

## TECHNICAL APPENDIX 7.1 – CUMULATIVE SOUND POWER LEVELS

The following sections present the noise emission data for each assessed cumulative development, including the adjustments made in accordance with the methodology described in Section 7.4.9 of the EIA Report.

### 7.1.1 Blairmains, Hill of Harthill and Knowehead Wind Turbines

**Table A7.1.1: Noise Emission Data<sup>1</sup> – NPS 100-24 100kw, 37 m Hub Height**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>								
	4	5	6	7	8	9	10	11	12
	Sound Power Level, dB(A)								
Sound Power Level, dB LWA, Standard Mode	-	-	93.9	98.5	100.6	101.6	103.0	103.0	103.0
Sound Power Level, dB, LWA, inc. 1.645 $\sigma$ dB allowance for uncertainty	-	-	97.9	100.1	102.1	103.1	104.6	104.6	104.6

**Table A7.1.2: NPS 100-24 100kw, 37 m Hub Height Octave-band Spectra<sup>2</sup>**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>								
	32	63	125	250	500	1000	2000	4000	8000
	Sound Power Level, dB(A)								
Sound Power Level, dB, LWA, Scaled to 104.6 dB(A)	69.5	82.1	90.6	96.4	98.7	99.0	97.6	92.6	80.4

### 7.1.2 Brownhill Farm Wind Farm

**Table A7.2.1: Noise Emission Data<sup>3</sup> – Vestas V136 4.2 MW, 82 m Hub Height**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>								
	4	5	6	7	8	9	10	11	12
	Sound Power Level, dB(A)								
Sound Power Level, dB LWA, Mode PO1	94.7	99.6	103.2	103.9	103.9	103.9	103.9	103.9	103.9
Sound Power Level, dB, LWA, inc. 2 dB allowance for uncertainty	96.7	101.6	105.2	105.9	105.9	105.9	105.9	105.9	105.9

<sup>1</sup> T09568 - NPS 100C-24 Standard Mode ETSU Summary

<sup>2</sup> T09568 - NPS 100C-24 Standard Mode ETSU Summary

<sup>3</sup> Brownhill Farm Wind Farm Environmental Statement – Table 7.7

**Table A7.2.2: Vestas V136 4.2 MW 82 m Hub Height, 82 m Hub Height Octave-band Spectra<sup>4</sup>**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>								
	32	63	125	250	500	1000	2000	4000	8000
	Sound Power Level, dB(A)								
Sound Power Level, dB, LWA, Scaled to 105.9 dB(A)	76.3	86.9	94.5	99.2	101.0	99.9	95.8	88.9	78.9

### 7.1.3 Burnhead Farm Wind Farm

**Table A7.3.1: Noise Emission Data<sup>5</sup> – Vestas V90, 80 m Hub Height**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>									
	4	5	6	7	8	9	10	11	12	
	Sound Power Level, dB(A)									
Sound Power Level, dB LWA, Standard Mode	94.4	99.4	102.5	103.6	104.0	104.0	104.0	104.0	104.0	104.0
Sound Power Level, dB, LWA, inc. 2 dB allowance for uncertainty	96.4	101.4	104.5	105.6	106.0	106.0	106.0	106.0	106.0	106.0

**Table A7.3.2: Vestas V90, 80 m Hub Height Octave-band Spectra<sup>6</sup>**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>							
	63	125	250	500	1000	2000	4000	8000
	Sound Power Level, dB(A)							
Sound Power Level, dB, LWA, Scaled to 106 dB(A)	90.5	95.7	98.1	99.5	99.7	98.5	94.9	81.1

<sup>4</sup> Brownhill Farm Wind Farm Environmental Statement – Table 7.7

<sup>5</sup> Document no.: 0008-1572 V01 2010-04-06 1/1 Octaves According to General Specification V90–1.8/2.0 MW VCS, 50 Hz – Section 4.1

<sup>6</sup> Document no.: 0008-1572 V01 2010-04-06 1/1 Octaves According to General Specification V90–1.8/2.0 MW VCS, 50 Hz – Section 4.1.1

### 7.1.4 Cowdenhead Wind Farm, Shotts Golf Club Wind Turbine and Tippethill Farm Wind Turbine

**Table A7.4.1: Noise Emission Data<sup>7</sup> – EWT DW54, 50 m Hub Height**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>								
	4	5	6	7	8	9	10	11	12
	Sound Power Level, dB(A)								
Sound Power Level, dB LWA, Standard Mode	-	99.5	98.0	99.0	100.0	100.5	100.5	100.5	100.5
Sound Power Level, dB, LWA, inc. 2 dB allowance for uncertainty	-	101.5	100.0	101.0	102.0	102.5	102.5	102.5	102.5

**Table A7.4.2: EWT DW54, 50 m Hub Height Octave-band Spectra<sup>8</sup>**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>							
	63	125	250	500	1000	2000	4000	8000
	Sound Power Level, dB(A)							
Sound Power Level, dB, LWA, Scaled to 102.5 dB(A)	84.7	90.8	96.1	97.4	96.0	93.5	86.6	74.8

