

# Cottam Solar Project

## PEIR – Volume 2 Appendices to Chapter 15: Noise and Vibration

Prepared by Tetra Tech Limited  
June 2022



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## **15.1 Noise Survey Information**

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# Cottam Solar Project

## Preliminary Environmental Information Report

### Appendix 15.1: Noise Survey Information

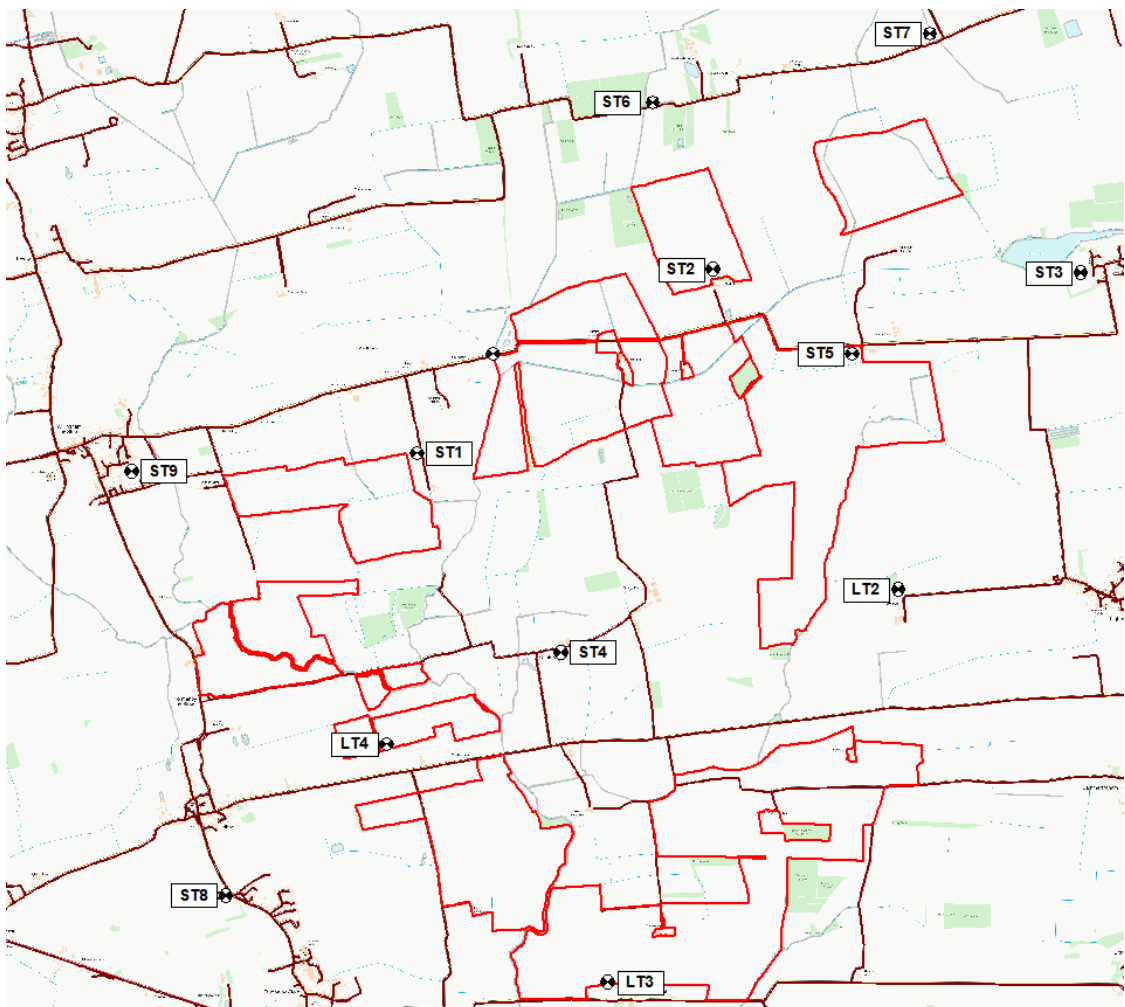
Prepared by Tetra Tech Limited



## 1.1 Cottam 1 Noise Survey

1.1.1 The baseline noise environment has been established following a noise survey undertaken from Thursday 9th September 2021 to Thursday 16th September 2021. Attended 15-minute short-term measures were undertaken at nine locations during the day, evening and night-time periods with four additional locations being measured unattended over a 161-hour period. Full details of the noise monitoring survey will be presented within the noise technical report, with a brief summary provided below.

