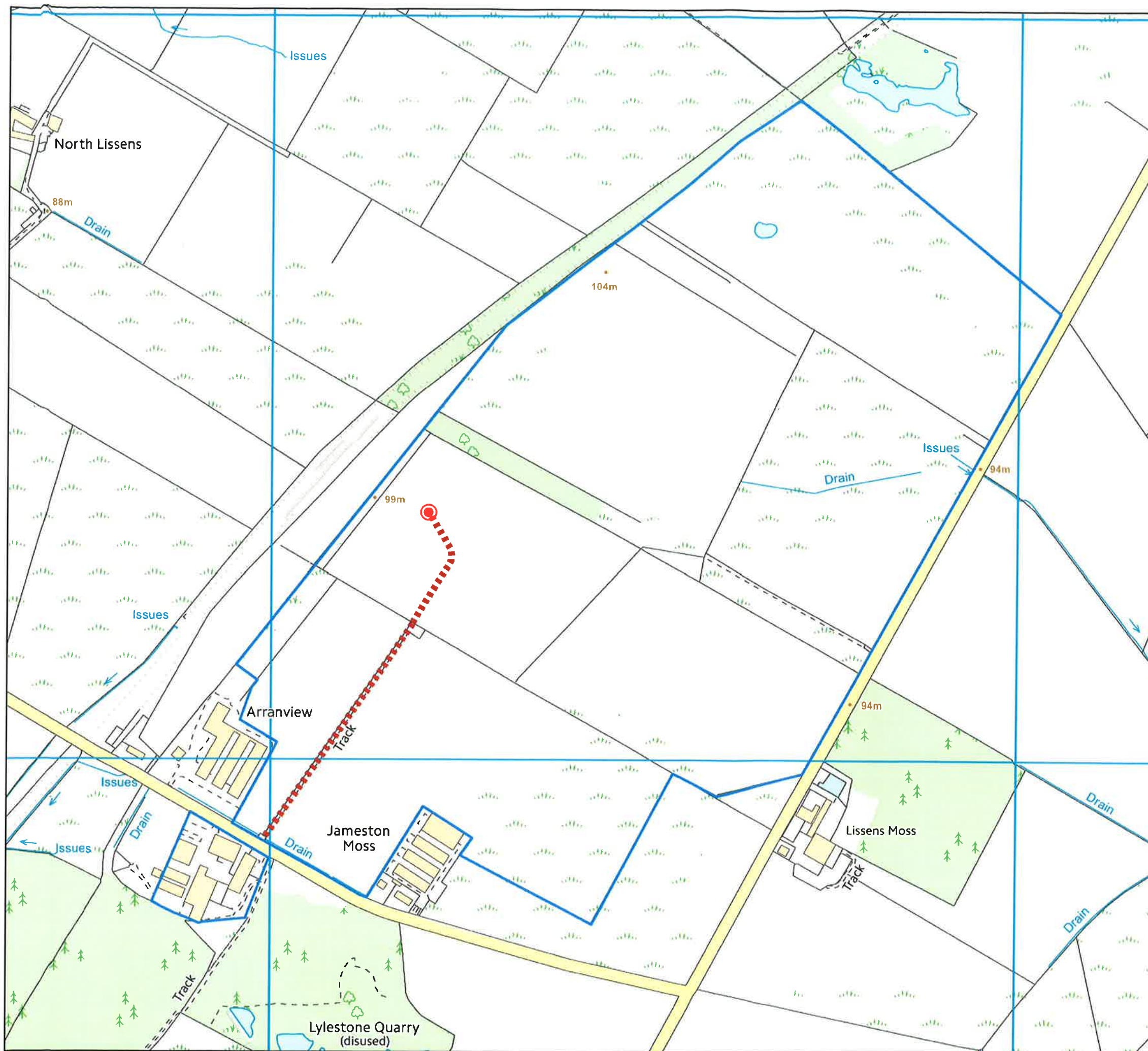




ENVIRONMENTAL REPORT FOR PROPOSED WIND DEVELOPMENT AT JAMESTON MOSS

APPENDIX DOCUMENTS

EXPERTISE | KNOWLEDGE | SUPPORT
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Appendix 3.1: Site Map of Jameston Moss

Legend:

-  Proposed Turbine Location
E:233210 N:647332
-  Land Ownership Boundary
-  Proposed Access Track

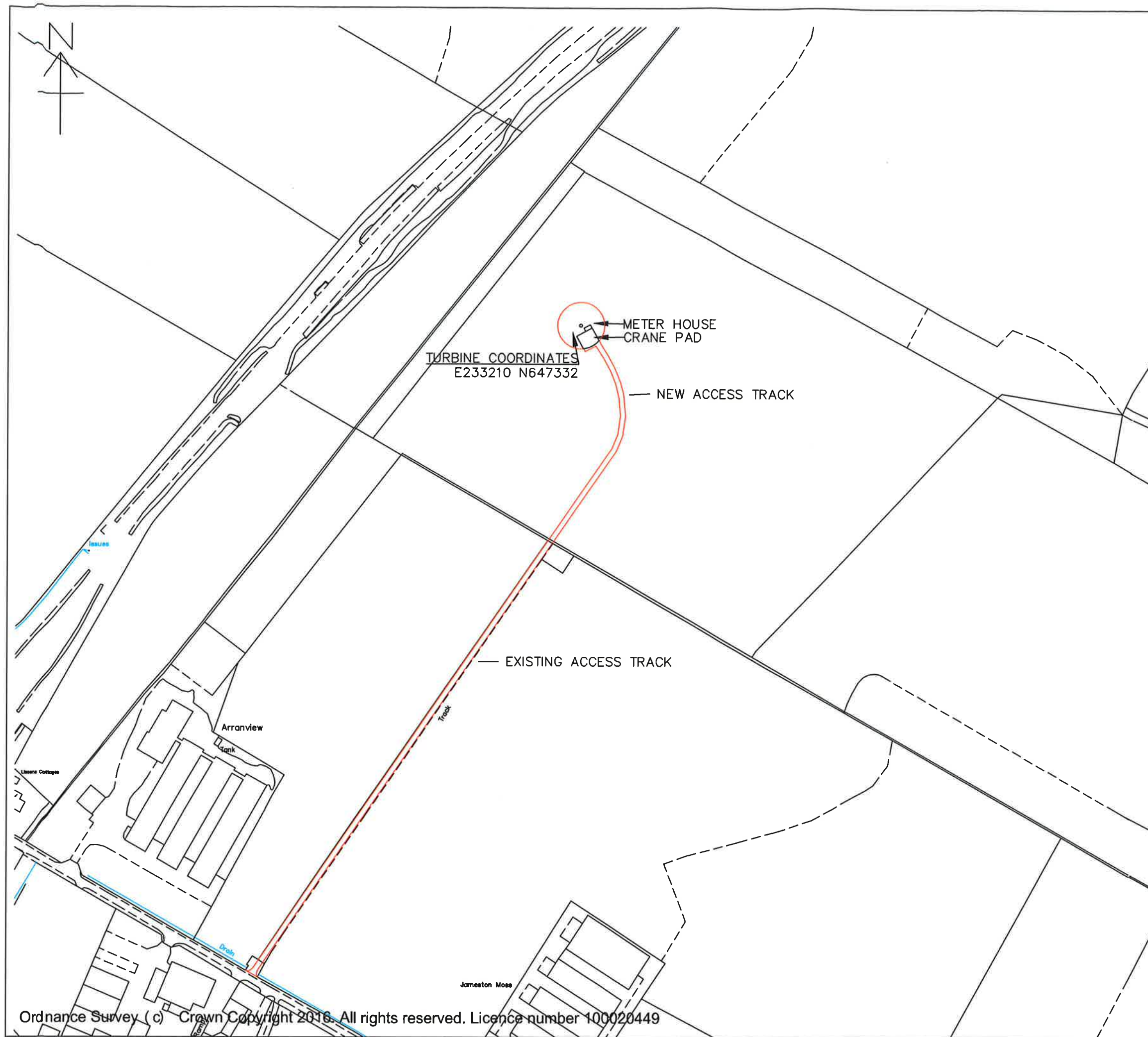
0 0.05 0.1 0.2 Kilometers

1:5,000

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Site Name: Jameston Moss
Client Name: Mr Miller
Site Reference: P07471
Drawing Reference: 07471/030/B
Date: 25/10/2016
User: CE



APPENDIX 3.2: SITE LAYOUT

TOTAL DEVELOPMENT AREA AMOUNTS TO 2620 SQUARE METRES.

PROJECT SPECIFICATIONS:

TURBINE TO BE AN nED100 WITH A TIP HEIGHT OF 47 METRES. FINAL COLOUR TO BE LIGHT GREY, RAL 7035, WITH A NON-REFLECTIVE MATT FINISH.

TURBINE POSITIONING TO INCORPORATE A 5 METRE MICROSITING ALLOWANCE, RESULTING IN A 32 METRE TURBINE CIRCLE.

METER HOUSE TO BE 5.0 METRES LONG BY 2.5 METRES WIDE, 2.5 METRES TALL. SUBSTATION WILL BE A BRICK-BUILT STRUCTURE.

CRANE PAD TO BE 12 METRES BY 12 METRES. ACCESS TRACK WILL BE 3.5 METRES WIDE.

CRANE PAD AND ACCESS TRACK COMPOSED OF TYPE 1 COMPACTED STONE AGGREGATE TO A DEPTH BELOW GROUND LEVEL OF 0.3 METRES.

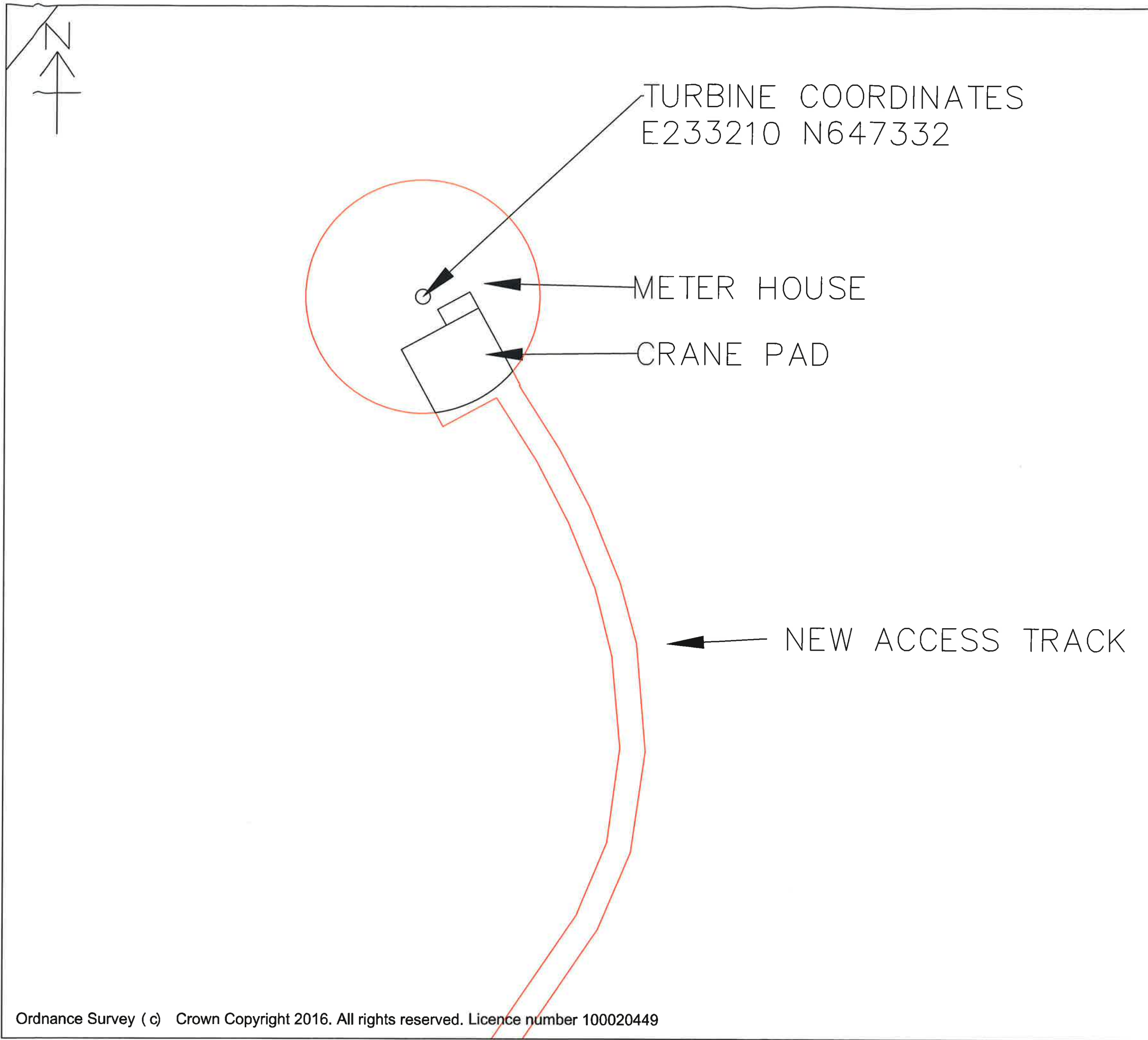


SCALE 1:2500



PROPOSED ERECTION OF ONE 47 metre TO TIP WIND TURBINE for MR MILLER at JAMESTON MOSS, DALRY, KA24 4HB.

SITE REFERENCE	DRAWING NUMBER
07471	07471/033/B
DRAWN BY	DATE
CE	09/06/2016



APPENDIX 3.3: BLOCK PLAN

TOTAL DEVELOPMENT AREA AMOUNTS TO 2620 SQUARE METRES.

PROJECT SPECIFICATIONS:

TURBINE TO BE AN nED100 WITH A TIP HEIGHT OF 47 METRES. FINAL COLOUR TO BE LIGHT GREY, RAL 7035, WITH A NON-REFLECTIVE MATT FINISH.

TURBINE POSITIONING TO INCORPORATE A 5 METRE MICROSITING ALLOWANCE, RESULTING IN A 32 METRE TURBINE CIRCLE.

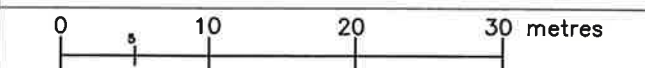
METER HOUSE TO BE 5.0 METRES LONG BY 2.5 METRES WIDE, 2.5 METRES TALL. SUBSTATION WILL BE A BRICK-BUILT STRUCTURE.

CRANE PAD TO BE 12 METRES BY 12 METRES. ACCESS TRACK WILL BE 3.5 METRES WIDE.

CRANE PAD AND ACCESS TRACK COMPOSED OF TYPE 1 COMPACTED STONE AGGREGATE TO A DEPTH BELOW GROUND LEVEL OF 0.3 METRES.

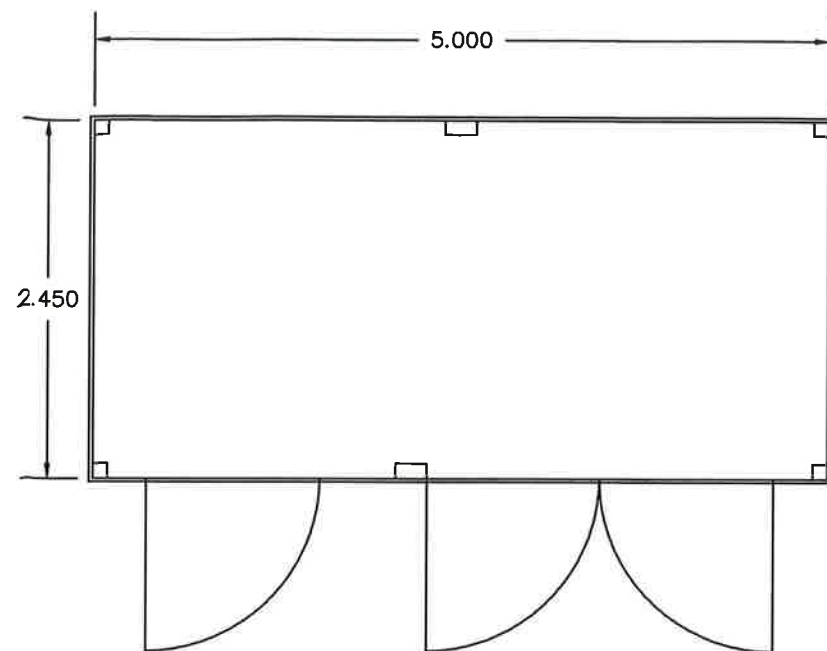


SCALE 1:500

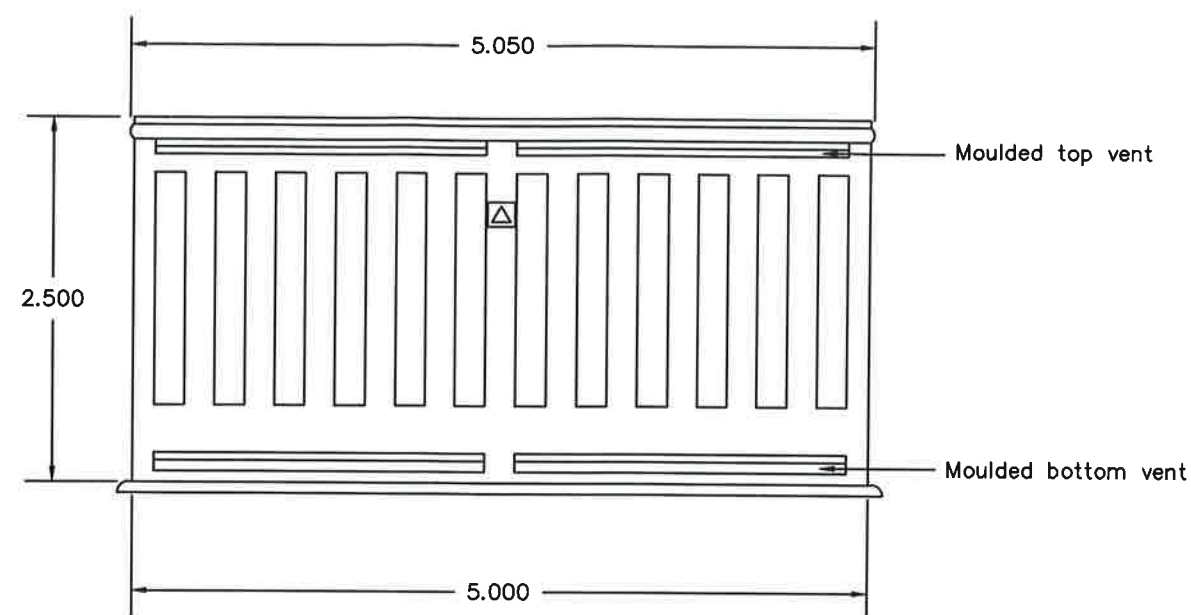


PROPOSED ERECTION OF ONE 47 metre TO TIP WIND TURBINE for MR MILLER at JAMESTON MOSS, DALRY, KA24 4HB.

