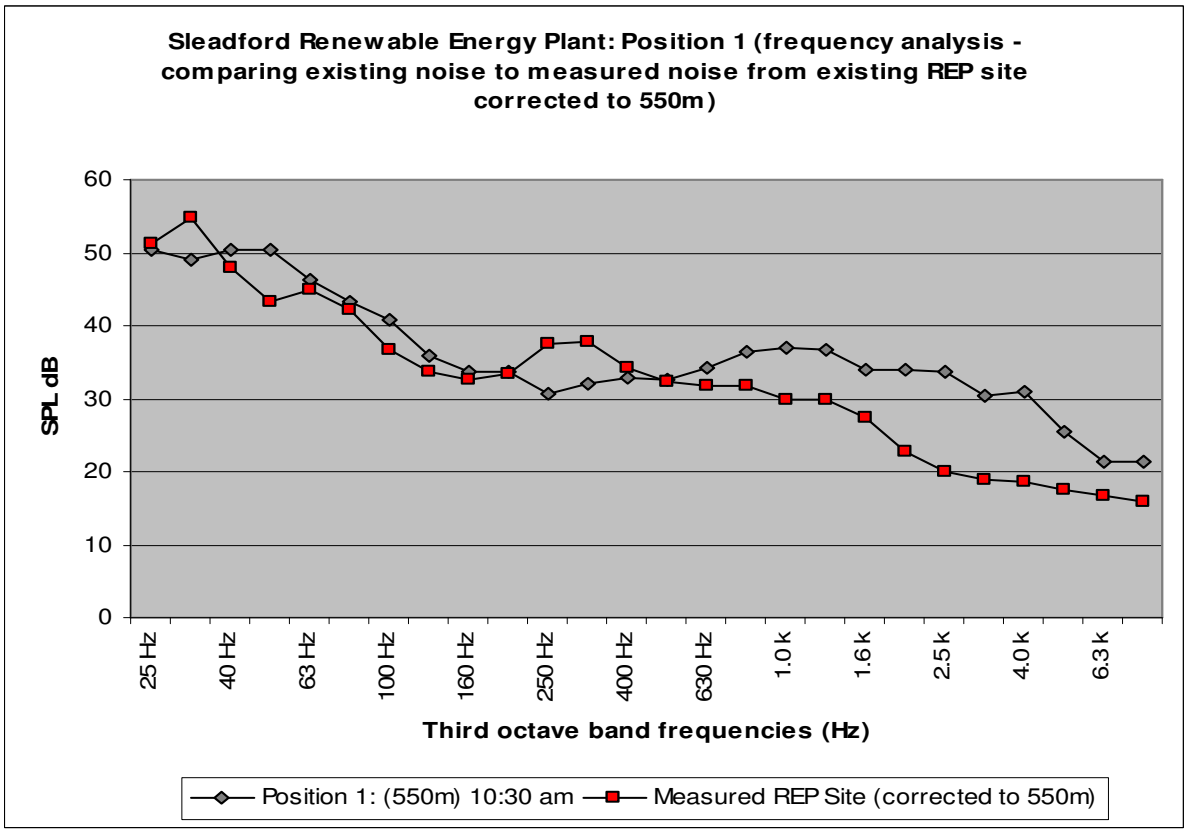


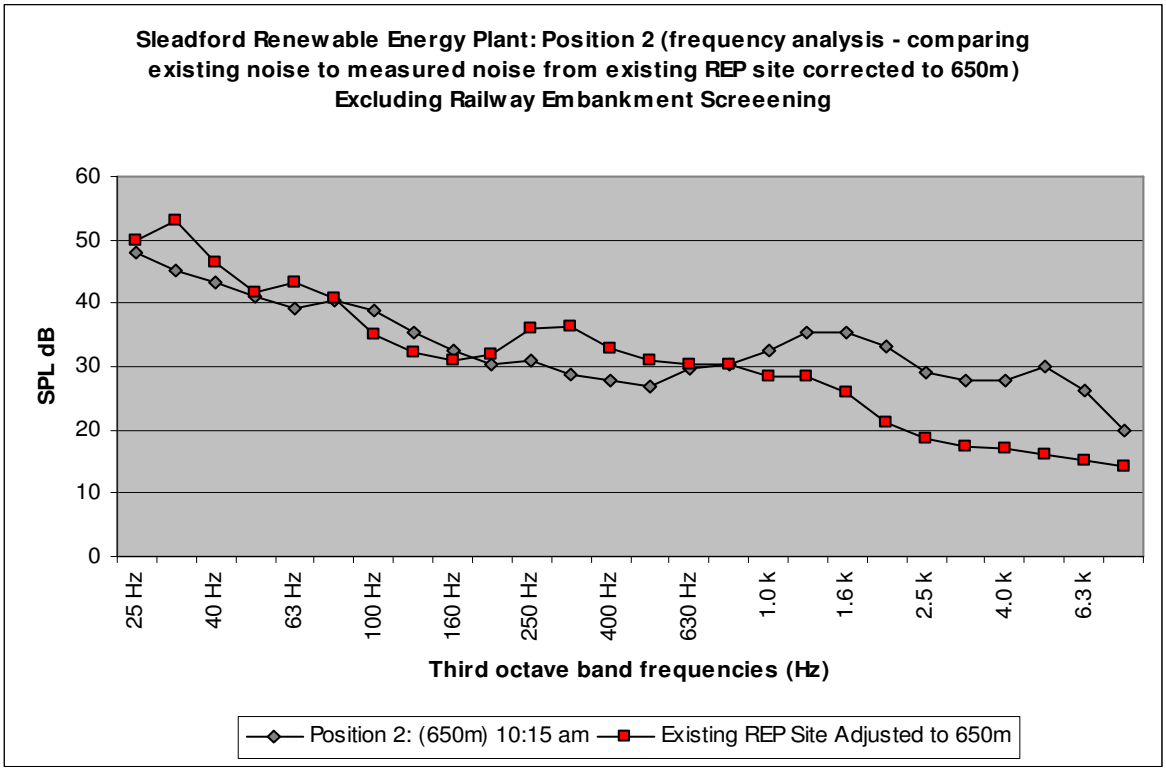
External Noise Measurements Corrected for Distance at each receptor