**Figure A.15.1 Noise Monitoring Locations**



Not to scale. OS Licence No. AL553611

1.1.2 The existing ambient noise climate was mainly dominated by road traffic noise and occasional farming related noise. The main sources of this noise included: Kexby

Road, Willingham Road, Stow Road, the A1500 and the B1241. A summary of the baseline noise monitoring survey is shown in Table A.15.1 below.

**Table A.15.1 Results of Baseline Noise Monitoring Survey (Average Levels)**

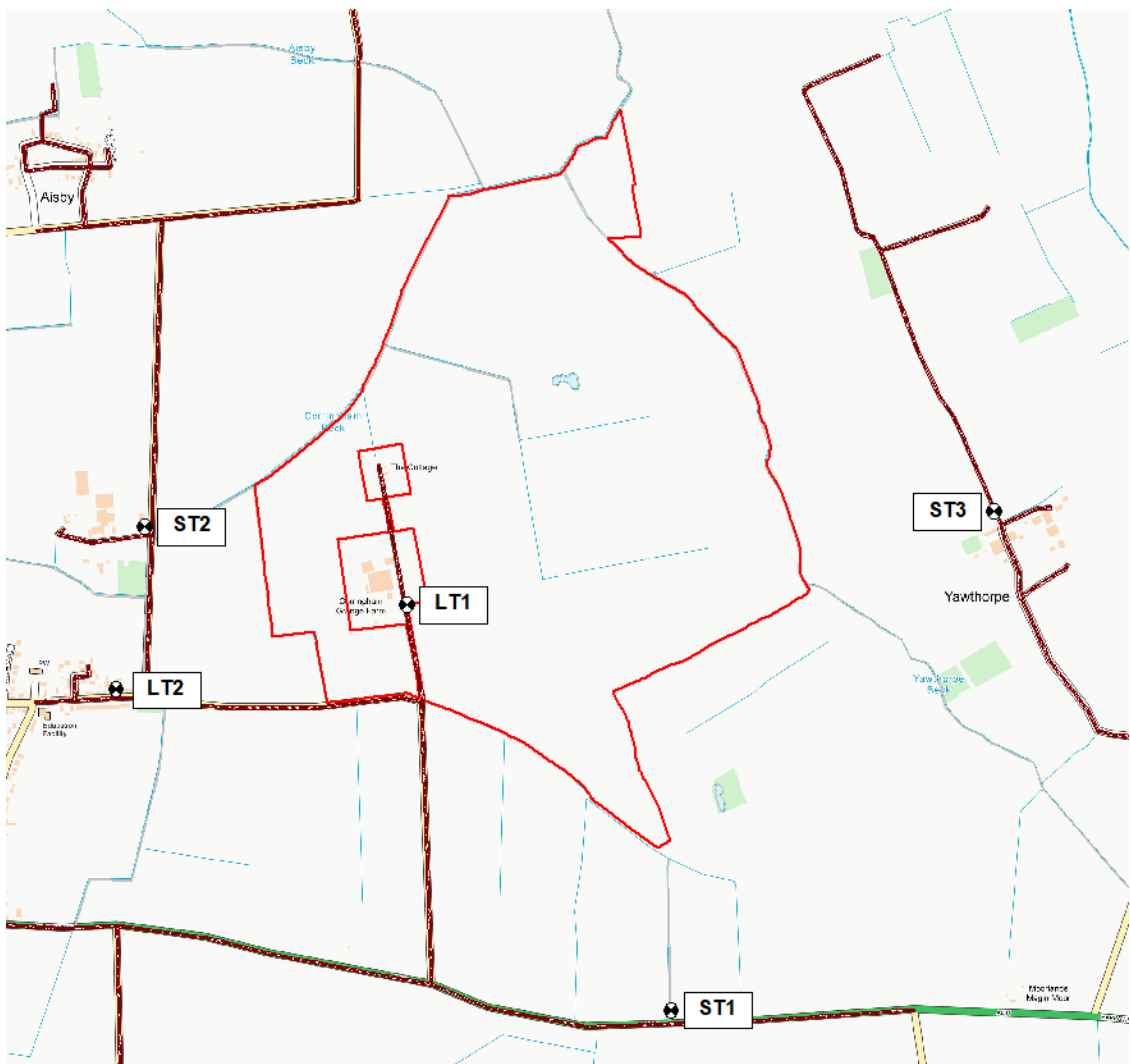
Period	Duration (T)	Monitoring Date and Times	Location	L <sub>Aeq,T</sub> (dB)	L <sub>Amax,T</sub> (dB)	L <sub>Amin,T</sub> (dB)	L <sub>A10,T</sub> (dB)	L <sub>A90,T</sub> (dB)
Weekday Daytime 07:00 - 23:00	72 Hours	09/09/2021 – 16/09/2021 07:00 - 23:00	LT1	54.5	104.1	15.6	42.3	32.0
Weekday Night-time 23:00 - 07:00	41 Hours	09/09/2021 – 16/09/2021 23:00 - 07:00		44.9	89.3	14.8	28.2	19.0
Weekend Daytime 07:00 - 23:00	32 Hours	09/09/2021 – 16/09/2021 07:00 - 23:00		49.7	86.7	16.7	42.8	28.0
Weekend Night-time 23:00 - 07:00	16 hours	09/09/2021 – 16/09/2021 23:00 - 07:00		37.4	70.8	15.5	26.3	18.0
Weekday Daytime 07:00 - 23:00	72 Hours	09/09/2021 – 16/09/2021 07:00 - 23:00	LT2	51.3	86.3	18.5	42.2	34.0
Weekday Night-time 23:00 - 07:00	41 Hours	09/09/2021 – 16/09/2021 23:00 - 07:00		37.2	75.9	17.6	32.1	20.0
Weekend Daytime 07:00 - 23:00	32 Hours	09/09/2021 – 16/09/2021 07:00 - 23:00		49.0	92.2	18.9	41.0	28.0
Weekend Night-time 23:00 - 07:00	16 hours	09/09/2021 – 16/09/2021 23:00 - 07:00		34.7	70.5	18.2	29.4	22.0
Weekday Daytime 07:00 - 23:00	72 Hours	09/09/2021 – 16/09/2021 07:00 - 23:00	LT3	45.0	91.2	18.3	39.4	32.0
Weekday Night-time 23:00 - 07:00	41 Hours	09/09/2021 – 16/09/2021 23:00 - 07:00		31.8	65.4	14.9	30.5	23.0
Weekend Daytime 07:00 - 23:00	32 Hours	09/09/2021 – 16/09/2021 07:00 - 23:00		45.7	89.2	20.0	39.8	33.0
Weekend Night-time 23:00 - 07:00	16 hours	09/09/2021 – 16/09/2021 23:00 - 07:00		31.8	61.2	16.3	31.7	26.0
Weekday Daytime 07:00 - 23:00	72 Hours	09/09/2021 – 16/09/2021 07:00 - 23:00	LT4	40.3	77.2	16.1	39.9	32.0
Weekday Night-time 23:00 - 07:00	41 Hours	09/09/2021 – 16/09/2021 23:00 - 07:00		31.7	77.1	14.9	28.4	17.0
Weekend Daytime 07:00 - 23:00	32 Hours	09/09/2021 – 16/09/2021 07:00 - 23:00		40.3	66.7	17.7	39.8	24.0
Weekend Night-time 23:00 - 07:00	16 hours	09/09/2021 – 16/09/2021 23:00 - 07:00		31.4	62.3	15.6	28.4	18.0
Daytime	15 Mins	09/09/2021	ST1	47.0	60.9	33.1	50.7	38.0