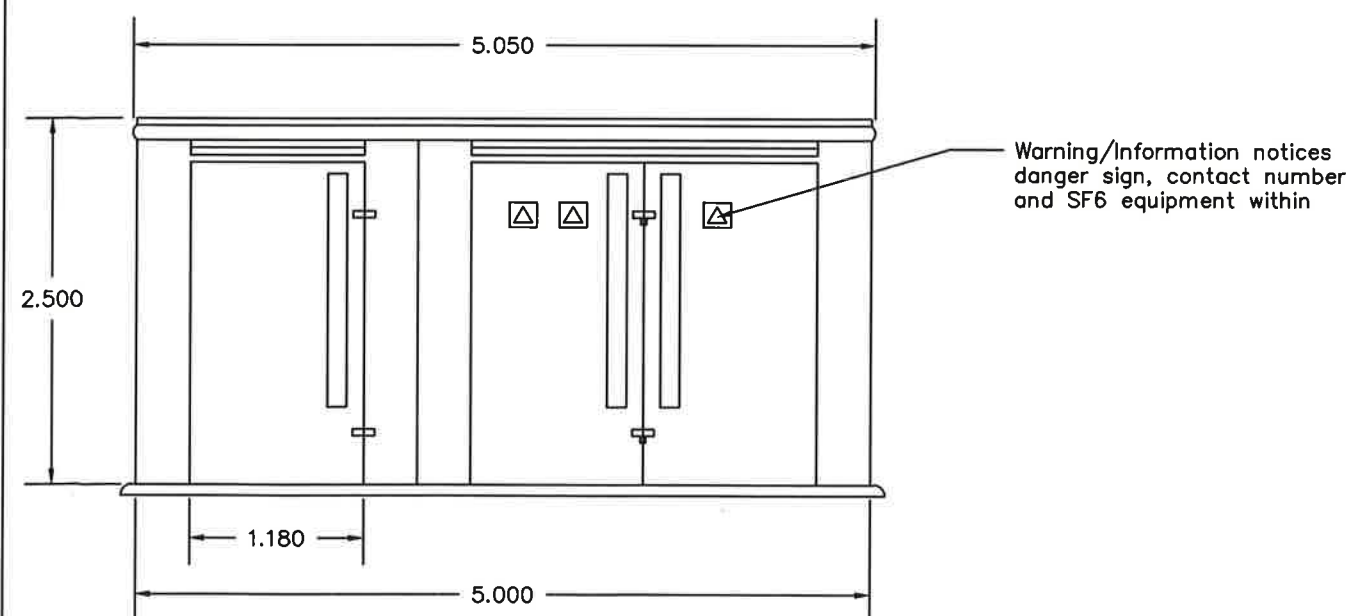
SITE REFERENCE	DRAWING NUMBER
07471	07471/034/B
DRAWN BY	DATE
CE	09/06/2016



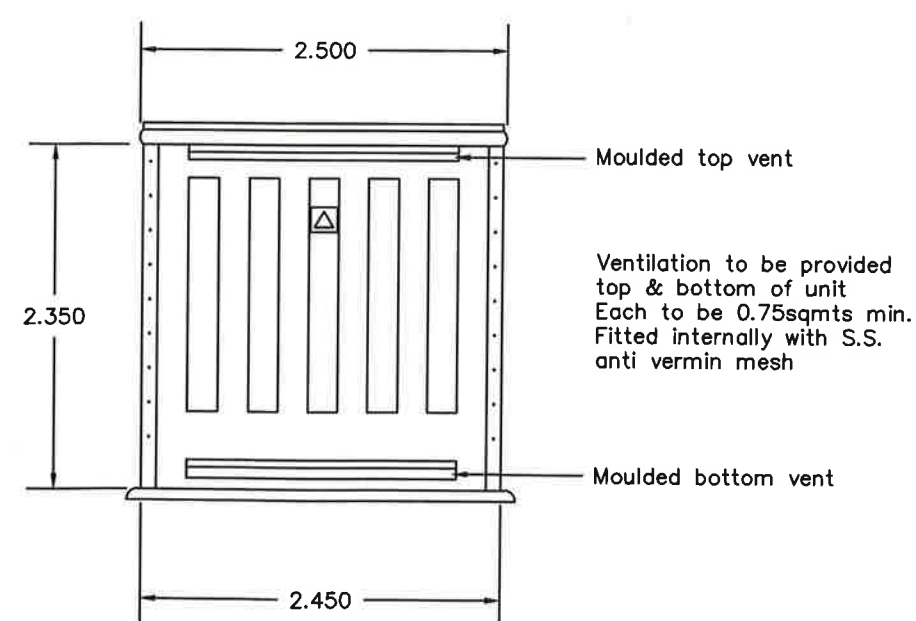
Plan



Rear Elevation



Front Elevation



Side Elevation
Opposite Side Identical

APPENDIX 3.5: METER HOUSE

Specifications

FOUNDATION: Up to 750mm C40 grade concrete plinth on minimum 50mm blinding concrete on undisturbed inorganic strata.

WALLS: Walls to be 100mm thick concrete blockwork with an external finish of wet dash render, painted to the satisfaction of the local authority.

ROOF: Proprietary profiled metal sheeting (coloured green).

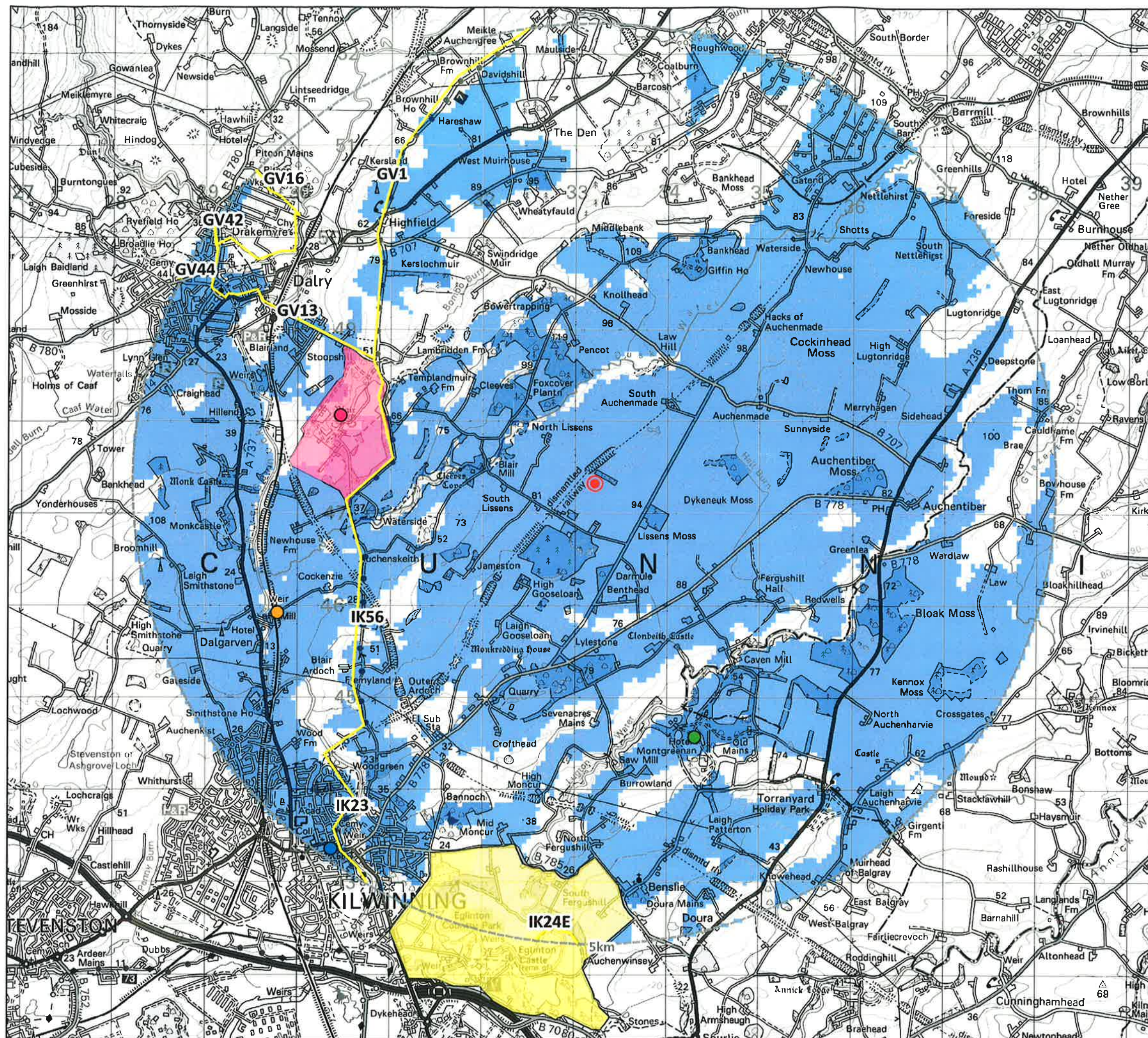


SCALE: 1:50



TURBINE METER HOUSE SCHEMATIC

SITE REFERENCE	DRAWING NUMBER
07471	07471/032/A
DRAWN BY	DATE
CE	01/06/2016



Appendix 5.1: Tourist Attractions within a 5km Study Area

Legend:

-  Proposed Turbine Location
E:233210 N:647332
-  Zone of Theoretical Visibility to Blade Tip
-  Blair Estate
-  Eglinton Country Park
-  Core Paths
-  Blair Castle
-  Dalgarn Mill
-  Montgreenan House
-  Kilwinning Abbey

Notes:
This ZTV is computer generated from OS Landform Panorama DTM Data. It does not account for vegetation or built structures which may screen views. The earth's curvature and atmospheric refraction are included. Viewer height above ground is 2.0m.

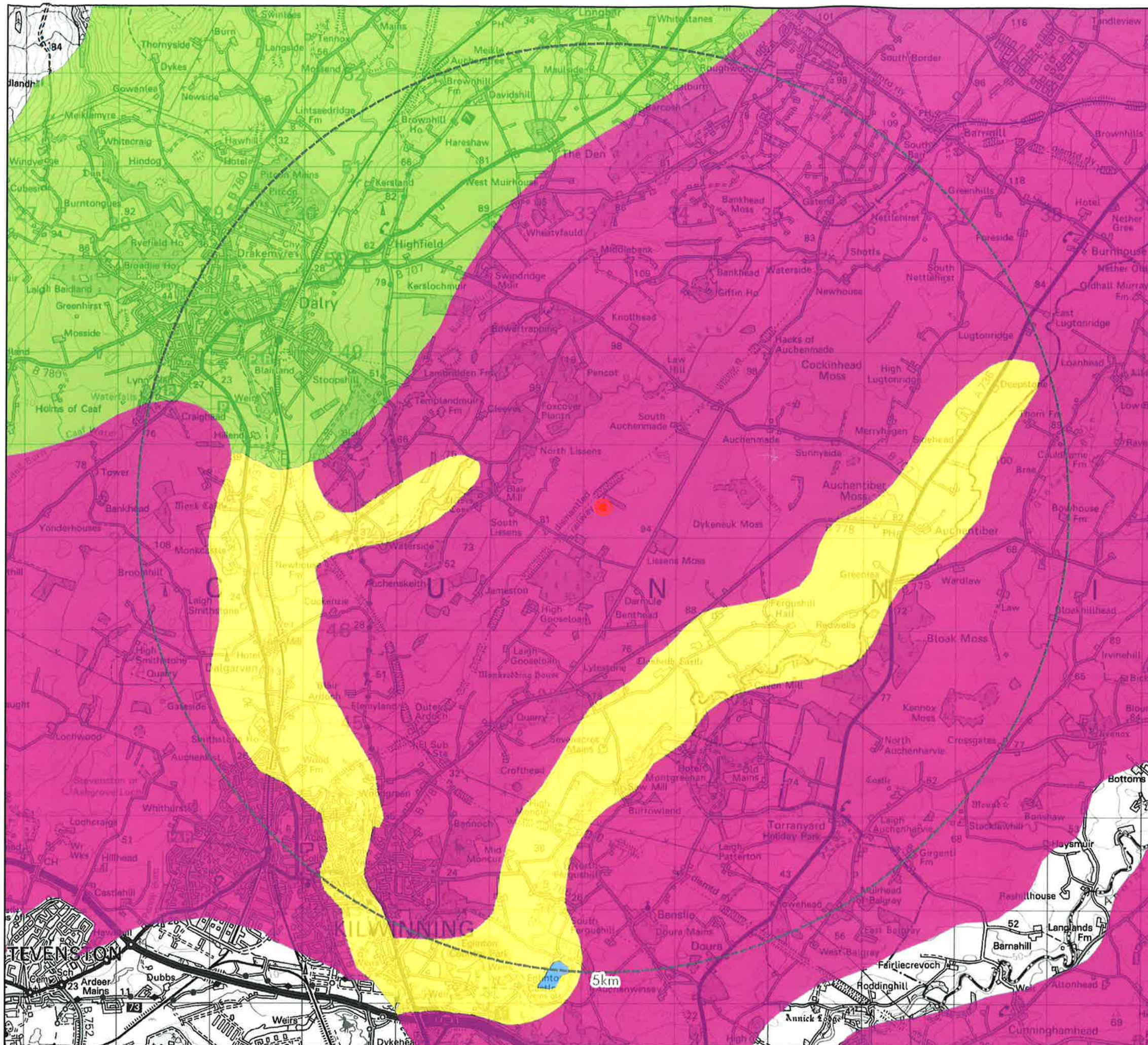
0 0.5 1 2 Kilometers

1:40,000

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Site Name: Jameston Moss
Client Name: Mr Miller
Site Reference: P07471
Drawing Reference: 07471/010/B
Date: 04/11/2016
User: CE



Appendix 6.2 Landscape Character Types within 5km

Legend:

-  Proposed Turbine Location
E:233210 N:647332
-  Ayrshire Lowlands
-  Lowland River Valleys
-  Broad Valley Lowlands
-  Inland Loch

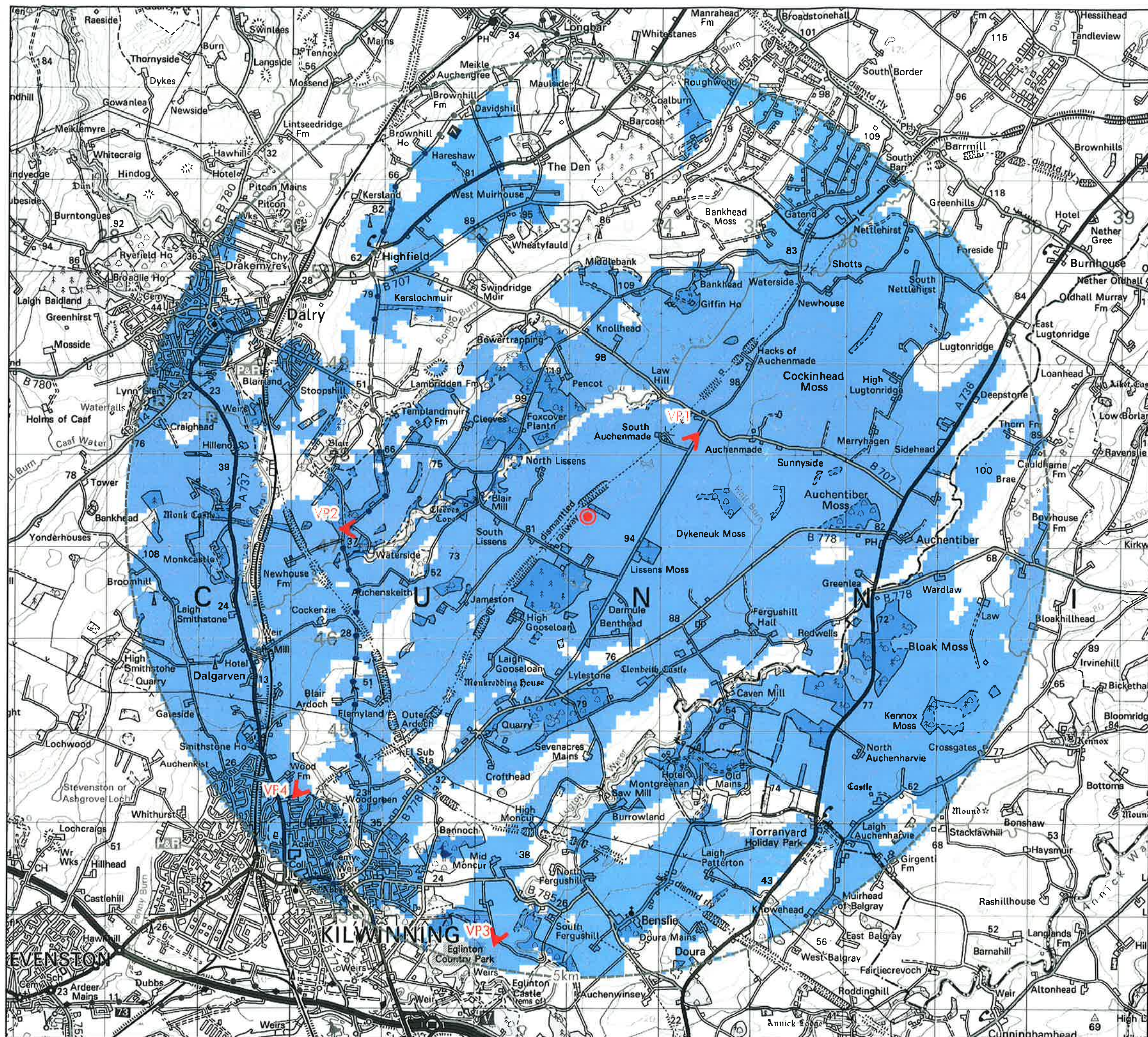
0 0.5 1 2 Kilometers

1:40,000

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Client Name: Mr Miller
Site Reference: P07471
Drawing Reference: 07471/013/B
Date: 25/10/2016
User: CE



Appendix 6.3: Viewpoint Location Map with ZTV Overlay

Legend:

-  Proposed Turbine Location
E:233210 N:647332
-  Zone of Theoretical Visibility
to Blade Tip
-  Viewpoints:
VP1 Auchenmade
E234417 N648252
VP2 Blair Estate
E230661 N647236
VP3 Eglinton Park
E232220 N642786
VP4 Kilwinning
E230130 N644303

Notes:
This ZTV is computer generated from OS Landform Panorama DTM Data. It does not account for vegetation or built structures which may screen views. The earth's curvature and atmospheric refraction are included. Viewer height above ground is 2.0m.