### 7.1.5 Drumduff Wind Farm

**Table A7.5.1: Noise Emission Data<sup>9</sup> – Gamesa G80, 78 m Hub Height**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>								
	4	5	6	7	8	9	10	11	12
	Sound Power Level, dB(A)								
Sound Power Level, dB LWA, Standard Mode	95.9	100.7	103.0	103.1	103.1	103.1	103.1	103.1	103.1
Sound Power Level, dB, LWA, inc. 2 dB allowance for uncertainty	97.9	102.7	105.0	105.1	105.1	105.1	105.1	105.1	105.1

<sup>7</sup> Sound power warranty levels DW52/54 500kW Doc code: S-1005020

<sup>8</sup> Sound power warranty levels DW52/54 500kW Doc code: S-1005020

<sup>9</sup> GD027805-en Rev: 4 – Noise Emission Analysis for G8x Wind Turbines – Table 13

**Table A7.5.2: Gamesa G80, 78 m Hub Height Octave-band Spectra<sup>10</sup>**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>								
	32	63	125	250	500	1000	2000	4000	8000
	Sound Power Level, dB(A)								
Sound Power Level, dB, LWA, Scaled to 105.1 dB(A)	76.7	85.3	92.6	97.5	100.2	99.5	96.1	90.1	80.3

### 7.1.6 Drumelzie Wind Farm

**Table A7.6.1: Noise Emission Data<sup>11</sup> – Lagerwey L93, 80 m Hub Height**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>								
	4	5	6	7	8	9	10	11	12
	Sound Power Level, dB(A)								
Sound Power Level, dB LWA, Standard Mode	95.4	100.3	102.5	103.0	103.0	103.0	103.0	103.0	103.0
Sound Power Level, dB, LWA, inc. 2 dB allowance for uncertainty	97.4	102.3	104.5	105.0	105.0	105.0	105.0	105.0	105.0

**Table A7.6.2: Lagerwey L93, 80 m Hub Height Octave-band Spectra<sup>12</sup>**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>							
	63	125	250	500	1000	2000	4000	8000
	Sound Power Level, dB(A)							
Sound Power Level, dB, LWA, Scaled to 105 dB(A)	85.1	97.1	97.2	98.3	98.9	95.5	94.0	85.5

### 7.1.7 Forrestfield Wind Farm

**Table A7.7.1: Noise Emission Data<sup>13</sup> – Generic turbine envelope, 75 m Hub Height**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>								
	4	5	6	7	8	9	10	11	12
	Sound Power Level, dB(A)								
Sound Power Level, dB, LWA, inc.	100.8	103.4	106.4	107.8	108.0	108.0	108.0	108.0	108.0

<sup>10</sup> GD027805-en Rev: 4 – Noise Emission Analysis for G8x Wind Turbines – Table 1

<sup>11</sup> Drumelzie Wind Farm Environmental Statement – Table 5-4

<sup>12</sup> Drumelzie Wind Farm Environmental Statement – Table 5-5

<sup>13</sup> Forrestfield Wind Farm Environmental Statement – Table 9.10

	Standardised 10 m Wind Speed, ms <sup>-1</sup>								
	4	5	6	7	8	9	10	11	12
	Sound Power Level, dB(A)								
2 dB allowance for uncertainty									

**Table A7.7.2: Generic turbine envelope, 80 m Hub Height Octave-band Spectra<sup>14</sup>**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>							
	63	125	250	500	1000	2000	4000	8000
	Sound Power Level, dB(A)							
Sound Power Level, dB, LWA, Scaled to 108 dB(A)	89.1	94.8	101.6	103.4	101.5	96.9	95.2	87.2

### 7.1.8 Southrigg 1 Wind Turbine

**Table A7.8.1: Noise Emission Data<sup>15</sup> – Vensys 87, 85 m Hub Height**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>								
	4	5	6	7	8	9	10	11	12
	Sound Power Level, dB(A)								
Sound Power Level, dB LWA, Standard Mode	-	-	-	100.8	102.7	105.4	105.6	105.6	105.6
Sound Power Level, dB, LWA, inc. 2 dB allowance for uncertainty	-	-	-	102.8	104.7	107.4	107.6	107.6	107.6

**Table A7.8.2: Vensys 87, 85 m Hub Height Octave-band Spectra<sup>16</sup>**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>							
	63	125	250	500	1000	2000	4000	8000
	Sound Power Level, dB(A)							
Sound Power Level, dB, LWA, Scaled to 107.6 dB(A)	84.3	93.9	100.8	102.8	101.6	98.3	93.2	86.9