Period	Duration (T)	Monitoring Date and Times	Location	L <sub>Aeq,T</sub> (dB)	L <sub>Amax,T</sub> (dB)	L <sub>Amin,T</sub> (dB)	L <sub>A10,T</sub> (dB)	L <sub>A90,T</sub> (dB)
07:00 - 19:00		15:51						
	15 Mins	09/09/2021 16:42	ST2	40.2	51.1	29.9	43.7	34.8
	15 Mins	09/09/2021 16:13	ST3	58.2	81.9	31.9	59.5	36.1
	15 Mins	09/09/2021 15:53	ST4	53.3	79.4	33.6	47.2	36.9
	15 Mins	10/09/2021 09:32	ST5	52.4	79.6	32.9	44.8	35.2
	15 Mins	09/09/2021	ST6	52.3	77.1	28.2	43.8	32.7
	15 Mins	09/09/2021 15:44	ST7	48.4	68.7	29.6	48.6	35.4
	15 Mins	09/09/2021 15:27	ST8	63.1	82.5	36.0	68.2	43.7
	15 Mins	09/09/2021 15:29	ST9	46.2	69.8	31.3	47.0	35.4
Evening 19:00 - 23:00	15 Mins	09/09/2021 21:37	ST1	37.7	64.9	19.7	35.2	23.8
	15 Mins	09/09/2021 22:04	ST2	34.3	64.4	19.5	29.8	22.3
	15 Mins	09/09/2021 20:44	ST3	27.3	43.7	20.1	29.8	22.0
	15 Mins	09/09/2021 20:42	ST4	36.2	61.1	29.8	36.6	32.3
	15 Mins	09/09/2021 22:30	ST5	32.8	63.5	19.1	31.3	21.3
	15 Mins	09/09/2021 21:27	ST6	42.4	67.4	26.7	46.3	30.2
	15 Mins	09/09/2021 20:20	ST7	30.6	43.1	23.1	33.7	26.0
	15 Mins	09/09/2021 20:12	ST8	57.6	77.6	29.7	58.3	35.1
	15 Mins	09/09/2021 21:11	ST9	36.1	65.2	23.5	37.0	27.3
Night-time 23:00 - 07:00	15 Mins	10/09/2021 00:16	ST1	39.2	66.6	19.6	33.9	23.8
	15 Mins	09/09/2021 23:53	ST2	40.8	66.3	30.9	42.9	35.1
	15 Mins	09/09/2021 23:49	ST3	25.5	48.2	19.0	27.9	20.6
	15 Mins	10/09/2021 00:42	ST4	25.6	55.0	13.6	18.5	14.4
	15 Mins	09/09/2021 23:12	ST5	34.5	63.0	19.8	31.8	23.0
	15 Mins	09/09/2021 23:04	ST6	28.5	48.3	24.0	29.1	25.7
	15 Mins	10/09/2021 00:12	ST7	24.6	45.7	20.0	26.0	21.8
	15 Mins	10/09/2021	ST8	25.0	57.9	13.6	21.6	14.5
	15 Mins	10/09/2021 00:42	ST9	38.3	70.7	28.5	33.4	30.4