0 0.5 1 2 Kilometers

1:40,000

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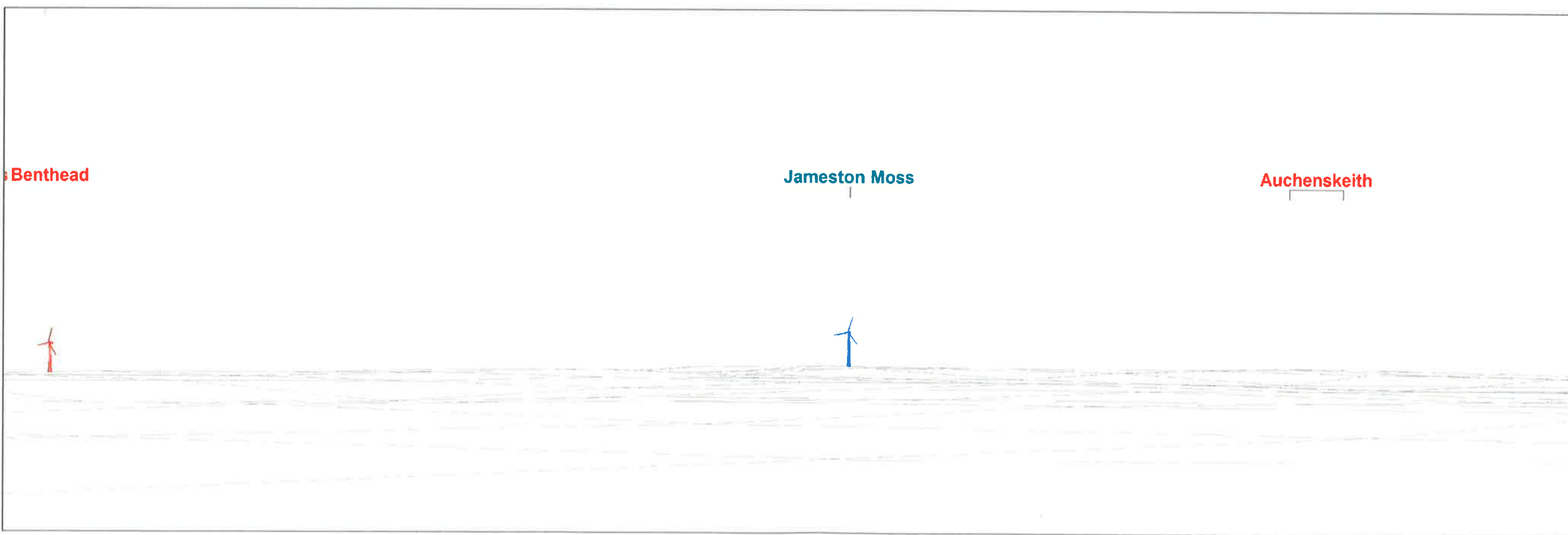
Site Name: Jameston Moss
Client Name: Mr Miller
Site Reference: P07471
Drawing Reference: 07471/014/B
Date: 04/11/2016
User: CE



Baseline Photograph



Wireframe



Appendix 6.4: Auchenmade facing southwest

Distance to turbine: 1.5km
Camera Height: 1.5m
Focal Length: 50mm

Camera: Cannon EOS 5D Mark II
Date Photograph Taken: 14.04.16
Time Photograph Taken: 12.00

Proposed Development
Approved Development
Pending Development





Appendix 6.5: Auchenmade facing southwest

Recommended viewing distance when viewed with both eyes: 550mm

Distance to turbine: 1.5km

Camera Height: 1.5m

Focal Length: 50mm

Camera: Canon EOS 5D Mark II

Date Photograph Taken: 14/04/16

Time Photograph Taken: 12.00

Proposed Development

Approved Development

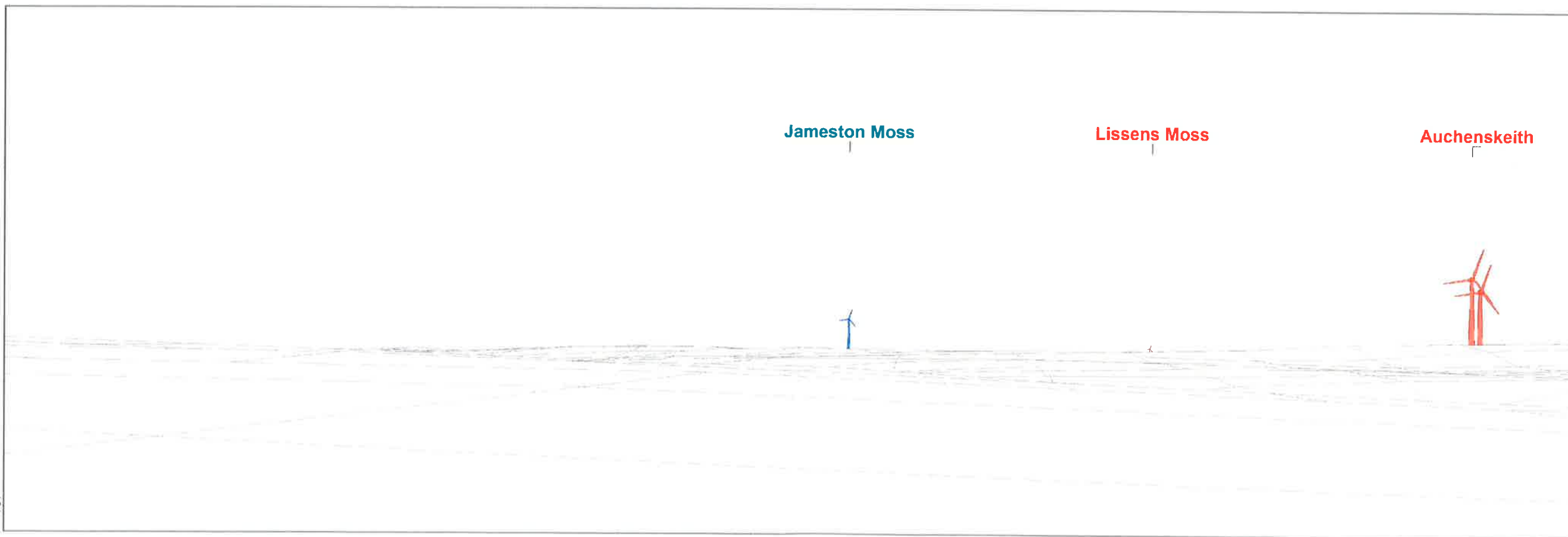
Pending Development



Baseline Photograph



Wireframe



Appendix 6.6: Blair Estate facing east

Distance to turbine: 2.5km
Camera Height: 1.5m
Focal Length: 50mm

Camera: Cannon EOS 5D Mark II
Date Photograph Taken: 14.04.16
Time Photograph Taken: 13.00

Proposed Development
Approved Development
Pending Development





Appendix 6.7: Blair Estate facing east

Recommended viewing distance when viewed with both eyes: 550mm

Distance to turbine: 2.5km

Camera Height: 1.5m

Focal Length: 50mm

Camera: Canon EOS 5D Mark II

Date Photograph Taken: 14/04/16

Time Photograph Taken: 13.00

Proposed Development

Approved Development

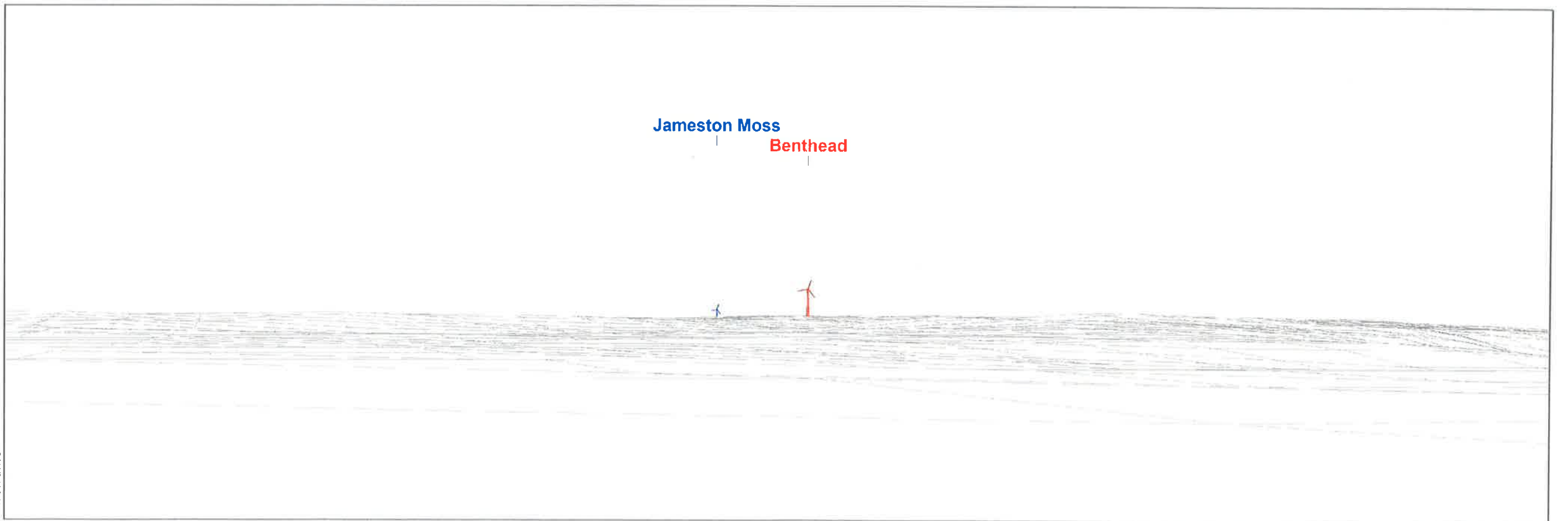
Pending Development



Baseline Photograph



Wireframe



Appendix 6.8: Eglinton Country Park facing north northeast

Distance to turbine: 4.6km
Camera Height: 1.5m
Focal Length: 50mm

Camera: Cannon EOS 5D Mark II
Date Photograph Taken: 14.04.16
Time Photograph Taken: 13.50

Proposed Development
Approved Development
Pending Development





Photomontage

Appendix 6.9: Eglinton Country Park facing north northeast

Recommended viewing distance when viewed with both eyes: 550mm

Distance to turbine: 4.6km

Camera Height: 1.5m

Focal Length: 50mm

Camera: Canon EOS 5D Mark II

Date Photograph Taken: 14/04/16

Time Photograph Taken: 13.50

Proposed Development

Approved Development

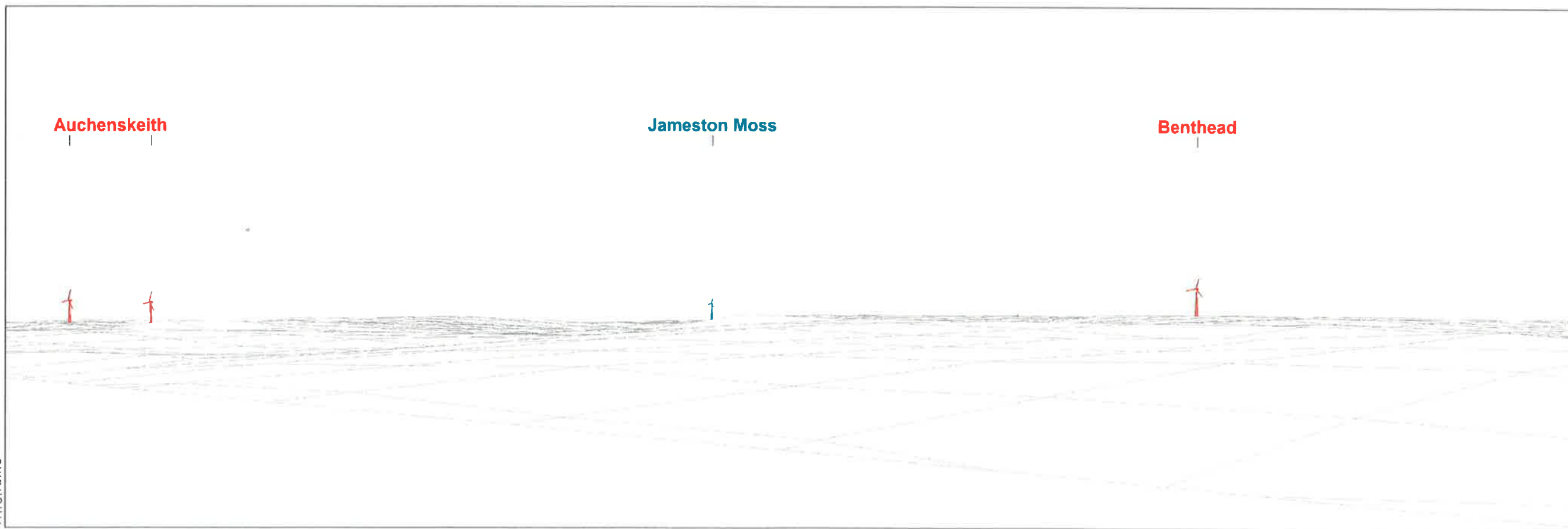
Pending Development



Baseline Photograph



Wireframe



Appendix 6.10: Kilwinning facing northeast

Distance to turbine: 4.3km
Camera Height: 1.5m
Focal Length: 50mm

Camera: Cannon EOS 5D Mark II
Date Photograph Taken: 14.04.16
Time Photograph Taken: 12.30

Proposed Development
Approved Development
Pending Development





Appendix 6.11: Kilwinning facing northeast

Recommended viewing distance when viewed with both eyes: 550mm

Distance to turbine: 4.3km

Camera Height: 1.5m

Focal Length: 50mm

Camera: Canon EOS 5D Mark II

Date Photograph Taken: 14/04/16

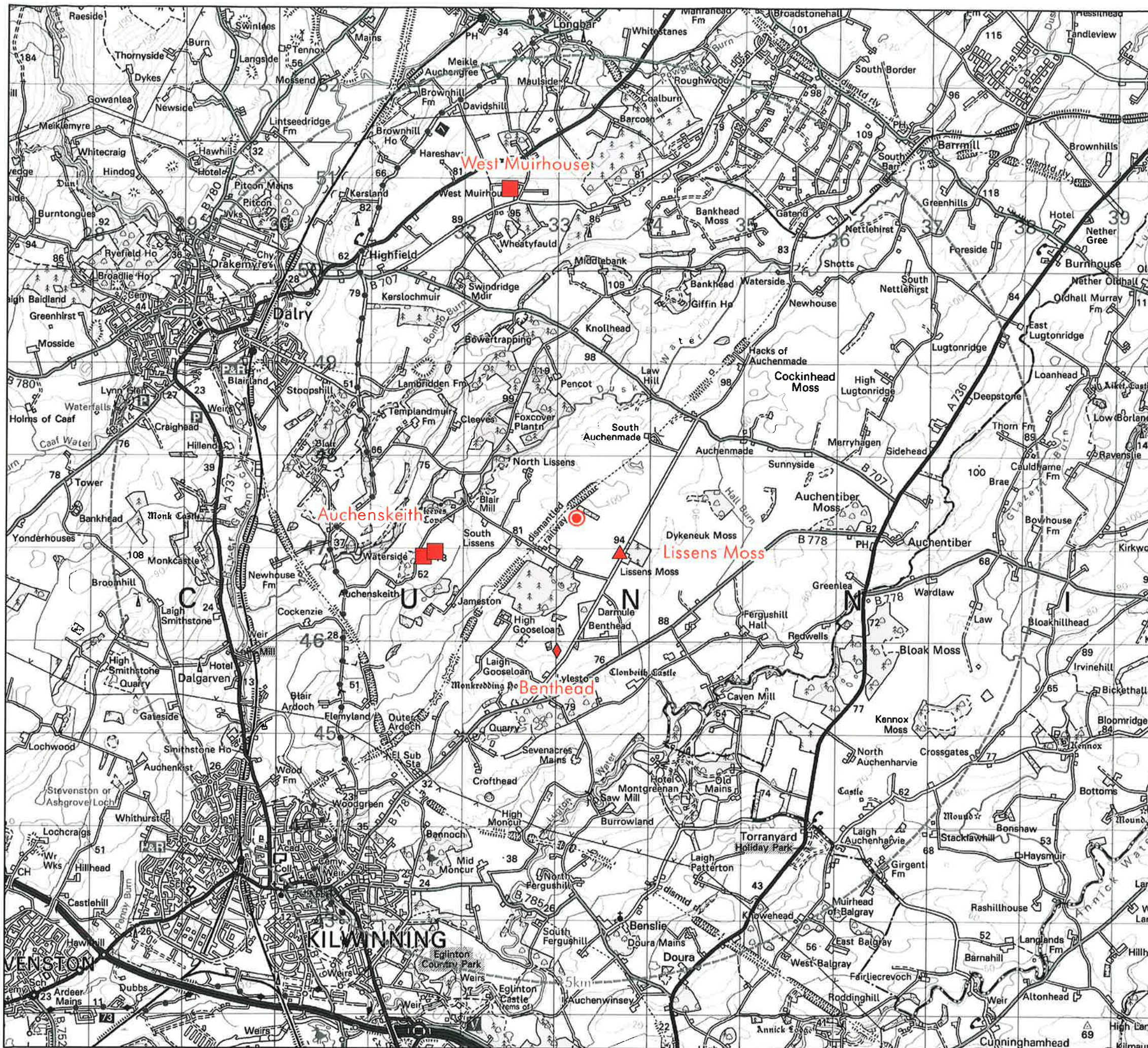
Time Photograph Taken: 12.30

Proposed Development

Approved Development

Pending Development





Appendix 6.12: Cumulative Turbines within 5km Radius

Legend:

-  Proposed Turbine Location
E:233210 N:647332
-  Small (15-30m) Approved/ Installed
-  Small/ Medium (30-50m) Approved/ Installed
-  Medium (50-70m) Approved/ Installed

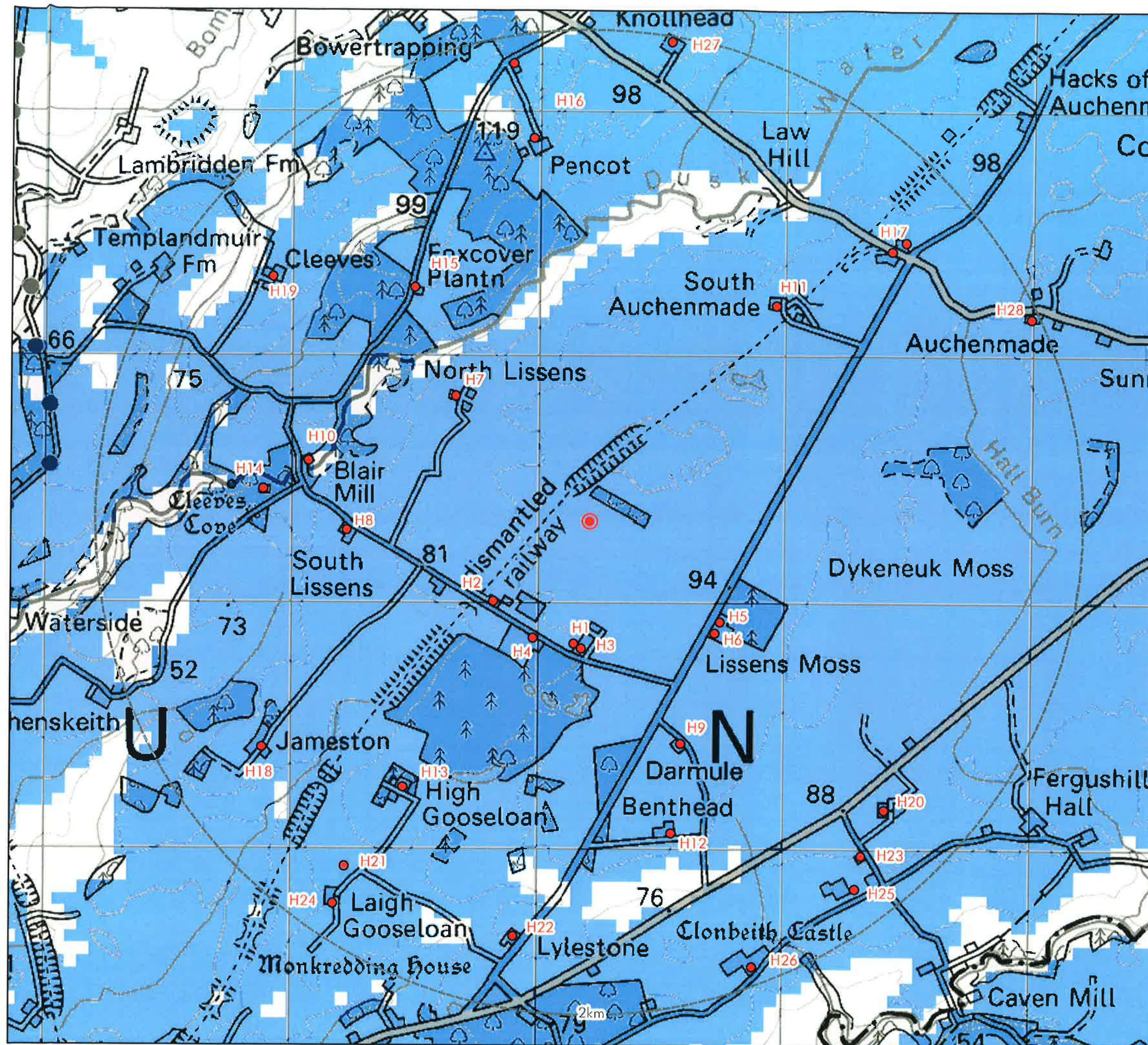
0 0.5 1 2 Kilometers

1:40,000

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Client Name: Mr Miller
Site Reference: P07471
Drawing Reference: 07471/023/B
Date: 26/10/2016
User: CE



Appendix 6.13: Residential Properties within 2km Radius

Legend:

-  Proposed Turbine Location
E:233210 N:647332
-  Zone of Theoretical Visibility to Blade Tip
-  Residential Properties

Notes:

This ZTV is computer generated from OS Landform Panorama DTM Data. It does not account for vegetation or built structures which may screen views. The earth's curvature and atmospheric refraction are included. Viewer height above ground is 2.0m.