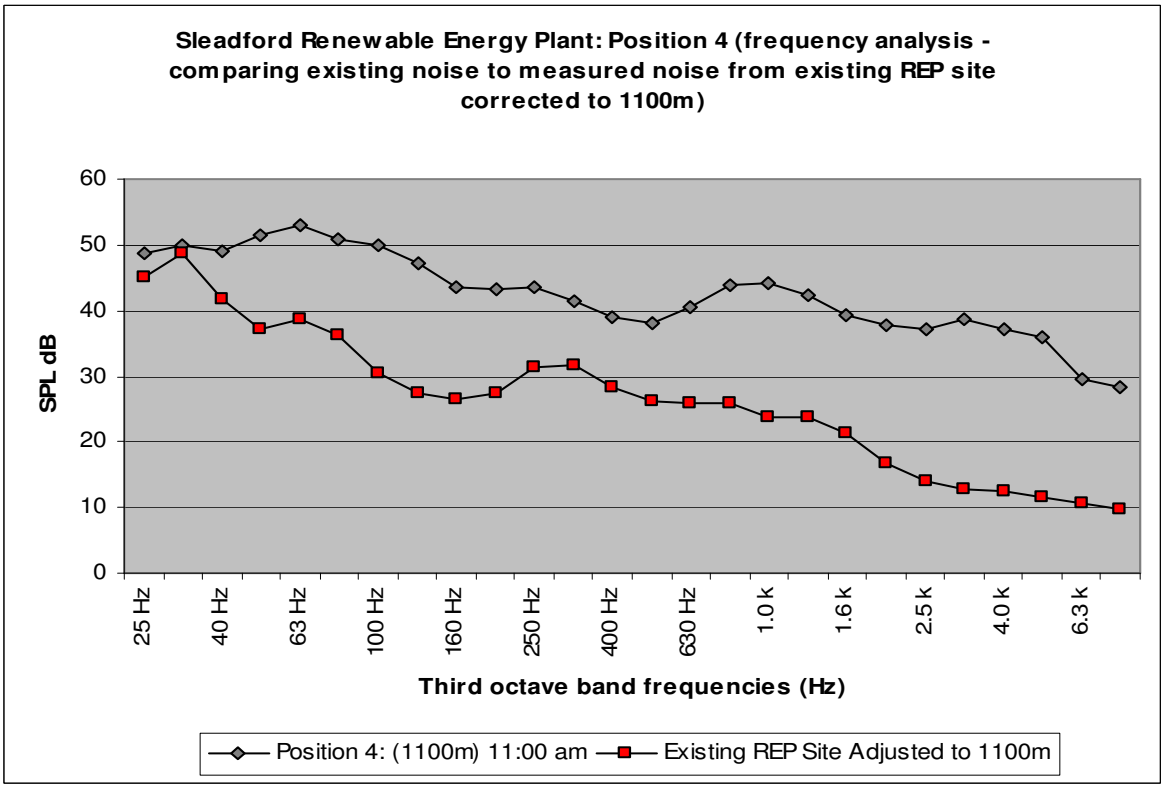





Sleadford Renewable Energy Plant: Position 3
(frequency analysis - comparing existing noise to measured noise from existing REP site corrected to 1250m)
SPL dB
60
50
40
30
20
10
0
25 Hz
31.5 Hz
40 Hz
50 Hz
63 Hz
80 Hz
100 Hz
125 Hz
160 Hz
200 Hz
250 Hz
315 Hz
400 Hz
500 Hz
630 Hz
800 Hz
1.0 k
1.25 k
1.6 k
2.0 k
2.5 k
3.15 k
4.0 k
5.0 k
6.3 k
8.0 k
Third octave band frequencies (Hz)
Position 3 (06:15)
Typical REP Site Noise Adjusted to 1250m


Sleadford Renewable Energy Plant: Position 1 (frequency analysis - comparing existing noise to measured noise from existing REP site corrected to 550m)
SPL dB
60
50
40
30
20
10
0
25 Hz
40 Hz
63 Hz
100 Hz
160 Hz
250 Hz
400 Hz
630 Hz
1.0 k
1.6 k
2.5 k
4.0 k
6.3 k
Third octave band frequencies (Hz)
Position 1: (550m) 10:30 am
Measured REP Site (corrected to 550m)


Sleadford Renewable Energy Plant: Position 2 (frequency analysis - comparing existing noise to measured noise from existing REP site corrected to 650m) Excluding Railway Embankment Screeening
SPL dB
60
50
40
30
20
10
0
25 Hz
40 Hz
63 Hz
100 Hz
160 Hz
250 Hz
400 Hz
630 Hz
1.0 k
1.6 k
2.5 k
4.0 k
6.3 k
Third octave band frequencies (Hz)
Position 2: (650m) 10:15 am
Existing REP Site Adjusted to 650m


Sleadford Renewable Energy Plant: Position 4 (frequency analysis - comparing existing noise to measured noise from existing REP site corrected to 1100m)
SPL dB
60
50
40
30
20
10
0
25 Hz
40 Hz
63 Hz
100 Hz
160 Hz
250 Hz
400 Hz
630 Hz
1.0 k
1.6 k
2.5 k
4.0 k
6.3 k
Third octave band frequencies (Hz)
Position 4: (1100m) 11:00 am
Existing REP Site Adjusted to 1100m