## 1.2 Cottam 2 Noise Survey

1.2.1 The baseline noise environment has been established following a noise survey undertaken from Thursday 9<sup>th</sup> September 2021 to Thursday 16<sup>th</sup> September 2021. Attended 15-minute short-term measures were undertaken at three locations during the day, evening and night-time periods with two additional locations being measured unattended over a 161-hour period. Full details of the noise monitoring survey will be presented within the noise technical report, with a brief summary provided below.

**Figure A.15.2 Noise Monitoring Locations**



Not to scale. OS Licence No. AL553611



1.2.2 The existing ambient noise climate was dominated by road traffic noise with the main sources being: the A631 and Corringbeck Road during the daytime and evening, the road traffic noise is reduced at night-time with the dominant noise source being background animal noises. A summary of the baseline noise monitoring survey is shown in Table A.15.2 below.

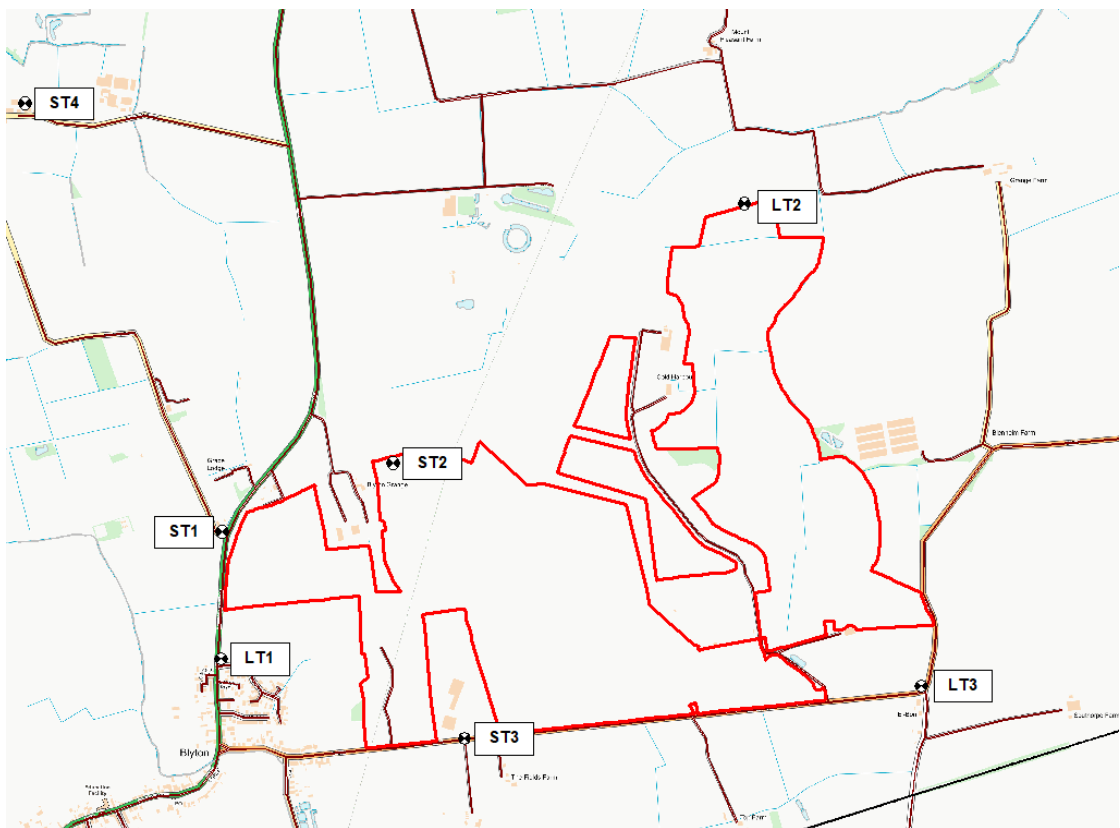
**Table A.15.2 Results of Baseline Noise Monitoring Survey (Average Levels)**