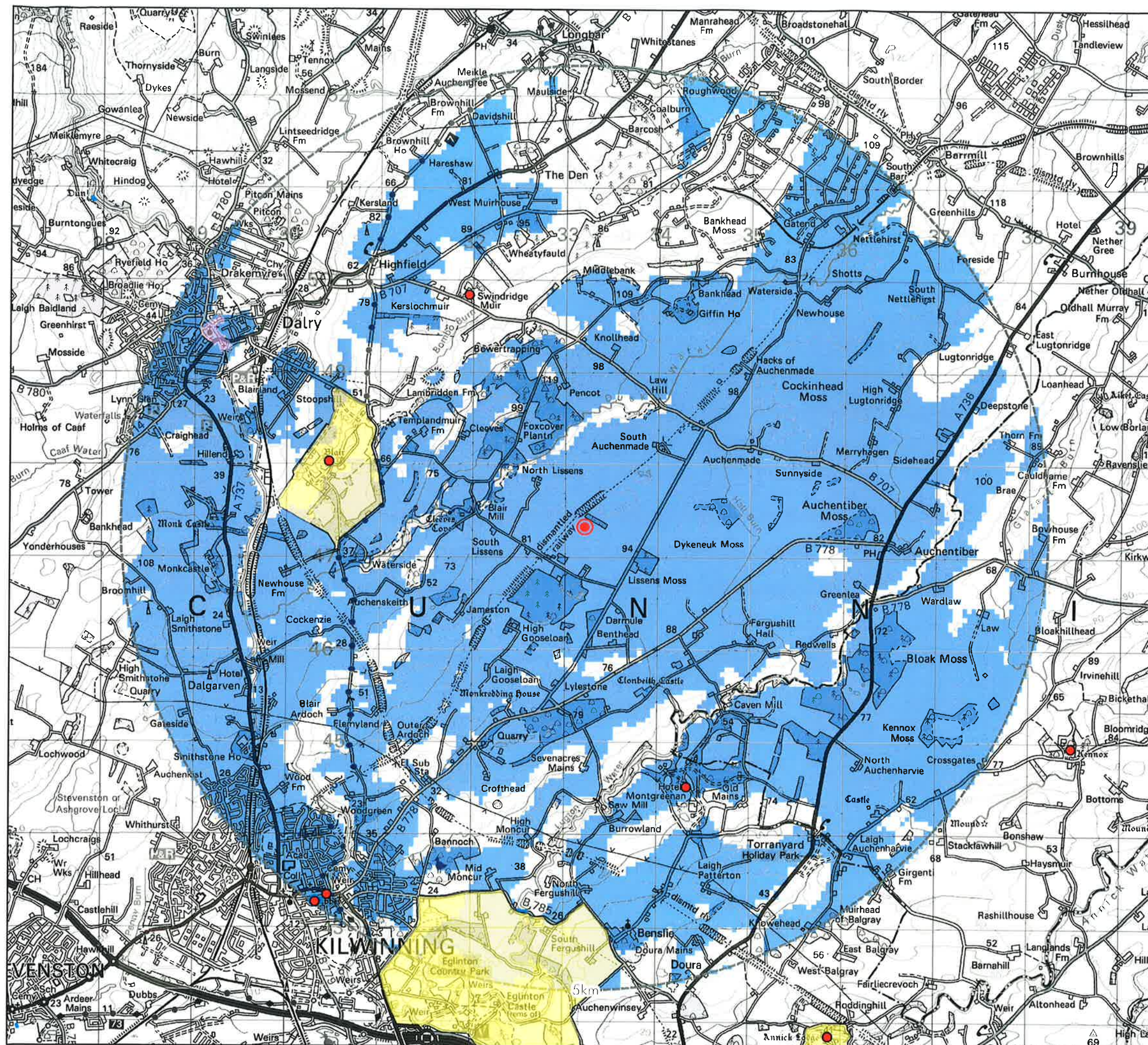
0 0.2 0.4 0.8 Kilometers

1:15,000

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Drawing Reference: 07471/035/B
Date: 26/10/2016
User: CE



Appendix 7.1: Local Historic Environment within a 5km study radius of Jameston Moss

Legend:

- Proposed Turbine Location
E:233210 N:647332
- Zone of Theoretical Visibility to Blade Tip
- 'A' Listed Buildings
- Conservation Area
- Scheduled Ancient Monument
- Gardens and Designed Landscapes

Notes:
This ZTV is computer generated from OS Landform Panorama DTM Data. It does not account for vegetation or built structures which may screen views. The earth's curvature and atmospheric refraction are included. Viewer height above ground is 2.0m.

0 0.5 1 2 Kilometers
1:40,000

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Site Name: Jameston Moss
Client Name: Mr Miller
Site Reference: P07471
Drawing Reference: 07471/011/C
Date: 08/11/2016
User: C.E

**ACOUSTIC NOISE TEST FOR A NORVENTO
nED100 LOW NOISE WIND TURBINE**

Results Report

Report nº: TR-13-015D



**Polígono Berriainz, Calle C, Nave 103
CP. 31013 Berriozar - Navarra – Spain
Desk Phone: +34 948 287 668
Fax: + 34 948 309 129**

ACOUSTIC NOISE TESTING REPORT

PROJECT: NORVENTO Ned100 LOW NOISE

BID CODE:

Manufacturer	NORVENTO
Customer	DEWI
Address	c/Larragueta 8B 3-31013 Ansoain, Navarra, Spain
Starting date	11/04/2013
Ending date	11/04/2013
Testing method	IEC 61400-11 Edition 3.0 2012
Report Issuer	Aresse Engineering

APPROVED BY:	
Full name:	Gorka Gainza González
Signature:	
Date:	23/09/2013

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1. Scope

This report describes the results of the acoustic noise test performed in a Norvento nED100 wind turbine, operating in Low Noise mode, located at Cervo wind farm, in Cervo, Lugo.

The WTGS tested was proposed by Norvento Energia.

This report has been developed by Acoidan Betancort Montesdeoca and approved by Joseba Iraizoz Lafuente.

2. Reference and applicable documents

[1] IEC. *Wind turbine generator systems - Part 11: Acoustic noise measurement techniques*. IEC 61400-11 Edition 3.0, 2012

3. Definitions

D	Rotor diameter
H	Height of rotor centre
$L_{Aeq,k}$	Equivalent continuous A-weighted sound pressure level at each integer wind speed, where $k = 6, 7, 8, 9, 10$
$L_{Aeq,c}$	Equivalent continuous A-weighted sound pressure level corrected for background noise at each integer wind speed and corrected to reference conditions
L_n	Equivalent continuous sound pressure level of the background noise
L_s	Equivalent continuous sound pressure level of only wind turbine noise
L_{s+n}	Equivalent continuous sound pressure level of combined wind turbine and background noise
$L_{WA,k}$	Apparent sound power level, where $k = 6, 7, 8, 9, 10$
R_0	Reference distance
R_1	Slant distance, from rotor centre to measurement position
S_0	Reference area, $S_0 = 1m^2$
SPL	Sound pressure level

4. Test site description

The following table includes information about the site location provided by the customer in the document "01--FPI-01.00 petición inf ing".

Geographical area	
Country	Spain
Region	Galicia
Province	Lugo
Town	Cervo
Wind farm	Cervo Wind Farm

Table 4.1. Site location



Figure 4.1. Site maps

Cervo Wind Farm is close to Cervo, a little village located in Lugo, near to Burela. To go to the site, take the road C-642 and leave it at exit to San Cibrao. Then, take to Burela.

The wind farm is placed on the top of a hill, with slopes at north and south. The location of the site is near the sea and a water treatment plant. The vegetation consists of small bushes.

Surrounding the reference microphone position there were not any reflecting structures.

Due to these terrain characteristics, the reference roughness length considered is $z_0 = 0.05\text{m}$ (farmland with some vegetation).

5. Instrumentation

Signal	Equipment	Type	Model	Serial number	Calibration certificate	Last calibration date
Sound pressure	National Instrument	National Instrument	9171	16C5E49	12/34511111	20/04/2012
Wind speed	NRG SYSTEMS	NRG SYSTEMS	NRG #40 Hall	179700004025	40H_sn179700003825_2 012-01-23	23/06/2012
Wind direction	NRG SYSTEMS	NRG SYSTEMS	NRG #200P	---	---	---
Temperature	VAISALA	VAISALA	HMP155	G0640001	LT-12316-1	24/04/2012
Pressure	VAISALA	VAISALA	PTB110	G0630002	LP-12086-1	23/04/2012
Electrical power*	National Instrument	National Instrument	1970790-04L	16B7ABE	043625	04/05/2012
Nacelle wind speed*	National Instrument	National Instrument	1970790-04L	16B7ABE	043625	04/05/2012
Pitch angle*	National Instrument	National Instrument	1970790-04L	16B7ABE	043625	04/05/2012
Generator speed*	National Instrument	National Instrument	1970790-04L	16B7ABE	043625	04/05/2012

Table 5.1. Instrumentation

(*) These signals are provided by the customer

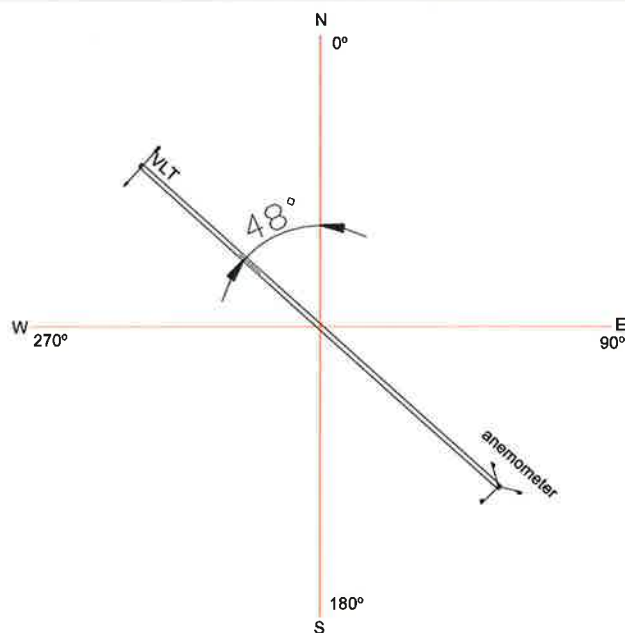


Figure 5.1. General layout (top view)

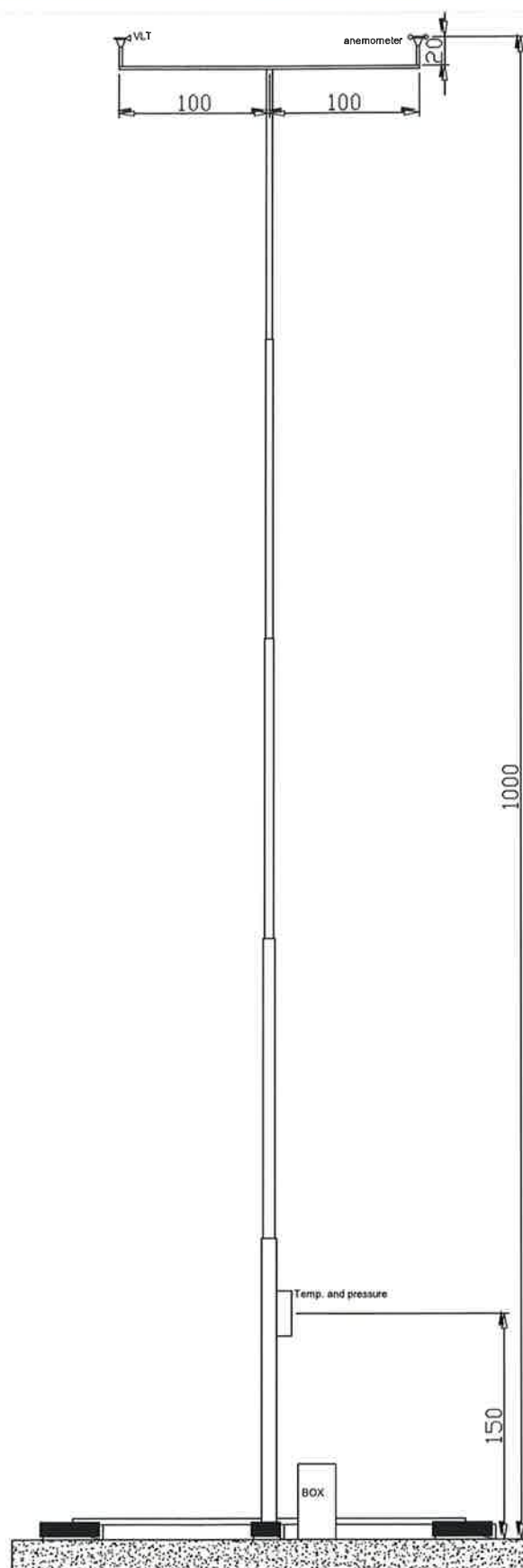


Figure 5.2. General layout (predominant wind direction view)

6. Description of the measurement procedure

This acoustic noise test has been performed following a method based in reference [1].

The following parameters have been obtained:

- Sound power levels
- 1/3-octave band spectra
- Tonality analysis

Sound power level and levels in the thirds octave bands have been obtained using signals with the next characteristics:

- Averaging time of 10 seconds
- Sampling frequency of 25600 samples per second

Non acoustic signals are characterized by:

- Averaging time of 10 seconds
- Sampling frequency of 1 sample per second

The microphone has been placed in the allowed limits for the horizontal distance from the WTGS, $R_0 = H+D/2 = 47m \pm 20\%$ (See Table 6.2)

The data have been recorded in 2 intervals and 2 positions.

Measuring interval	Date	Starting time	Ending time	Auxiliary position
Interval 1	11-04-2013	14:20	14:56	Position 2
Interval 2	11-04-2013	14:56	18:53	Position 1
Total number of measurements				
Of WTGS running			713	
Of WTGS parked			236	

Table 6.1. Measuring intervals

The measurements cover the speed range between 7.0 and 12.0 m/s, referenced at hub height. This wind speed has been obtained from measurements of the produced electric power.

The neighbouring wind turbine has been stopped during the measurement campaign.

The microphone has been installed in the allowed region in both positions (see Figure 6.1).

The distance between mast reference and the WTGS is 24m in the direction of 313° from the WTGS. The main wind direction considered in the two intervals has been $227^\circ \pm 15^\circ$.

It has not been recorded in the auxiliary positions 2, 3 and 4 because an analysis of directivity has not been requested by the customer.

UTM coordinates	X	Y	Horizontal distance to WTGS (m)
Wind turbine	626865	4838837	0
Met mast	626881	4838841	24
Reference position POS1	626899	4838889	47
Reference position POS2	626884	4838900	47
Neighbouring wind turbine 1	626886	4838772	87

Table 6.2. UTM coordinates



Figure 6.1. Microphone, met mast position and neighbouring wind turbines

7. Test conditions

The environmental conditions during the period of measurements have been:

Environmental conditions	Minimum	Mean	Maximum
Turbulence (%)	2.76	11.74	35.29
Air pressure (hPa)	1014	1015	1016
Temperature (°)	14.27	16.32	17.49
Range of the downwind direction (°)	220	230	265

Table 7.1. Environmental conditions

8. Results

8.1. Registered data

The following figure shows all data pairs of the wind turbine sound and background noise depending on the wind speed. The averaging time for each data is 10 seconds. (Blue stars correspond with wind turbine noise and red circles with the background noise)

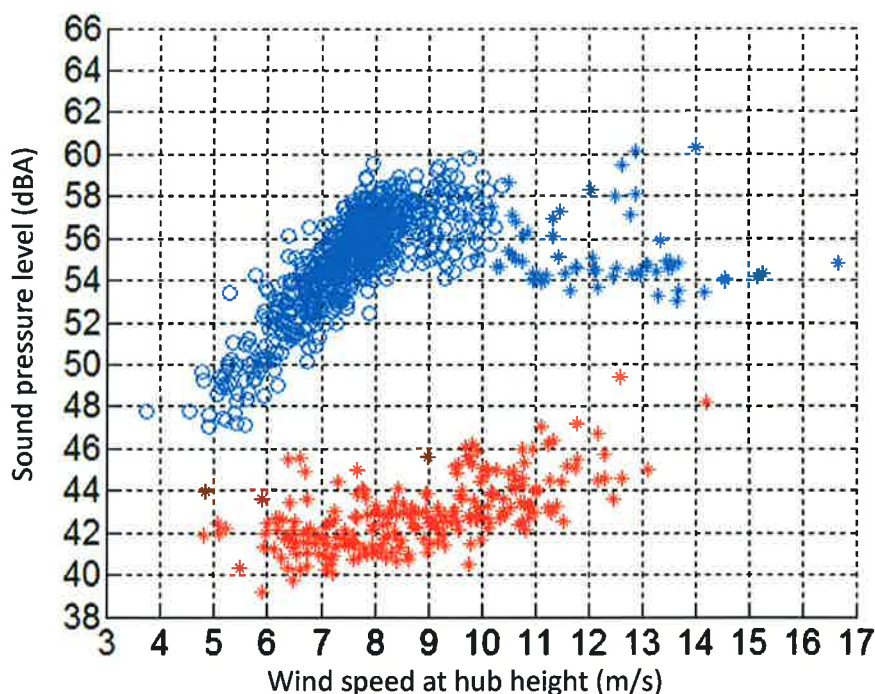


Figure 8.1. Sound pressure level of wind turbine noise and background noise versus wind speed at hub height

8.2. Apparent sound power level

Wind speed at hub height (m/s)	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0
Wind speed at 10m (m/s)	5.6	6.0	6.4	6.8	7.2	7.7	8.1	8.5	8.9	9.3	9.7
L_{Aeq} (dBA)	54.24	55.63	56.4	57.05	57.05	57.25	57.09	56.42	54.75	55.62	55.21
L_{Aeqn} (dBA)	41.49	42.48	42.28	42.34	42.70	43.72	43.79	43.89	44.36	44.55	45.93
$L_{Aeq,c}$ (dBA)	54.01	55.42	56.23	56.90	56.89	57.05	56.88	56.17	54.34	55.27	54.67
Apparent power level L_{WA} (dBA) at hub height	93.81	95.22	96.03	96.70	96.69	96.85	96.68	95.97	94.13	95.06	94.47
Uncertainty U_{LWA} (dBA)	1.30	1.21	1.15	1.12	1.24	1.15	1.22	1.38	1.31	1.51	1.85

Table 8.1. Apparent sound power level and uncertainty

Component	Range a	Standard uncertainty U_B
Calibration	± 0.3	0.2
Instrument	± 1.7	1.0
Board	± 0.5	0.3
Distance and direction	± 0.2	0.1
Weather conditions	± 0.8	0.5
Wind speed, derived	± 0.3	0.2
Wind speed, power curve	± 0.3	0.2

Table 8.2. Values of type B uncertainty components

8.3. Third octave band levels

The third-octave spectra have been A-weighted. The wind speed is referenced at hub height.