<sup>14</sup> Forrestfield Wind Farm Environmental Statement – Table 9.11

<sup>15</sup> Rigg Wind Turbine Environmental Statement – Table 5.4

<sup>16</sup> Rigg Wind Turbine Environmental Statement – Table 5.5

### 7.1.9 Southrigg 2 Wind Turbine

**Table A7.9.1: Noise Emission Data<sup>17</sup> – Enercon E126 EP3, 86 m Hub Height**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>								
	4	5	6	7	8	9	10	11	12
	Sound Power Level, dB(A)								
Sound Power Level, dB LWA, Standard Mode	93.6	99.3	103.4	105.2	105.9	106.1	106.1	106.1	106.1
Sound Power Level, dB, LWA, inc. 2 dB allowance for uncertainty	95.6	101.3	105.4	107.2	107.9	108.1	108.1	108.1	108.1

**Table A7.9.2: Enercon E126 EP3, 86 m Hub Height Octave-band Spectra<sup>18</sup>**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>								
	32	63	125	250	500	1000	2000	4000	8000
	Sound Power Level, dB(A)								
Sound Power Level, dB, LWA, Scaled to 108.1 dB(A)	79.7	91.3	97.2	100.2	102.4	102.4	100.4	92.9	76.2

### 7.1.10 Torrance Farm Wind Farm and Torrance Farm Wind Farm Extension

**Table A7.10.1: Noise Emission Data<sup>19</sup> – Siemens SWT-3.0-101, 74.5 m Hub Height**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>								
	4	5	6	7	8	9	10	11	12
	Sound Power Level, dB(A)								
Sound Power Level, dB LWA, Standard Mode	94.9	99.6	104.8	107.0	107.0	107.0	107.0	107.0	107.0
Sound Power Level, dB, LWA, inc. 2 dB allowance for uncertainty	96.9	101.6	106.8	109.0	109.0	109.0	109.0	109.0	109.0

<sup>17</sup> Rigg Wind Turbine Environmental Statement – Appendix 5 Table 1

<sup>18</sup> Rigg Wind Turbine Environmental Statement – Appendix 5 Table 2

<sup>19</sup> Torrance Farm Wind Park Extension Environmental Statement – Table 10.1

**Table A7.10.2: Siemens SWT-3.0-101, 74.5m Hub Height Octave-band Spectra<sup>20</sup>**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>							
	63	125	250	500	1000	2000	4000	8000
	Sound Power Level, dB(A)							
Sound Power Level, dB, LWA, Scaled to 109 dB(A)	83.8	95.7	102.4	105.7	102.4	94.5	83.6	80.3

**7.1.11 West Benhar Wind Farm**

**Table A7.11.1: Noise Emission Data<sup>21</sup> – Vestas V117 4.3 MW, 91.5 m Hub Height**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>									
	4	5	6	7	8	9	10	11	12	
	Sound Power Level, dB(A)									
Sound Power Level, dB LWA, Standard Mode	96.0	100.2	104.0	105.9	106.0	106.0	106.0	106.0	106.0	106.0
Sound Power Level, dB, LWA, inc. 2 dB allowance for uncertainty	98.0	102.2	106.0	107.9	108.0	108.0	108.0	108.0	108.0	108.0

**Table A7.11.2: Vestas V117 4.3 MW, 91.5 m Hub Height Octave-band Spectra<sup>22</sup>**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>									
	32	63	125	250	500	1000	2000	4000	8000	
	Sound Power Level, dB(A)									
Sound Power Level, dB, LWA, Scaled to 108 dB(A)	80.0	89.6	97.1	100.2	101.9	102.4	99.9	95.8	84.4	

<sup>20</sup> Torrance Farm Wind Park Extension Environmental Statement – Table 10.2

<sup>21</sup> Performance Specification V117-4.0/4.2 MW 50/60 Hz Power Curves, Ct Values and Sound Curves, Mode 0/0-0S Document no.: 0067-7064 V06 – Table 6.3

<sup>22</sup> Vestas Document DMS 0057-8823\_V01 T05 0057-8823 VER 01 – Table 1

**7.1.12 Wester Hassockrig Wind Turbine**

**Table A7.12.1: Noise Emission Data<sup>23</sup> – Powerwind 500, 50 m Hub Height**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>								
	4	5	6	7	8	9	10	11	12
	Sound Power Level, dB(A)								
Sound Power Level, dB LWA, Standard Mode	88.7	93.9	97.6	99.9	100.8	100.8	100.8	100.8	100.8
Sound Power Level, dB, LWA, inc. 2 dB allowance for uncertainty	90.7	95.9	99.6	101.9	102.8	102.8	102.8	102.8	102.8

**Table A7.12.2: Powerwind 500, 50 m Hub Height Octave-band Spectra<sup>24</sup>**

	Standardised 10 m Wind Speed, ms <sup>-1</sup>							
	63	125	250	500	1000	2000	4000	8000
	Sound Power Level, dB(A)							
Sound Power Level, dB, LWA, Scaled to 102.8 dB(A)	84.8	91.1	94.5	97.3	97.0	94.8	90.5	79.5

<sup>23</sup> PowerWind Sound Power Level Doc No. 76774 Rev 05

<sup>24</sup> PowerWind Sound Power Level Doc No. 76774 Rev 05