Period	Duration (T)	Monitoring Date and Times	Location	L <sub>Aeq,T</sub> (dB)	L <sub>Amax,T</sub> (dB)	L <sub>Amin,T</sub> (dB)	L <sub>A10,T</sub> (dB)	L <sub>A90,T</sub> (dB)
Weekday Daytime 07:00 - 23:00	72 Hours	09/09/2021 – 16/09/2021 07:00 - 23:00	LT1	50.3	102.8	21.7	45.0	36.0
Weekday Night-time 23:00 – 07:00	41 Hours	09/09/2021 – 16/09/2021 23:00 - 07:00		37.2	75.5	19.9	32.8	22.0
Weekend Daytime 07:00 - 23:00	32 Hours	09/09/2021 – 16/09/2021 07:00 - 23:00		46.1	71.1	21.2	44.3	31.0
Weekend Night-time 23:00 – 07:00	16 hours	09/09/2021 – 16/09/2021 23:00 - 07:00		34.5	67.5	19.6	31.6	22.0
Weekday Daytime 07:00 - 23:00	72 Hours	09/09/2021 – 16/09/2021 07:00 - 23:00	LT2	50.6	89.0	19.6	44.5	34.0
Weekday Night-time 23:00 – 07:00	41 Hours	09/09/2021 – 16/09/2021 23:00 - 07:00		44.7	94.5	18.3	33.7	22.0
Weekend Daytime 07:00 - 23:00	32 Hours	09/09/2021 – 16/09/2021 07:00 - 23:00		48.9	98.6	19.9	42.9	36.0
Weekend Night-time 23:00 – 07:00	16 hours	09/09/2021 – 16/09/2021 23:00 - 07:00		38.7	74.4	18.1	32.9	22.0
Daytime 07:00 - 19:00	15 Mins	09/09/2021 13:51	ST1	73.5	91.6	34.0	78.6	38.6
	15 Mins	09/09/2021 14:17	ST2	50.0	74.6	32.1	46.4	37.1
	15 Mins	09/09/2021 13:26	ST3	44.4	67.7	29.7	46.0	36.3
Evening 19:00 - 23:00	15 Mins	09/09/2021 19:30	ST1	70.5	92.8	31.2	71.0	38.5
	15 Mins	09/09/2021 19:51	ST2	36.0	50.9	27.2	39.0	30.5
	15 Mins	09/09/2021 21:56	ST3	36.1	49.8	21.6	39.4	27.1
Night-time 23:00 - 07:00	15 Mins	10/09/2021 01:18	ST1	61.2	88.3	17.4	40.3	18.7
	15 Mins	10/09/2021 01:38	ST2	24.8	46.9	17.9	24.5	18.8
	15 Mins	10/09/2021 00:58	ST3	29.2	63.8	17.1	29.5	19.6

### 1.3 Cottam 3 Noise Survey

1.3.1 The baseline noise environment has been established following a noise survey undertaken from Thursday 9th September 2021 to Thursday 16th September 2021. Attended 15-minute short-term measures were undertaken at four locations during the day, evening and night-time periods with two additional locations being measured unattended over a 169-hour period. Full details of the noise monitoring survey will be presented within the noise technical report, with a brief summary provided below.

**Figure A.15.3 Noise Monitoring Locations**



Not to scale. OS Licence No. AL553611

1.3.2 The dominant noise sources found in the area include: road traffic noise from Laughton Road, Kirkton Road and Church Road. A summary of the baseline noise monitoring survey is shown in Table A.15.3 below.