8.3.1 Third octave band levels at 7.0 m/s

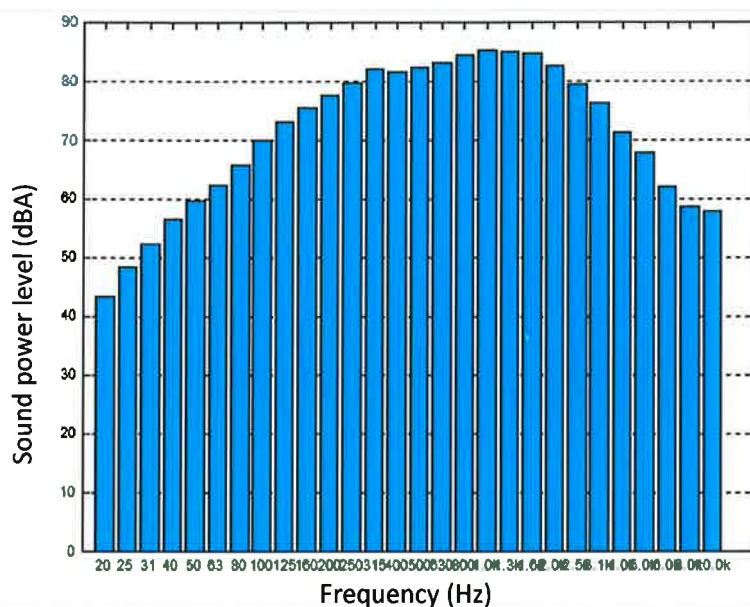


Figure 8.2. Third octave band levels at 7.0 m/s A-weighted

Frequency (Hz)	Sound power level (dBA)	Uncertainty U _L (dBA)
20	[43.21]	[3.32]
25	48.37	2.79
31.5	52.35	2.49
40	56.46	2.32
50	[59.59]	[2.83]
63	62.31	2.82
80	65.70	2.43
100	69.92	1.79
125	72.94	1.47
160	75.31	1.35
200	77.53	1.32
250	79.62	1.32
315	81.95	1.30
400	81.40	1.32

Frequency (Hz)	Sound power level (dBA)	Uncertainty U _L (dBA)
500	82.30	1.31
630	82.98	1.30
800	84.25	1.28
1000	85.09	1.28
1250	84.98	1.26
1600	84.52	1.26
2000	82.56	1.27
2500	79.44	1.28
3150	76.23	1.27
4000	71.30	1.34
5000	67.79	1.50
6300	62.06	2.32
8000	[58.51]	[2.80]
10000	[57.80]	[2.80]

Table 8.3. Third octave band levels at 7.0m/s A-weighted

[] The total noise level is less than 3 dB higher than the background noise level. A 3 dB correction is applied and the uncertainty is calculated as if the difference is 3 dB.

8.3.2 Third octave band levels at 7.5 m/s

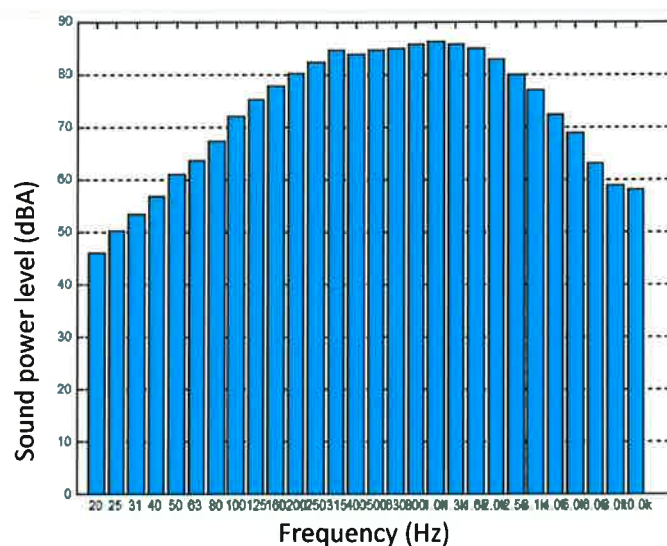


Figure 8.3. Graphic of third octave band levels at 7.5 m/s A-weighted

Frequency (Hz)	Sound power level (dBA)	Uncertainty U_1 (dBA)
20	[45.86]	[3.24]
25	[50.05]	[3.00]
31.5	[53.18]	[2.83]
40	56.63	2.63
50	60.90	2.37
63	63.61	2.19
80	67.30	1.94
100	71.84	1.47
125	75.20	1.30
160	77.71	1.23
200	80.17	1.20
250	82.19	1.20
315	84.50	1.20
400	83.80	1.20
500	84.59	1.21
630	84.88	1.20
800	85.72	1.21
1000	86.12	1.21
1250	85.62	1.20
1600	84.89	1.20
2000	82.80	1.21
2500	79.89	1.21
3150	76.90	1.20
4000	72.30	1.25
5000	68.92	1.37
6300	63.09	1.99
8000	[58.86]	[2.62]
10000	[58.03]	[2.62]

Table 8.4. Table of third octave band levels at 7.5 m/s A-weighted

[] The total noise level is less than 3 dB higher than the background noise level. A 3 dB correction is applied and the uncertainty is calculated as if the difference is 3 dB.

8.3.1 Third octave band levels at 8.0 m/s

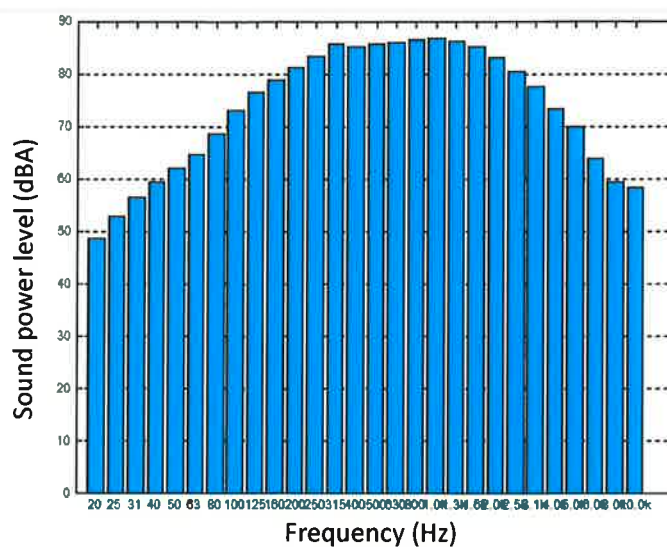


Figure 8.4. Graphic of third octave band levels at 8.0 m/s A-weighted

Frequency (Hz)	Sound power level (dBA)	Uncertainty U _L (dBA)
20	[48.48]	[3.03]
25	52.65	2.06
31.5	56.34	1.73
40	59.31	1.82
50	61.92	2.22
63	64.69	2.02
80	68.58	1.66
100	73.01	1.35
125	76.34	1.21
160	78.80	1.16
200	81.19	1.15
250	83.22	1.14
315	85.56	1.14
400	85.00	1.14
500	85.79	1.14
630	85.91	1.14
800	86.56	1.15
1000	86.81	1.15
1250	86.13	1.15
1600	85.16	1.15
2000	83.04	1.16
2500	80.30	1.16
3150	77.44	1.15
4000	73.32	1.19
5000	69.85	1.27
6300	63.91	1.76
8000	[59.26]	[2.57]
10000	[58.33]	[2.57]

Table 8.5. Table of third octave band levels at 8.0 m/s A-weighted

[] The total noise level is less than 3 dB higher than the background noise level. A 3 dB correction is applied and the uncertainty is calculated as if the difference is 3 dB.

8.3.1 Third octave band levels at 8.5 m/s

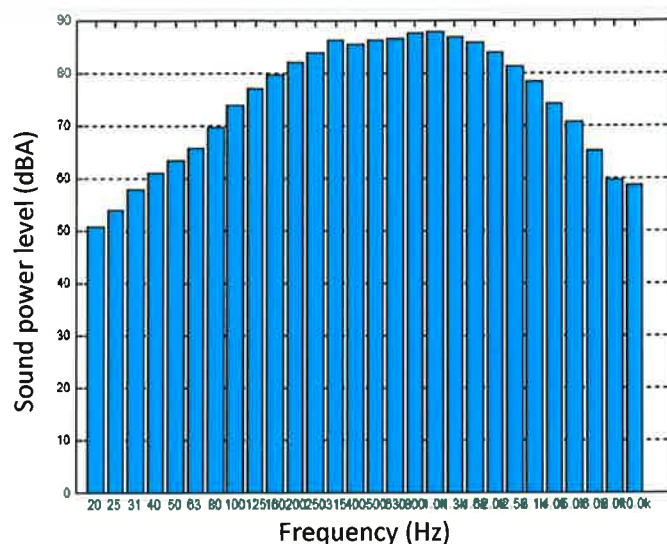


Figure 8.5. Graphic of third octave band levels at 8.5 m/s A-weighted

Frequency (Hz)	Sound power level (dBA)	Uncertainty U_L (dBA)
20	50.75	1.54
25	53.89	1.52
31.5	57.68	1.49
40	60.86	1.47
50	63.40	1.63
63	65.75	1.66
80	69.52	1.47
100	73.70	1.26
125	76.96	1.16
160	79.50	1.13
200	81.90	1.11
250	83.69	1.11
315	86.06	1.11
400	85.42	1.11
500	86.29	1.12
630	86.55	1.12
800	87.47	1.12
1000	87.65	1.12
1250	86.80	1.12
1600	85.78	1.13
2000	83.78	1.13
2500	81.24	1.13
3150	78.26	1.12
4000	74.06	1.15
5000	70.75	1.22
6300	65.04	1.57
8000	[59.69]	[2.46]
10000	[58.68]	[2.46]

Table 8.6. Table of third octave band levels at 8.5 m/s A-weighted

[] The total noise level is less than 3 dB higher than the background noise level. A 3 dB correction is applied and the uncertainty is calculated as if the difference is 3 dB.

8.3.1 Third octave band levels at 9.0 m/s

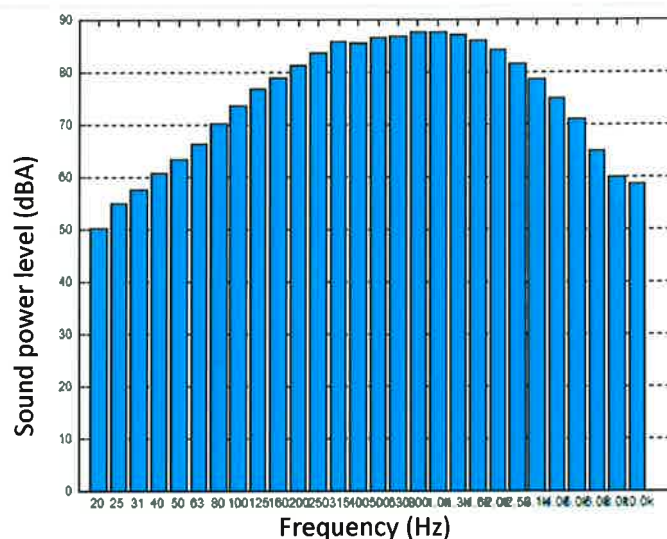


Figure 8.6. Graphic of third octave band levels at 9.0 m/s A-weighted

Frequency (Hz)	Sound power level (dBA)	Uncertainty U_L (dBA)
20	50.09	2.77
25	54.82	2.07
31.5	57.60	1.88
40	60.57	1.87
50	63.18	2.03
63	66.10	1.82
80	70.02	1.54
100	73.65	1.39
125	76.64	1.29
160	78.81	1.27
200	81.13	1.26
250	83.44	1.24
315	85.78	1.23
400	85.35	1.24
500	86.36	1.24
630	86.64	1.23
800	87.40	1.23
1000	87.57	1.23
1250	86.94	1.22
1600	85.99	1.23
2000	84.15	1.24
2500	81.52	1.24
3150	78.65	1.23
4000	74.74	1.25
5000	71.01	1.32
6300	64.98	1.72
8000	[59.80]	[2.65]
10000	[58.67]	[2.64]

Table 8.7. Table of third octave band levels at 9.0 m/s A-weighted

[] The total noise level is less than 3 dB higher than the background noise level. A 3 dB correction is applied and the uncertainty is calculated as if the difference is 3 dB.

8.3.1 Third octave band levels at 9.5 m/s

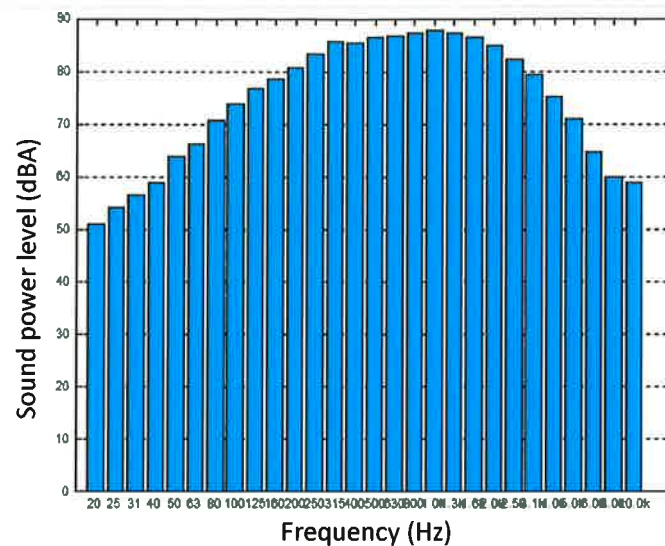


Figure 8.7. Graphic of third octave band levels at 9.5 m/s A-weighted

Frequency (Hz)	Sound power level (dBA)	Uncertainty U_L (dBA)
20	[50.98]	[3.60]
25	[54.12]	[3.23]
31.5	[56.32]	[3.07]
40	[58.91]	[2.72]
50	63.91	2.13
63	66.31	1.74
80	70.56	1.47
100	73.84	1.29
125	76.67	1.20
160	78.60	1.16
200	80.72	1.15
250	83.34	1.14
315	85.59	1.13
400	85.44	1.14
500	86.40	1.15
630	86.63	1.14
800	87.32	1.14
1000	87.67	1.14
1250	87.36	1.14
1600	86.57	1.14
2000	84.95	1.15
2500	82.15	1.16
3150	79.28	1.14
4000	75.17	1.18
5000	70.95	1.25
6300	64.59	1.70
8000	[59.96]	[2.44]
10000	[58.76]	[2.44]

Table 8.8. Table of third octave band levels at 9.5 m/s A-weighted

[] The total noise level is less than 3 dB higher than the background noise level. A 3 dB correction is applied and the uncertainty is calculated as if the difference is 3 dB.

8.3.1 Third octave band levels at 10.0 m/s

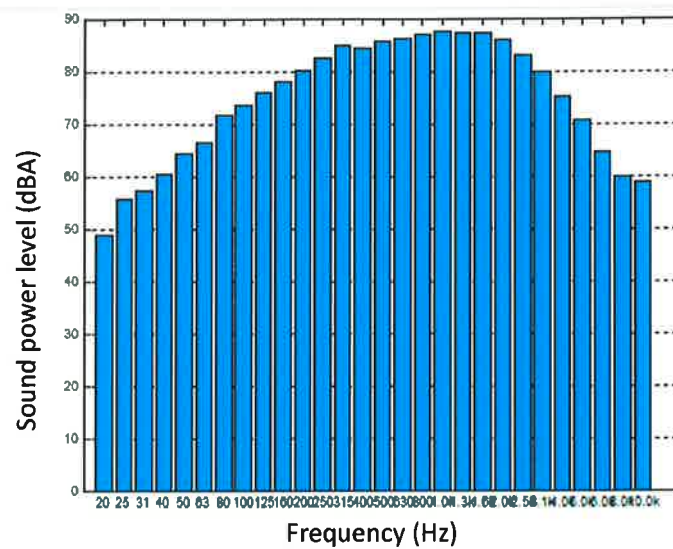


Figure 8.8. Graphic of third octave band levels at 10.0 m/s A-weighted

Frequency (Hz)	Sound power level (dBA)	Uncertainty U_1 (dBA)
20	[48.81]	[3.22]
25	55.67	2.28
31.5	57.26	2.39
40	60.34	2.31
50	64.42	1.93
63	66.42	1.91
80	71.77	1.42
100	73.55	1.35
125	76.04	1.28
160	77.98	1.26
200	80.13	1.27
250	82.38	1.23
315	84.80	1.23
400	84.45	1.23
500	85.68	1.24
630	86.07	1.22
800	87.02	1.21
1000	87.51	1.20
1250	87.34	1.19
1600	87.22	1.19
2000	85.92	1.20
2500	83.03	1.21
3150	79.79	1.19
4000	75.15	1.24
5000	70.70	1.32
6300	64.59	1.76
8000	[59.96]	[2.51]
10000	[58.83]	[2.50]

Table 8.9. Table of third octave band levels at 10.0 m/s A-weighted

[] The total noise level is less than 3 dB higher than the background noise level. A 3 dB correction is applied and the uncertainty is calculated as if the difference is 3 dB.

8.3.1 Third octave band levels at 10.5 m/s

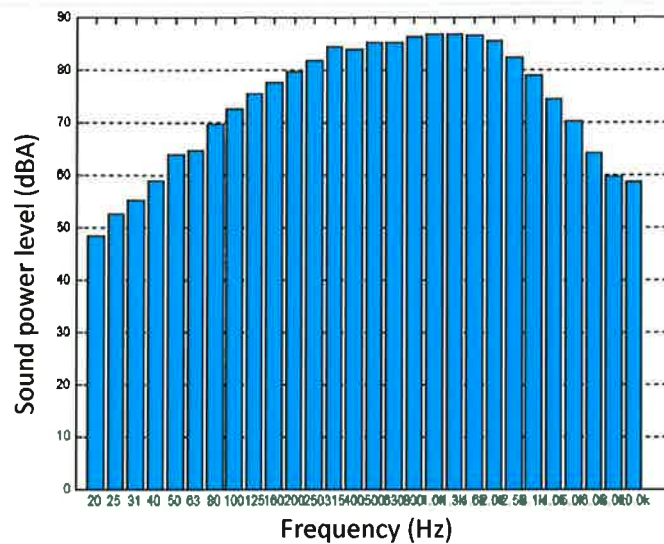


Figure 8.9. Graphic of third octave band levels at 10.5 m/s A-weighted

Frequency (Hz)	Sound power level (dBA)	Uncertainty U_1 (dBA)
20	[48.17]	[4.08]
25	[52.46]	[3.87]
31.5	[55.24]	[3.40]
40	[58.69]	[3.45]
50	63.84	2.29
63	64.59	2.38
80	69.65	1.67
100	72.39	1.62
125	75.50	1.51
160	77.48	1.56
200	79.65	1.69
250	81.71	1.52
315	84.26	1.57
400	83.89	1.54
500	85.03	1.52
630	85.17	1.44
800	86.26	1.40
1000	86.76	1.33
1250	86.69	1.26
1600	86.47	1.22
2000	85.32	1.21
2500	82.16	1.25
3150	78.91	1.23
4000	74.45	1.29
5000	70.12	1.48
6300	63.96	2.06
8000	[59.59]	[2.69]
10000	[58.49]	[2.68]

Table 8.10. Table of third octave band levels at 10.5 m/s A-weighted

[] The total noise level is less than 3 dB higher than the background noise level. A 3 dB correction is applied and the uncertainty is calculated as if the difference is 3 dB.