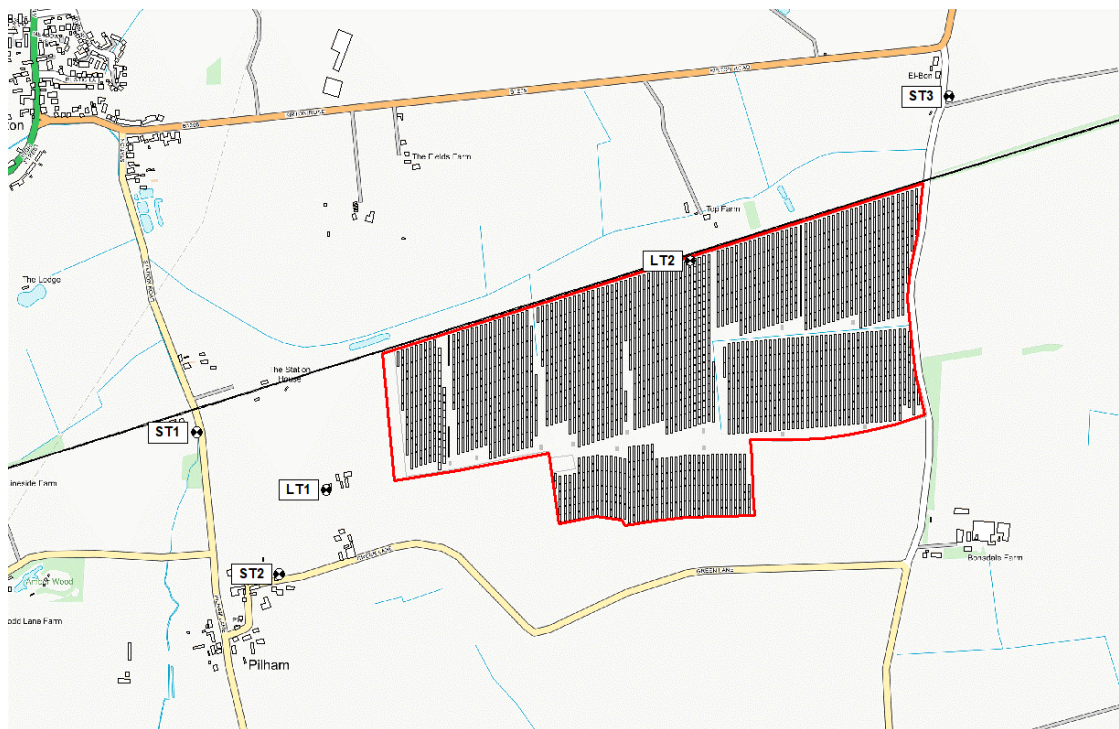
**Table A.15.3 Results of Baseline Noise Monitoring Survey (Average Levels)**