8.3.1 Third octave band levels at 11.0 m/s

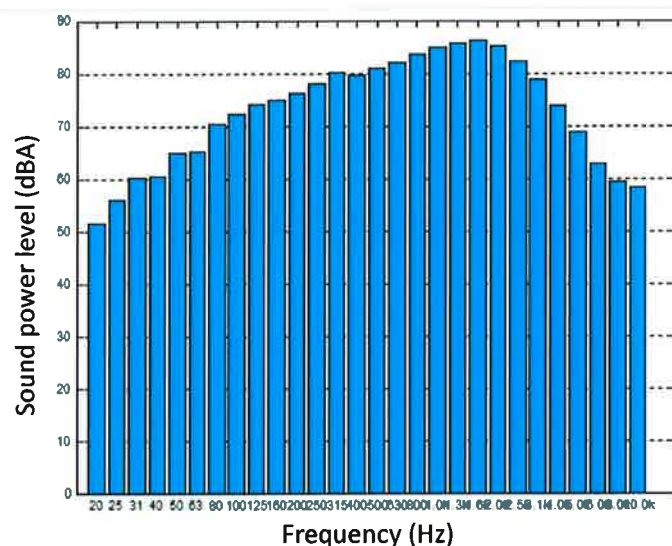


Figure 8.10. Graphic of third octave band levels at 11.0 m/s A-weighted

Frequency (Hz)	Sound power level (dBA)	Uncertainty U_L (dBA)
20	[51.45]	[4.09]
25	[55.85]	[3.98]
31.5	60.06	2.85
40	[60.46]	[3.22]
50	64.99	2.21
63	65.11	2.39
80	70.45	1.67
100	72.20	1.56
125	73.97	1.48
160	74.88	1.50
200	76.28	1.58
250	77.95	1.44
315	80.01	1.50
400	79.63	1.40
500	80.89	1.37
630	81.86	1.31
800	83.67	1.31
1000	84.88	1.27
1250	85.55	1.24
1600	86.19	1.23
2000	85.25	1.25
2500	82.11	1.28
3150	78.92	1.25
4000	73.75	1.34
5000	68.74	1.54
6300	62.79	2.25
8000	[59.39]	[2.49]
10000	[58.40]	[2.49]

Table 8.11. Table of third octave band levels at 11.0 m/s A-weighted

[] The total noise level is less than 3 dB higher than the background noise level. A 3 dB correction is applied and the uncertainty is calculated as if the difference is 3 dB.

8.4.1 Narrowband spectra at 9.0 m/s

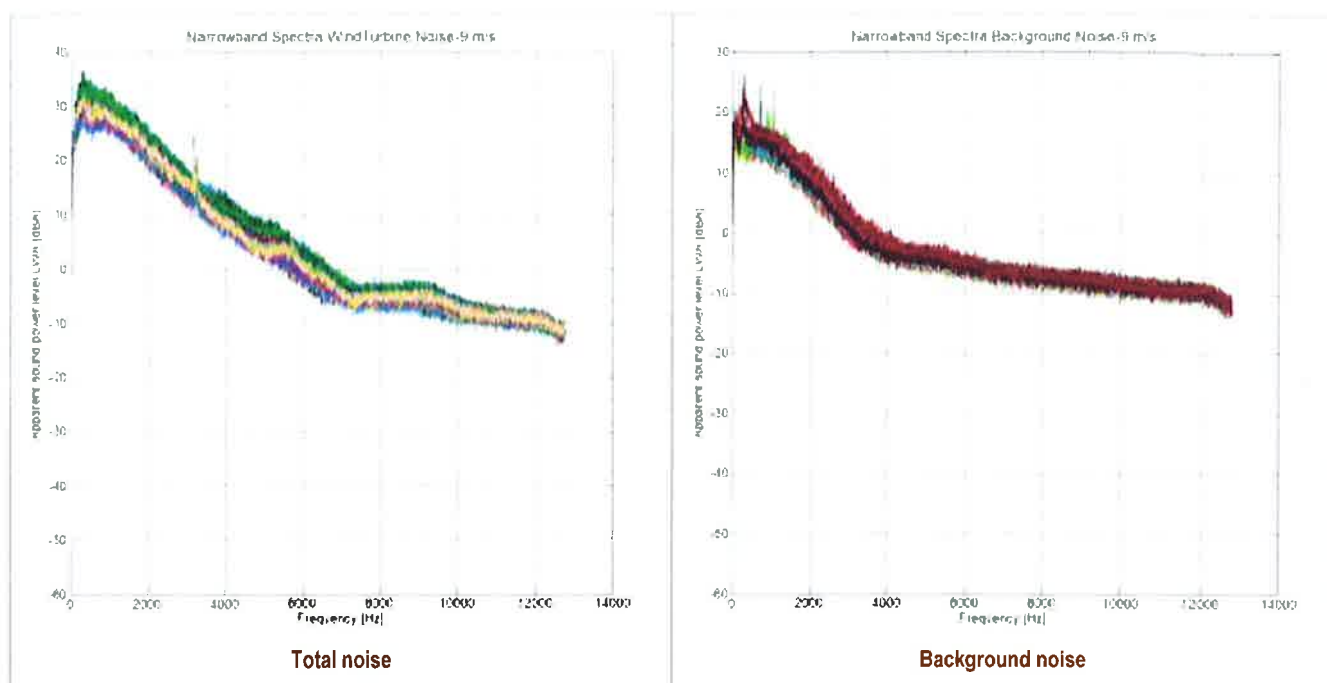


Figure 8.17. Narrowband spectra at 9.0 m/s

8.4.1 Narrowband spectra at 9.5 m/s

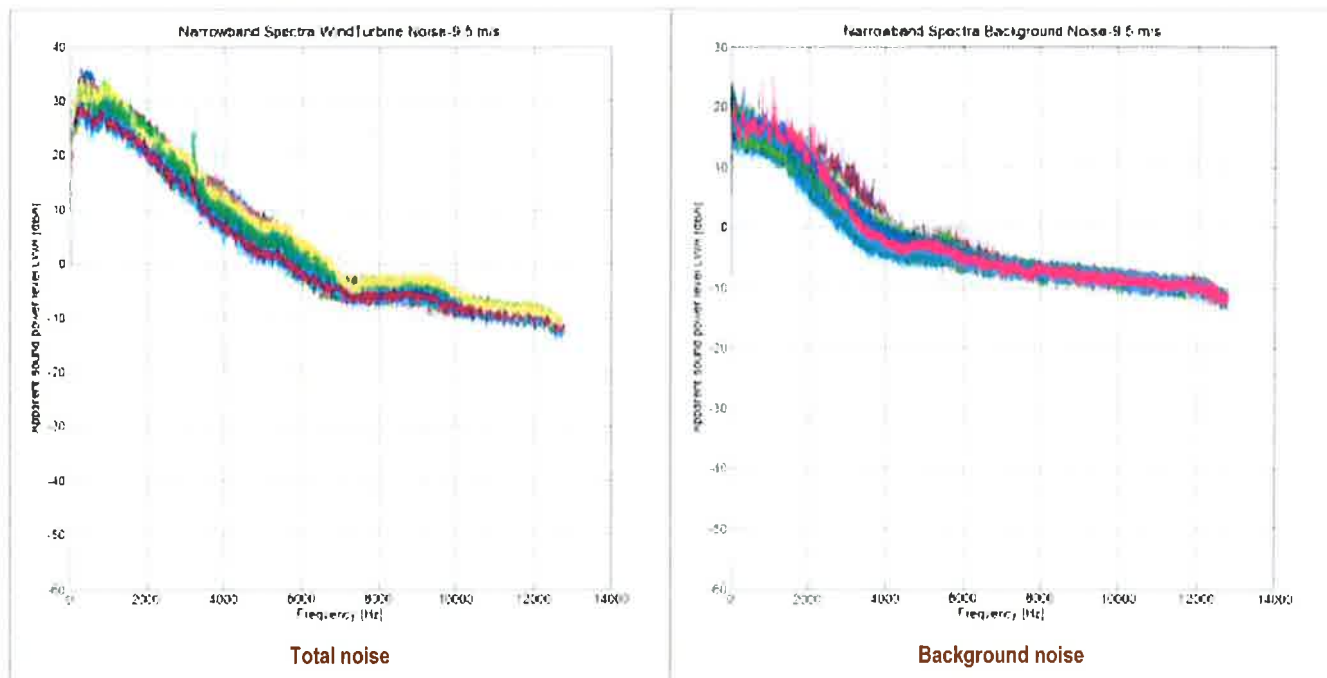


Figure 8.18. Narrowband spectra at 9.5 m/s

8.4.1 Narrowband spectra at 10.0 m/s

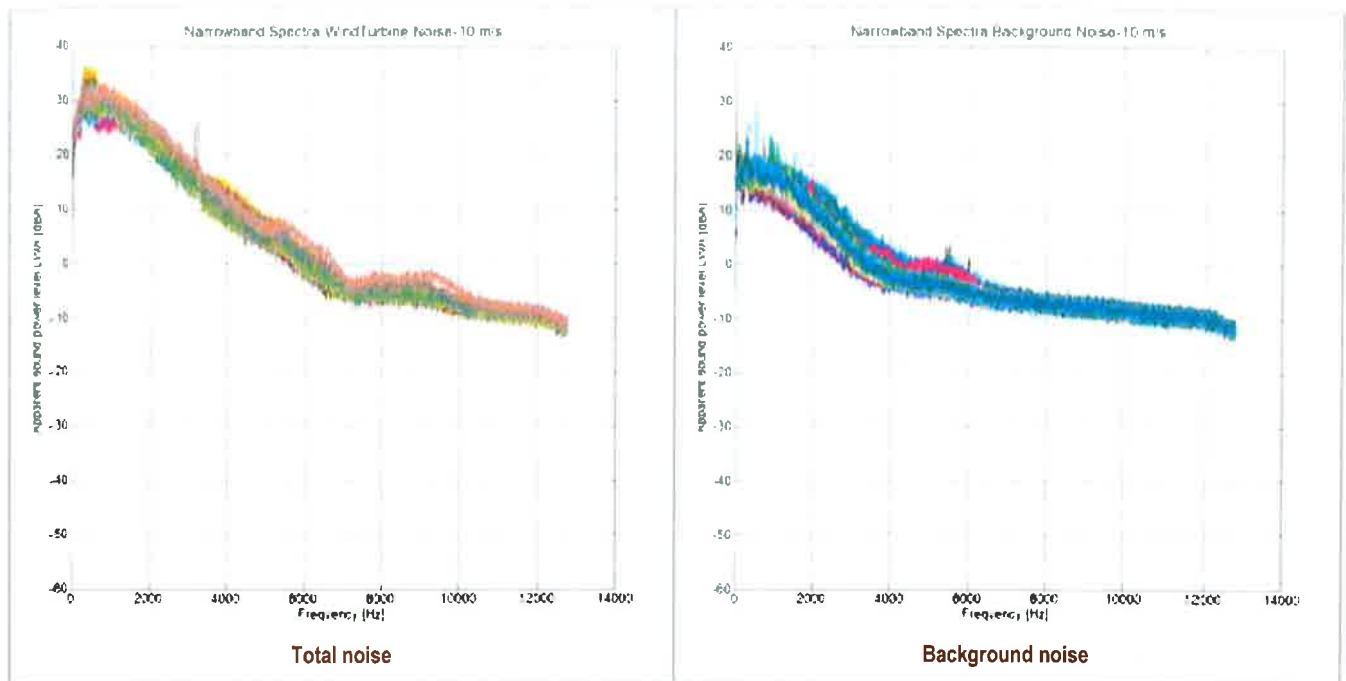


Figure 8.19. Narrowband spectra at 10.0 m/s

8.4.1 Narrowband spectra at 10.5 m/s

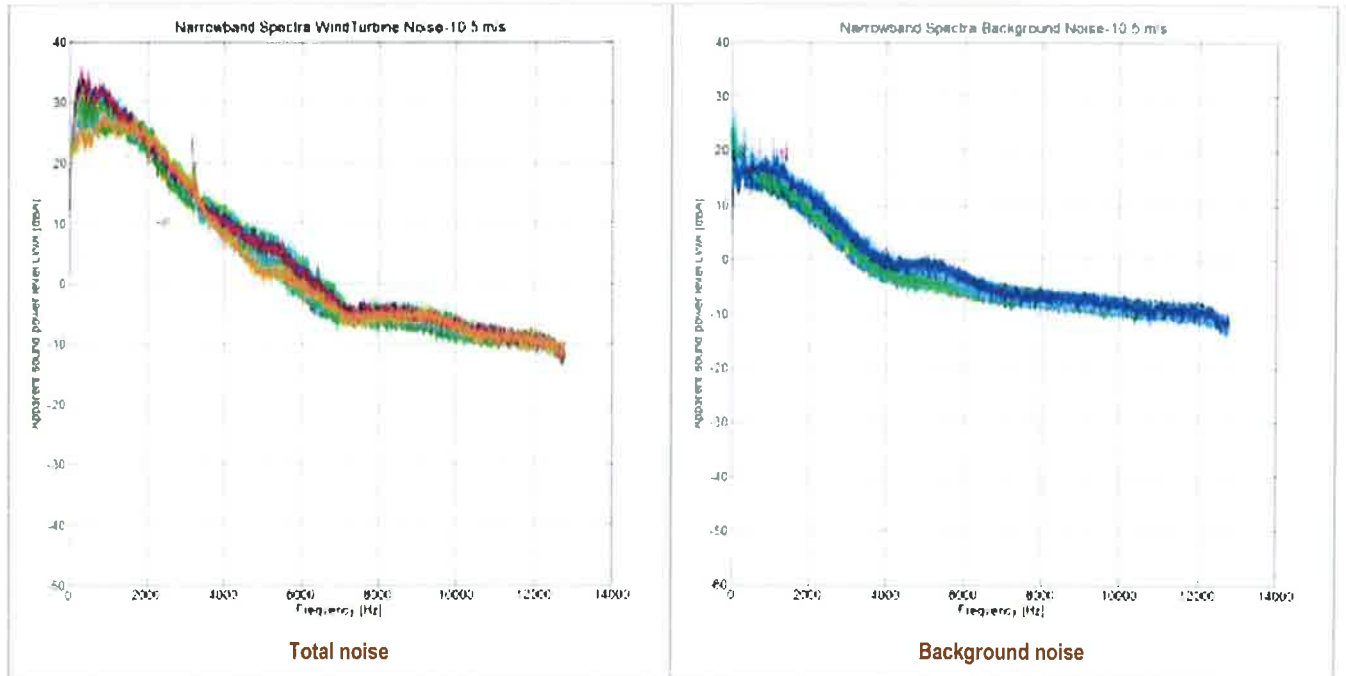


Figure 8.20. Narrowband spectra at 10.5 m/s

5. RESULTS ANALYSIS

5.1 Registered data and sound power determination

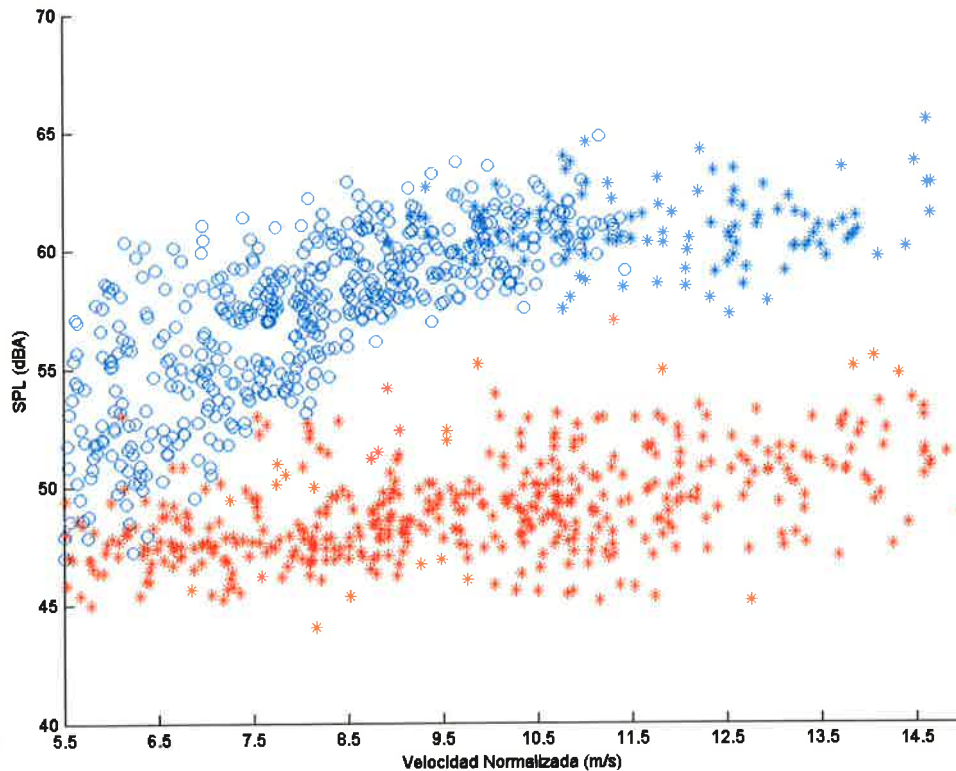


Fig. 3. Sound pressure level in dBA

Wind speed (m/s)	7.5	8.0	8.5	9.0		10.0	10.5	11.0	11.5	12.0	12.5	13.0
Wind turbine noise datasets	60	67	50	58	36	49	33	34	15	12	17	10
Background noise datasets	27	32	27	44	26	23	47	35	22	26	13	16

Table 1. Registered data for each of the wind speed bins

The figure shows the sound pressure level measurement bins vs wind speed. Operating wind turbine measurements (blue dots) and background noise (red dots) are represented.

To obtain the noise power in this case, the sound pressure measurements are performed at various wind speeds. These data are represented in a graph matching normalized wind speed with its corresponding sound pressure level. With those data, a curve and its equation is determined.

From these curves, wind turbine acoustic power to each wind speed is obtained after conversion from sound pressure level to sound power using the IEC61400-11 formula that depends on the measuring point distance.

$$L_{WA} = L_{Aeq,c} - 6 + 10 \lg \left[\frac{4 \pi R_1^2}{S_0} \right]$$

DEWI SP- NORVENTO NED100 ED3.0
5.2 Apparent sound power level

Wind turbine acoustic power results are obtained for each of the bins. Overall results are presented in sound power (dBA) in the following figure and table:

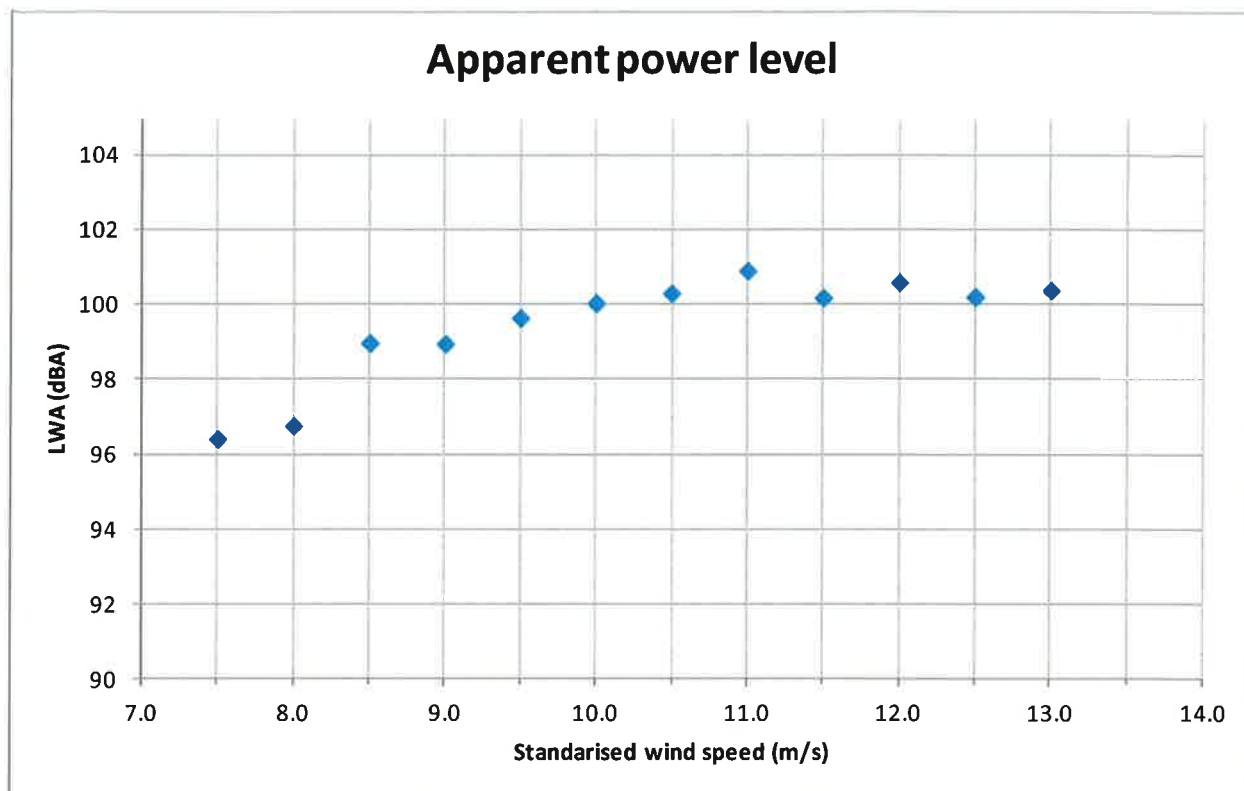


Fig. 4. Apparent sound power levels

Standardised wind speed (m/s)	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0
Laeq Wind Turbine (dBA)	57.28	57.55	59.55	59.55	60.19	60.65	60.86	61.40	60.80	61.21	60.81	61.01
Laeq background (dBA)	48.95	48.84	48.71	49.18	49.25	50.2	49.72	49.45	50.43	50.78	50.13	50.63
Laeq corrected (dBA)	56.61	56.96	59.18	59.16	59.85	60.25	60.52	61.12	60.40	60.80	60.42	60.59
Apparent power level (dBA)	96.41	96.76	98.98	98.96	99.65	100.05	100.32	100.92	100.20	100.60	100.22	100.39
Uncertainty (dBA)	0.95	0.87	0.84	0.74	0.86	0.73	0.75	0.70	0.71	0.93	1.01	1.15

Table 2. Apparent sound power level and uncertainty

DEWI SP- NORVENTO NED100 ED3.0

One-third octave band at 10.5m/s

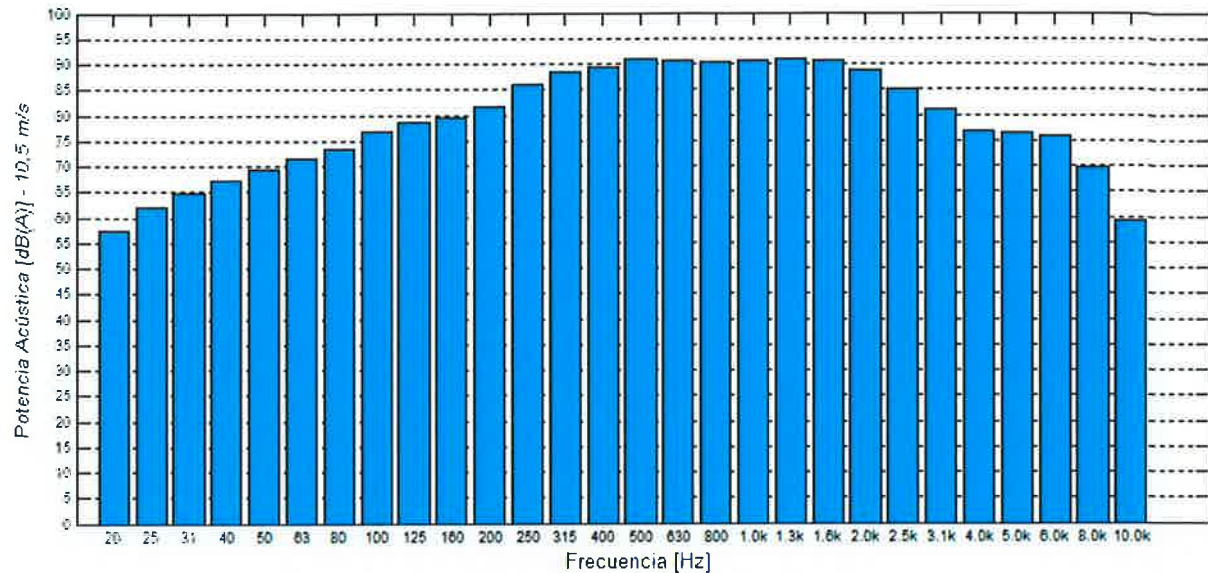


Fig. 11. One-third octave band at 10.5m/s

One-third octave band at 11.0m/s

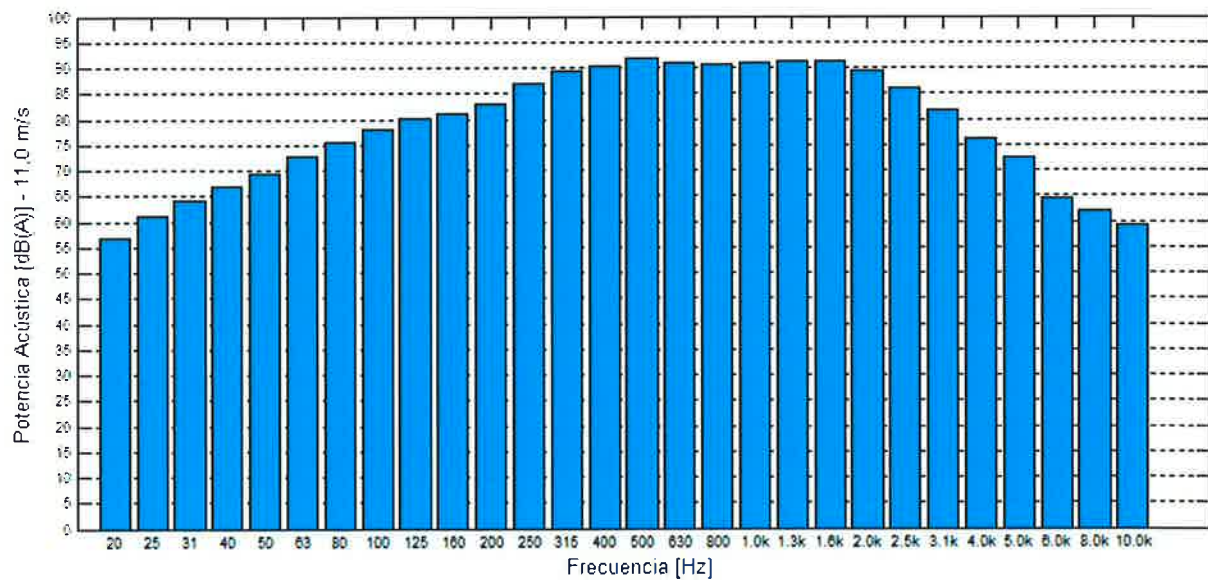


Fig. 12. One-third octave band at 11.0m/s

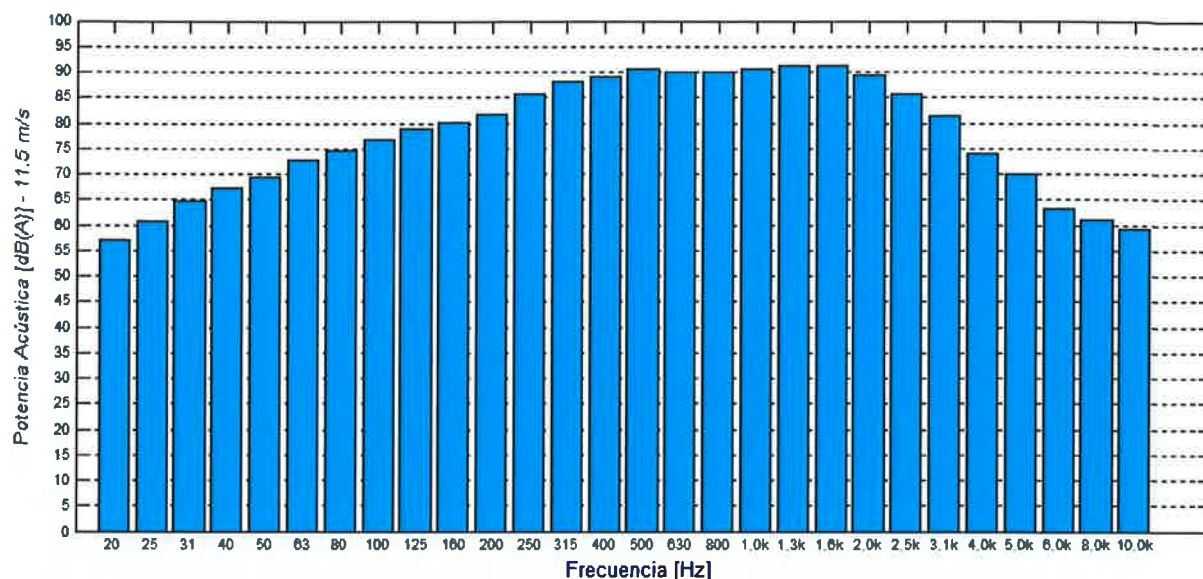
DEWI SP- NORVENTO NED100 ED3.0
One-third octave band at 11.5m/s