Period	Duration (T)	Monitoring Date and Times	Location	L <sub>Aeq,T</sub> (dB)	L <sub>Amax,T</sub> (dB)	L <sub>Amin,T</sub> (dB)	L <sub>A10,T</sub> (dB)	L <sub>A90,T</sub> (dB)
Weekday Daytime 07:00 - 23:00	81 Hours	09/09/2021 - 16/09/2021 07:00 - 23:00	LT1	63.4	96.9	20.2	65.9	44.0
Weekday Night-time 23:00 - 07:00	40 Hours	09/09/2021 - 16/09/2021 23:00 - 07:00		55.6	87.8	17.8	44.2	19.0
Weekend Daytime 07:00 - 23:00	32 Hours	11/09/2021 - 12/09/2021 07:00 - 23:00		61.5	99.1	18.4	63.7	44.0
Weekend Night-time 23:00 - 07:00	16 hours	11/09/2021 - 12/09/2021 23:00 - 07:00		52.7	81.4	18.4	43.2	22.0
Weekday Daytime 07:00 - 23:00	81 Hours	09/09/2021 - 16/09/2021 07:00 - 23:00	LT2	47.8	89.3	17.6	41.1	32.0
Weekday Night-time 23:00 - 07:00	40 Hours	09/09/2021 - 16/09/2021 23:00 - 07:00		30.3	69.0	15.4	28.8	20.0
Weekend Daytime 07:00 - 23:00	32 Hours	11/09/2021 - 12/09/2021 07:00 - 23:00		59.9	90.6	16.5	48.5	34.0
Weekend Night-time 23:00 - 07:00	16 hours	11/09/2021 - 12/09/2021 23:00 - 07:00		29.4	53.4	15.9	29.4	19.0
Weekday Daytime 07:00 - 23:00	81 Hours	09/09/2021 - 16/09/2021 07:00 - 23:00	LT3	55.7	100.1	18.8	56.4	40.0
Weekday Night-time 23:00 - 07:00	40 Hours	09/09/2021 - 16/09/2021 23:00 - 07:00		47.9	91.6	17.5	36.9	24.0
Weekend Daytime 07:00 - 23:00	32 Hours	11/09/2021 - 12/09/2021 07:00 - 23:00		57.9	95.2	18.9	56.8	44.0
Weekend Night-time 23:00 - 07:00	16 hours	11/09/2021 - 12/09/2021 23:00 - 07:00		44.7	73.8	17.1	36.7	26.0
Daytime 07:00 - 19:00	15 Mins	09/09/2021 10:52	ST1	57.8	74.2	36.9	61.6	44.9
	15 Mins	09/09/2021 11:02	ST2	40.8	63.4	28.1	43.5	32.7
	15 Mins	09/09/2021 11:16	ST3	66.6	86.1	25.2	63.8	29.9
	15 Mins	09/09/2021 11:29	ST4	48.9	74.0	28.0	42.8	31.9
Evening 19:00 - 23:00	15 Mins	09/09/2021 19:28	ST1	55.8	73.0	32.6	60.6	40.9
	15 Mins	09/09/2021 20:37	ST2	48.6	66.9	22.1	51.3	26.4
	15 Mins	09/09/2021 20:16	ST3	55.8	76.2	25.9	56.1	29.5
	15 Mins	09/09/2021 19:50	ST4	41.0	60.3	23.5	45.2	27.3
Night-time 23:00 - 07:00	15 Mins	10/09/2021 00:06	ST1	46.5	72.7	21.7	44.48	23.6
	15 Mins	09/09/2021 23:48	ST2	44.5	67.2	18.5	42.6	21.5
	15 Mins	10/09/2021 00:27	ST3	26.7	58.0	18.2	25.5	20.7
	15 Mins	09/09/2021 23:29	ST4	31.4	67.4	20.5	28.0	21.8

## 1.4 Cottam 3B Noise Survey

1.4.1 The baseline noise environment has been established following a noise survey undertaken from Thursday 9<sup>th</sup> September 2021 to Thursday 16<sup>th</sup> September 2021. Attended 15-minute short-term measures were undertaken at four locations during the day, evening and night-time periods with two additional locations being measured unattended over a 164-hour period. Full details of the noise monitoring survey will be presented within the noise technical report, with a brief summary provided below.

**Figure A.15.4 Noise Monitoring Locations**



Not to scale. OS Licence No. AL553611

1.4.2 The dominant noise source found in the area is road traffic noise from Station Road and Pilham Lane. A summary of the baseline noise monitoring survey is shown in Table A.15.4 below.

**Table A.15.4 Results of Baseline Noise Monitoring Survey (Average Levels)**

Period	Duration (T)	Monitoring Date and Times	Location	L <sub>Aeq,T</sub> (dB)	L <sub>Amax,T</sub> (dB)	L <sub>Amin,T</sub> (dB)	L <sub>A10,T</sub> (dB)	L <sub>A90,T</sub> (dB)
Weekday Daytime 07:00 - 23:00	78 Hours	09/09/2021 - 16/09/2021 13:58 - 12:03	LT1	58.2	109.9	17.1	41.9	36
Weekday Night-time 23:00 - 07:00	40 hours	09/09/2021 - 16/09/2021 23:00 - 07:00		35.3	85.6	16.0	30.2	20
Weekend Daytime 07:00 - 23:00	32 Hours	11/09/2021 - 12/09/2021 07:00 - 23:00		54.7	87.2	17.0	45.0	34
Weekend Night-time 23:00 - 07:00	16 hours	11/09/2021 - 12/09/2021 23:00 - 07:00		34.5	85.8	16.4	31.2	20
Weekday Daytime 07:00 - 23:00	77 Hours	09/09/2021 - 16/09/2021 12:54 - 08:54	LT2	59.5	102.2	17.6	40.7	32
Weekday Night-time 23:00 - 07:00	40 hours	09/09/2021 - 16/09/2021 23:00 - 07:00		32.9	73.8	15.9	29.5	18
Weekend Daytime 07:00 - 23:00	32 Hours	11/09/2021 - 12/09/2021 07:00 - 23:00		56.5	90.7	16.9	44.5	36
Weekend Night-time 23:00 - 07:00	16 hours	11/09/2021 - 12/09/2021 23:00 - 07:00		34.5	74.7	16.2	30.6	20
Daytime 07:00 - 19:00	15 Mins	09/09/2021 12:29	ST1	65.9	85.5	30.0	66.0	34.3
	15 Mins	09/09/2021 12:49	ST2	41.3	56.3	30.9	44.7	34.5
	15 Mins	09/09/2021 12:28	ST3	43.4	71.3	25.4	40.2	28.8
	15 Mins	09/09/2021 12:54	ST4	46.8	69.1	32.2	47.1	35.9
Evening 19:00 - 23:00	15 Mins	09/09/2021 21:24	ST1	55.1	77.2	24.3	52.1	28.2
	15 Mins	09/09/2021 21:43	ST2	56.9	81.4	22.8	48.9	25.7
	15 Mins	09/09/2021 21:00	ST3	43.4	79.3	17.5	36.7	22.4
	15 Mins	09/09/2021 19:06	ST4	39.3	64.9	25.2	38.5	28.0
Night-time 23:00 - 07:00	15 Mins	10/09/2021 01:03	ST1	34.8	67.4	20.4	33.8	23.3
	15 Mins	10/09/2021 01:20	ST2	26.0	50.6	17.6	27.8	19.4
	15 Mins	10/09/2021 00:45	ST3	28.9	60.6	17.3	24.4	18.8
	15 Mins	10/09/2021 01:57	ST4	31.2	43.2	25.0	33.0	27.7

## 15.2 Acoustic Terminology

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# Cottam Solar Project

## Preliminary Environmental Information Report

### Acoustic Terminology

Prepared by Tetra Tech Limited  
May 2022



<b>Noise</b>	Unwanted or unexpected sound.
<b>Frequency (Hz)</b>	The number of cycles per second (i.e., the number of vibrations that occur in one second); subjectively this is perceived as pitch.
<b>Frequency Spectrum</b>	The relative frequency contributions that make up a noise.
<b>"A" Weighting (dB(A))</b>	The human ear does not respond uniformly across the audible frequency range. The "A" weighting is commonly used to simulate the frequency response of the ear.
<b>Decibel (dB)</b>	The decibel is a logarithmic ratio of two values of a variable. The range of audible sound pressures is approximately $2 \times 10^{-5}$ Pa to 200 Pa. Using decibel notation presents this range in a more manageable form, 0 dB to 140 dB.
<b>Sound Pressure Level (<math>L_p</math>)</b>	<p>Equal to 20 times the logarithm to the base 10 of the ratio of the root mean squared (RMS) sound pressure to the reference sound pressure. In air the reference sound pressure is <math>2 \times 10^{-5}</math>Pa.</p> <p>Mathematically: Sound Pressure Level (dB) = <math>20 \log_{10} \{p(t) / P_0\}</math> Where <math>P_0 = 2 \times 10^{-5}</math> Pa</p>
<b>Ambient Noise Level, <math>L_{Aeq,T}</math></b>	The equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time that is usually composed of sound from many sources near and far.
<b>Background Noise Level <math>L_{A90,T}</math></b>	The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of a given time



interval, T, measured using the fast time weighting, F, and quoted to the nearest whole number.

**Reference Time Interval,  $T_r$**  The specified interval over which an equivalent continuous A-weighted sound pressure level is determined.

**Specific Noise Level,  $L_{Aeq,T_r}$**  The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source over a given reference time interval.

**Rating Level,  $L_{Ar,T_r}$**  The specific noise level plus any adjustment for any characteristic features of the noise.

**Level  $L_{A10,T}$**  The A-weighted sound pressure level exceeded for 10% of a given time interval, T, measured using the fast time weighting, F.

Between the quietest audible sound and the loudest tolerable sound, there is a ten million to one ratio in sound pressure (measured in pascals, Pa). Because of this wide range, a noise level scale based on logarithms is used in noise measurement called the decibel (dB) scale. Audibility of sound covers a range of approximately 0 to 140 dB.

**Table A15.2.1: Sound Pressure Level in dB  $L_{pA}$  for Common Situations**

Typical Noise Level, dB $L_{pA}$	Example
0	Threshold of hearing
30	Rural area at night, still air
40	Public library Refrigerator humming at 2 m
50	Quiet office, no machinery Boiling kettle at 0.5 m
60	Normal conversation

70	Telephone ringing at 2 m Vacuum cleaner at 3 m
80	General factory noise level
90	Heavy goods vehicle from pavement Powered lawnmower, operator's ear
100	Pneumatic drill at 5 m
120	Discotheque - 1 m in front of loudspeaker
140	Threshold of pain