Fig. 13. One-third octave band at 11.5m/s

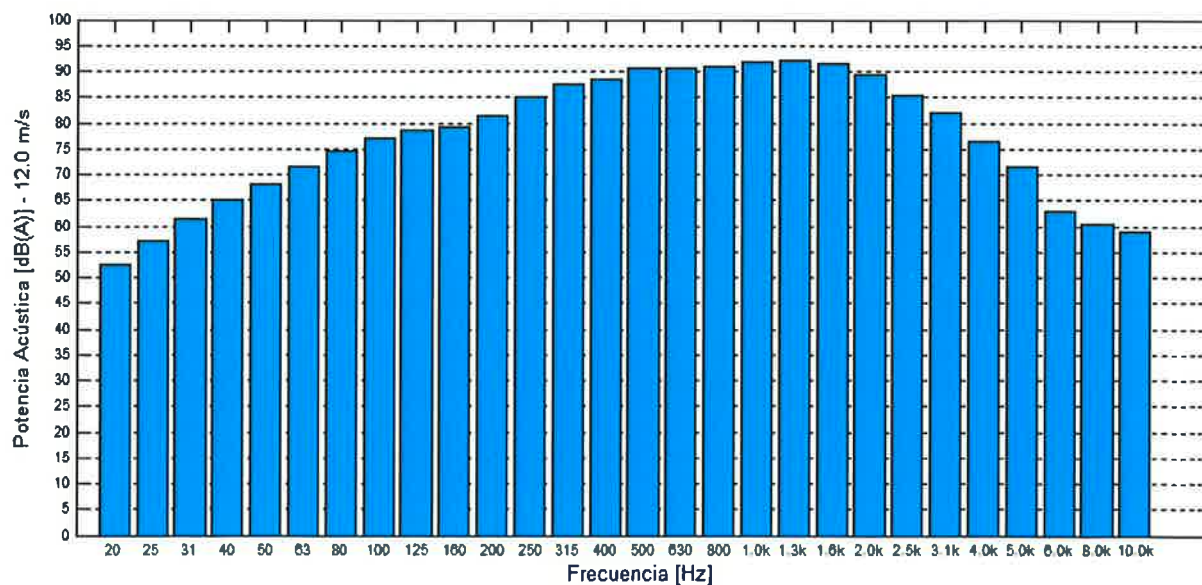
One-third octave band at 12.0m/s


Fig. 14. One-third octave band at 12.0m/s

DEWI SP- NORVENTO NED100 ED3.0

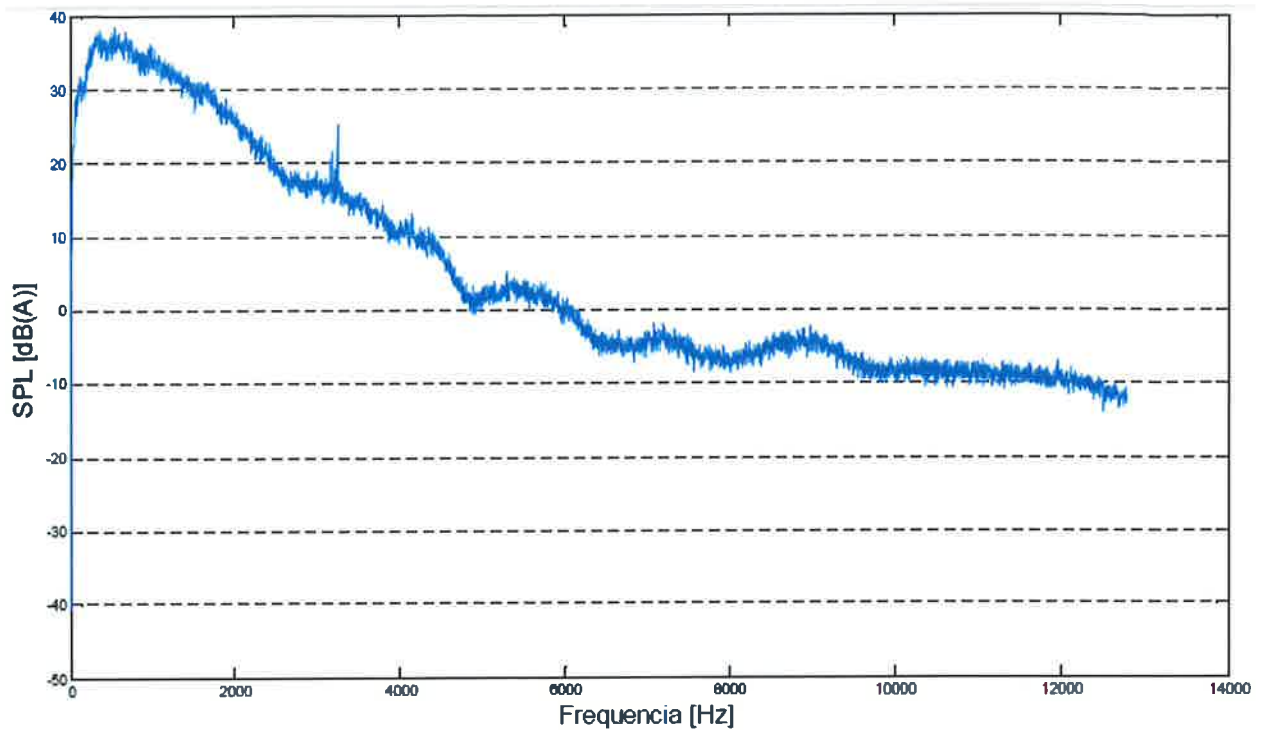


Fig. 23. Narrow band spectrum at 10.5m/s

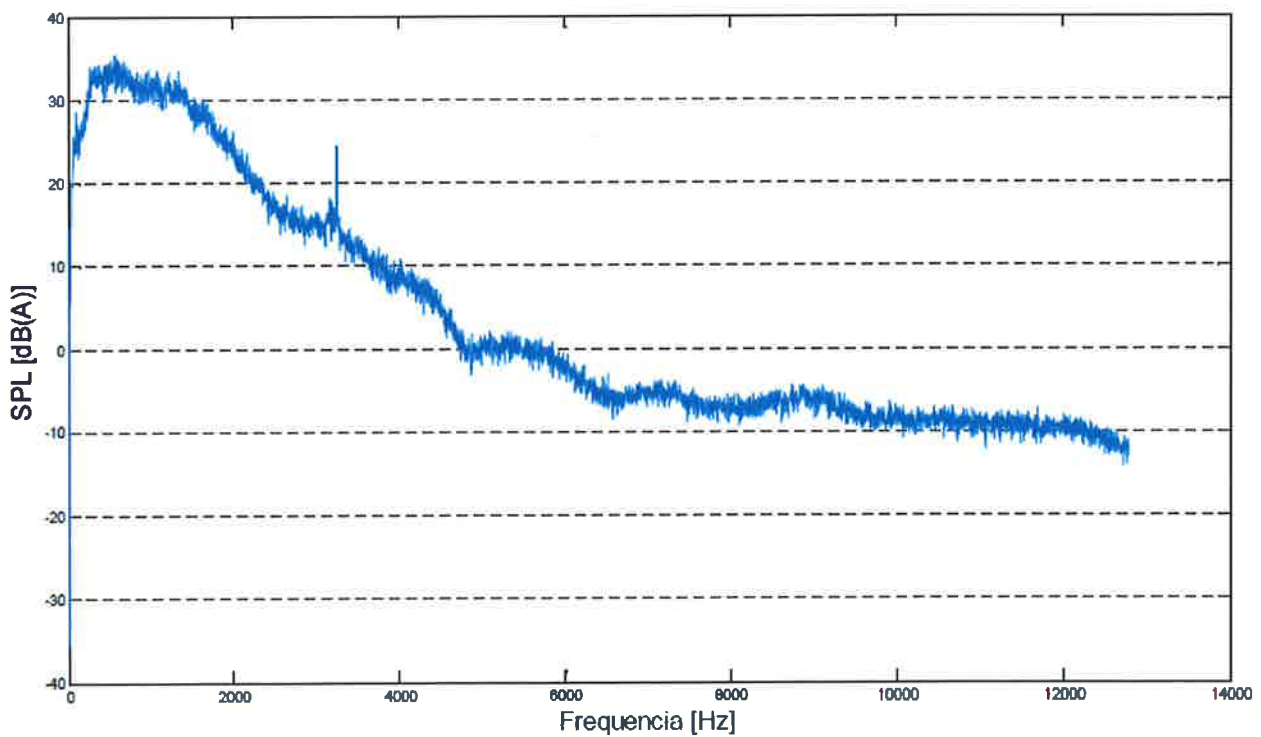


Fig. 24. Narrow band spectrum at 11.0m/s

DEWI SP- NORVENTO NED100 ED3.0

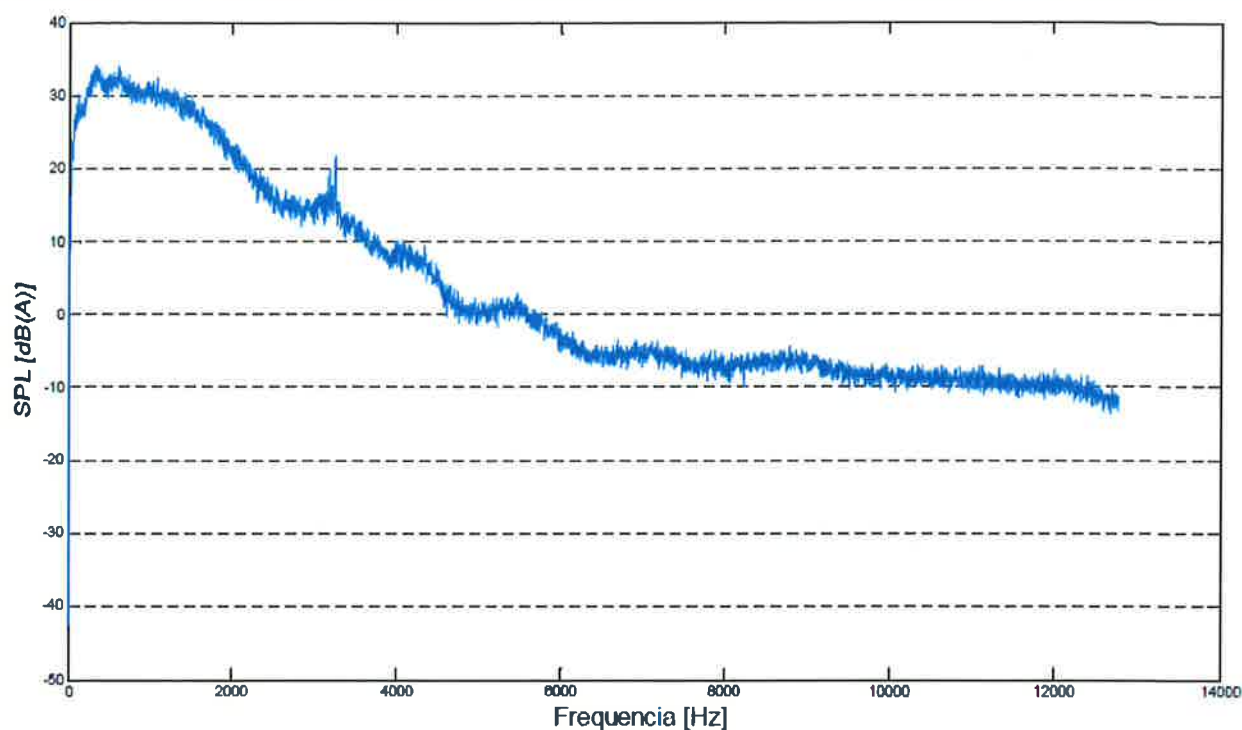


Fig. 25. Narrow band spectrum at 11.5m/s

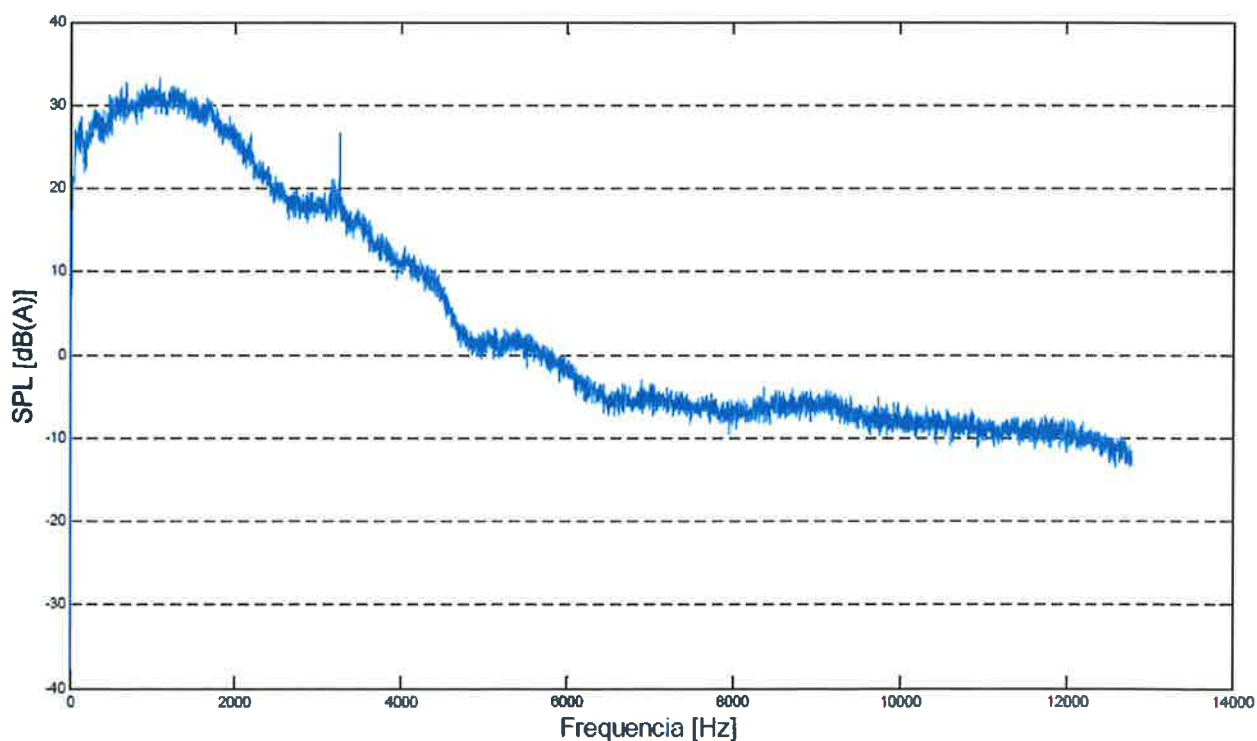


Fig. 26. Narrow band spectrum at 12.0m/s

DEWI SP- NORVENTO NED100 ED3.0

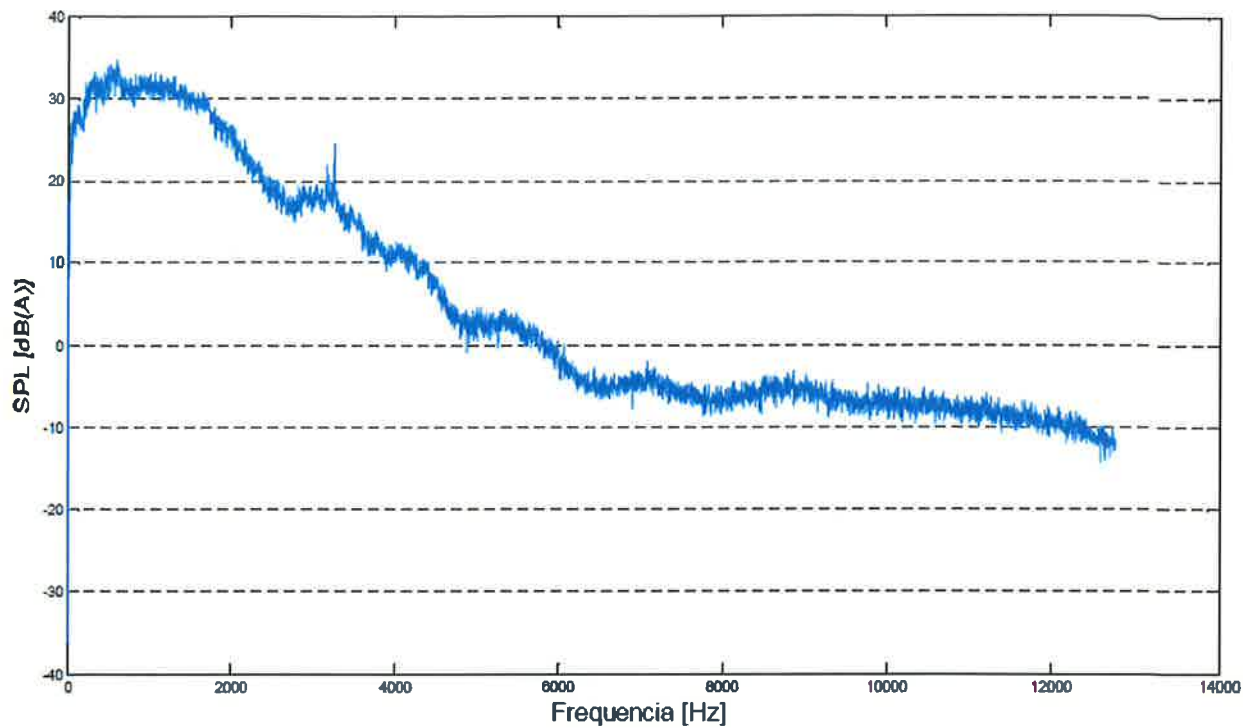


Fig. 27. Narrow band spectrum at 12.5m/s

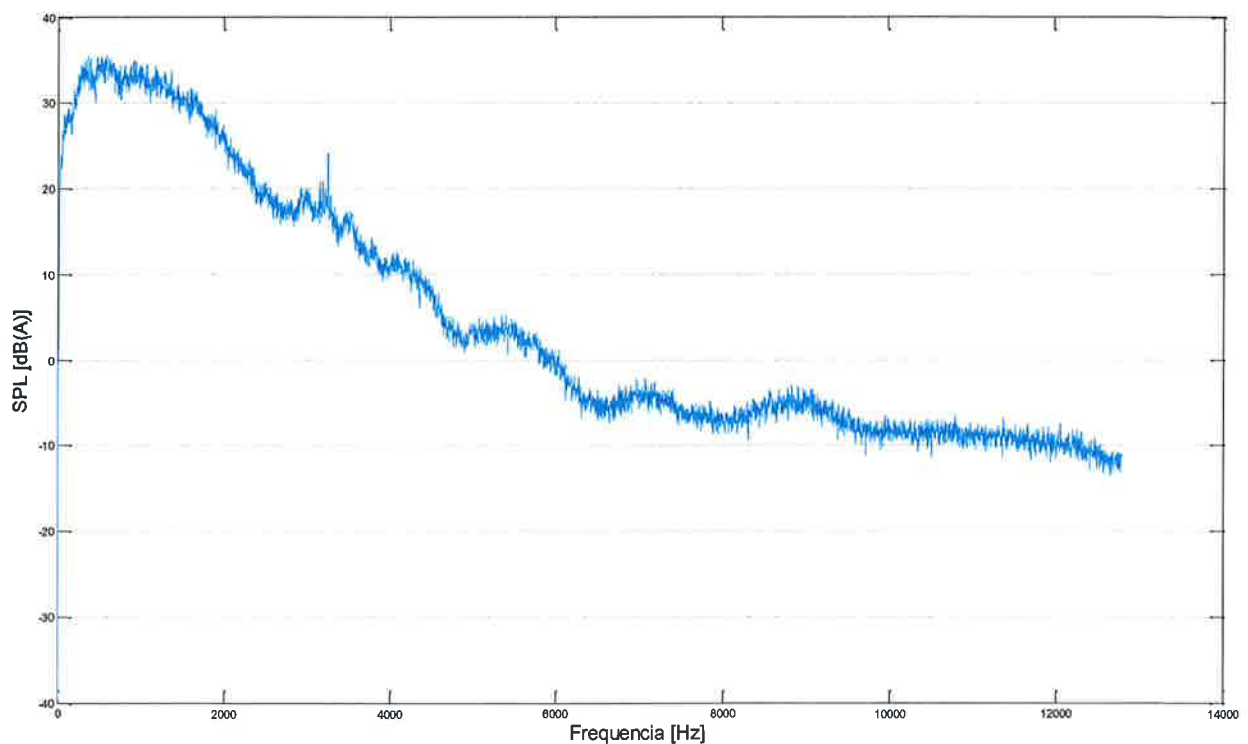


Fig. 28. Narrow band spectrum at 13.0m/s

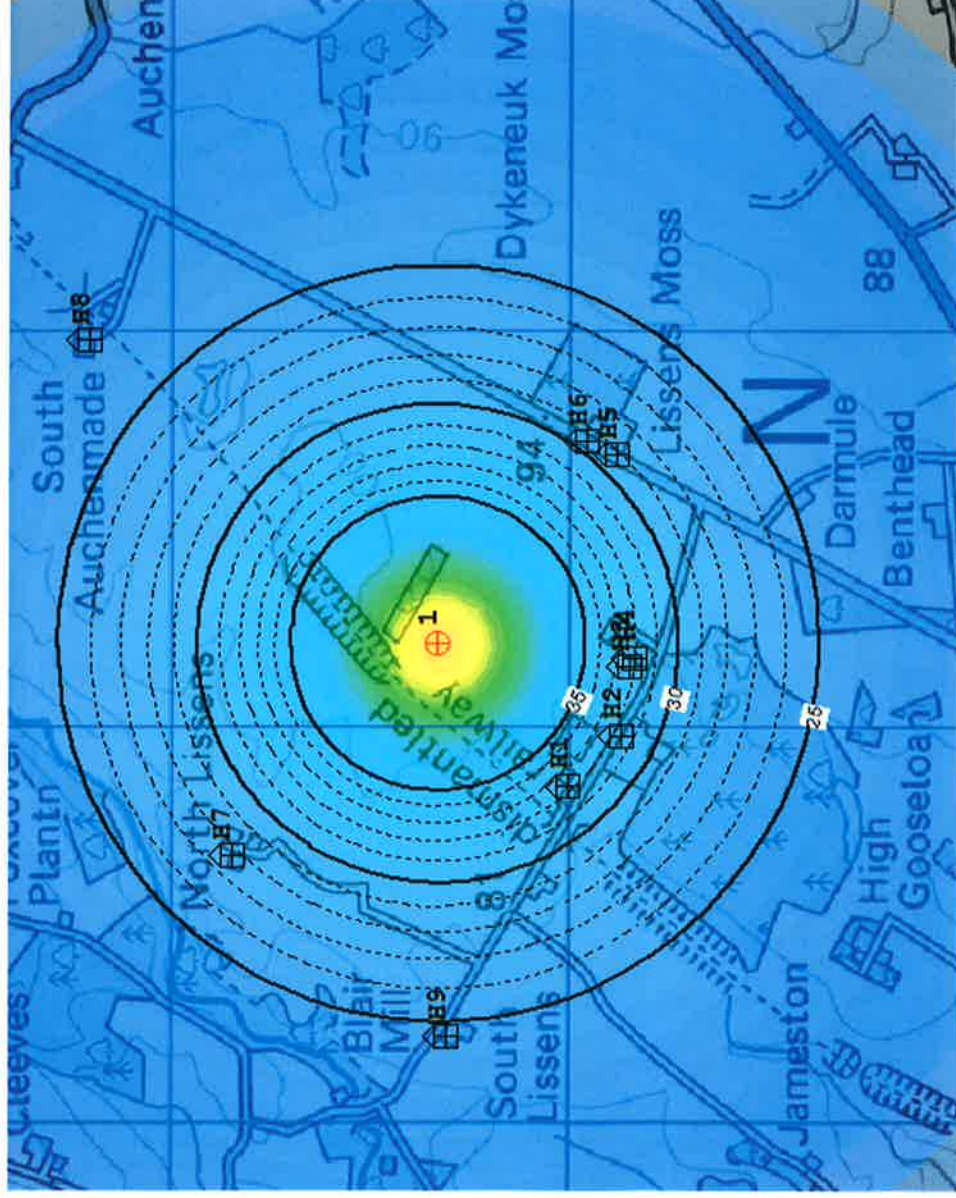
DEWI SP- NORVENTO NED100 ED3.0

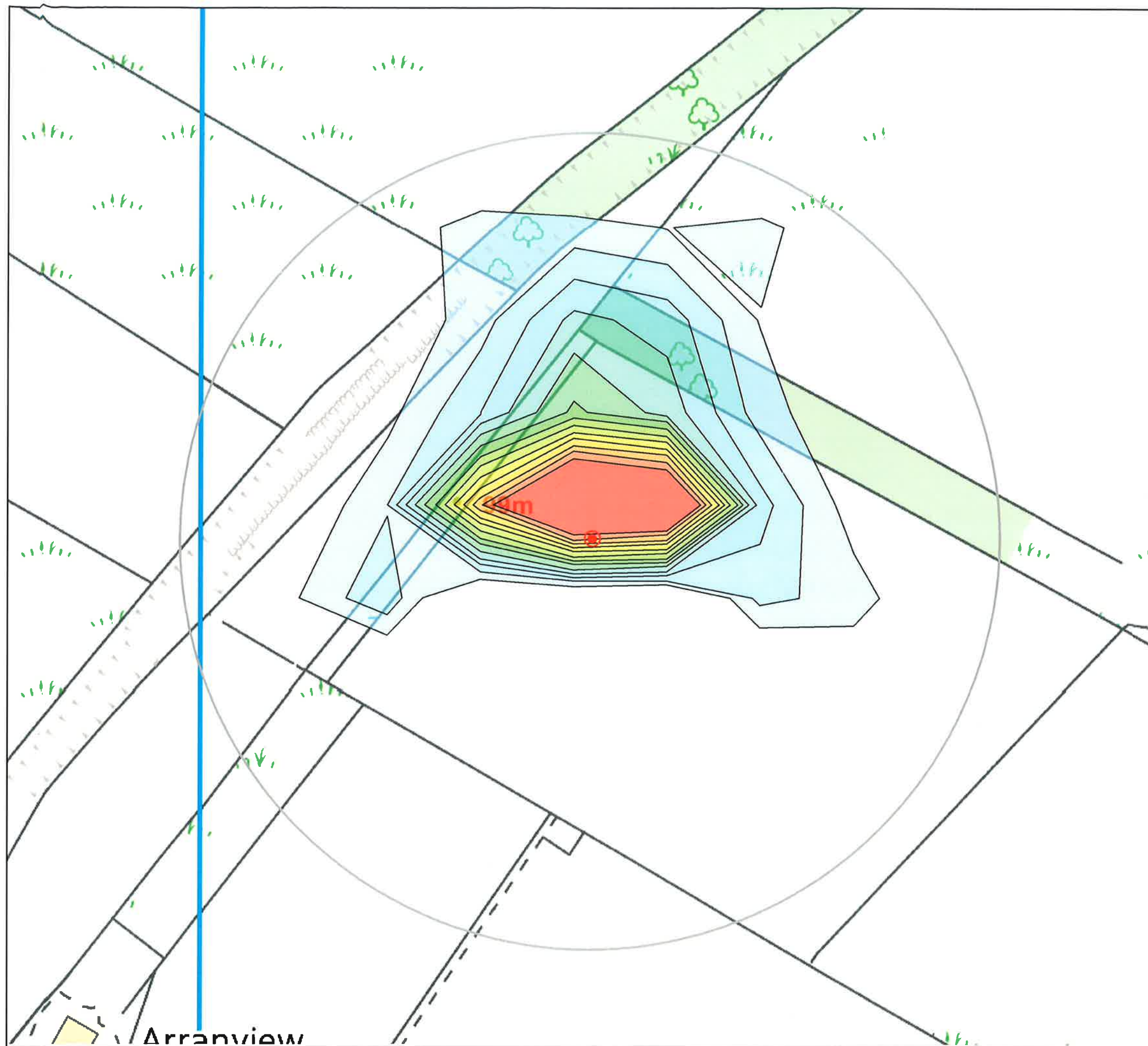
As a result of this analysis, tones have not been found during the wind turbine operation. The following table shows the summary of the tonal analysis.

Integer wind speed (m/s)	Vs	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0
Center frequency (Hz)	F	3228	3248	3248	3244	3246	3248	3250	3252	3250	3248	3250	3246
Tonal Audibility (dBA)	$\Delta L_{a,k}$	-7.9251	-7.2459	-6.5824	-8.2504	-9.2361	-9.2853	-9.1667	-10.5912	-11.7380	-10.9142	-10.7788	-13.3039
Comments		<-3	<-3	<-3	<-3	<-3	<-3	<-3	<-3	<-3	<-3	<-3	<-3

Table 4. Summary of tonal analysis results for standardized wind speed

Appendix 8.2 – noise contour map LAeq,t (dB) at 10m/s wind speed





Appendix 9.1: Shadow Flicker Analysis at Jameston Moss

Legend:

-  Proposed Turbine Location
E:233210 N:647332
-  10x Rotor Diameter (220m)

Annual Shadow Flicker Hours

Elevation

- 30
- 40
- 50
- 60
- 70
- 80
- 90
- 100
- 110
- 120
- 130
- 140
- 150

0 0.025 0.05 0.1 Kilometers

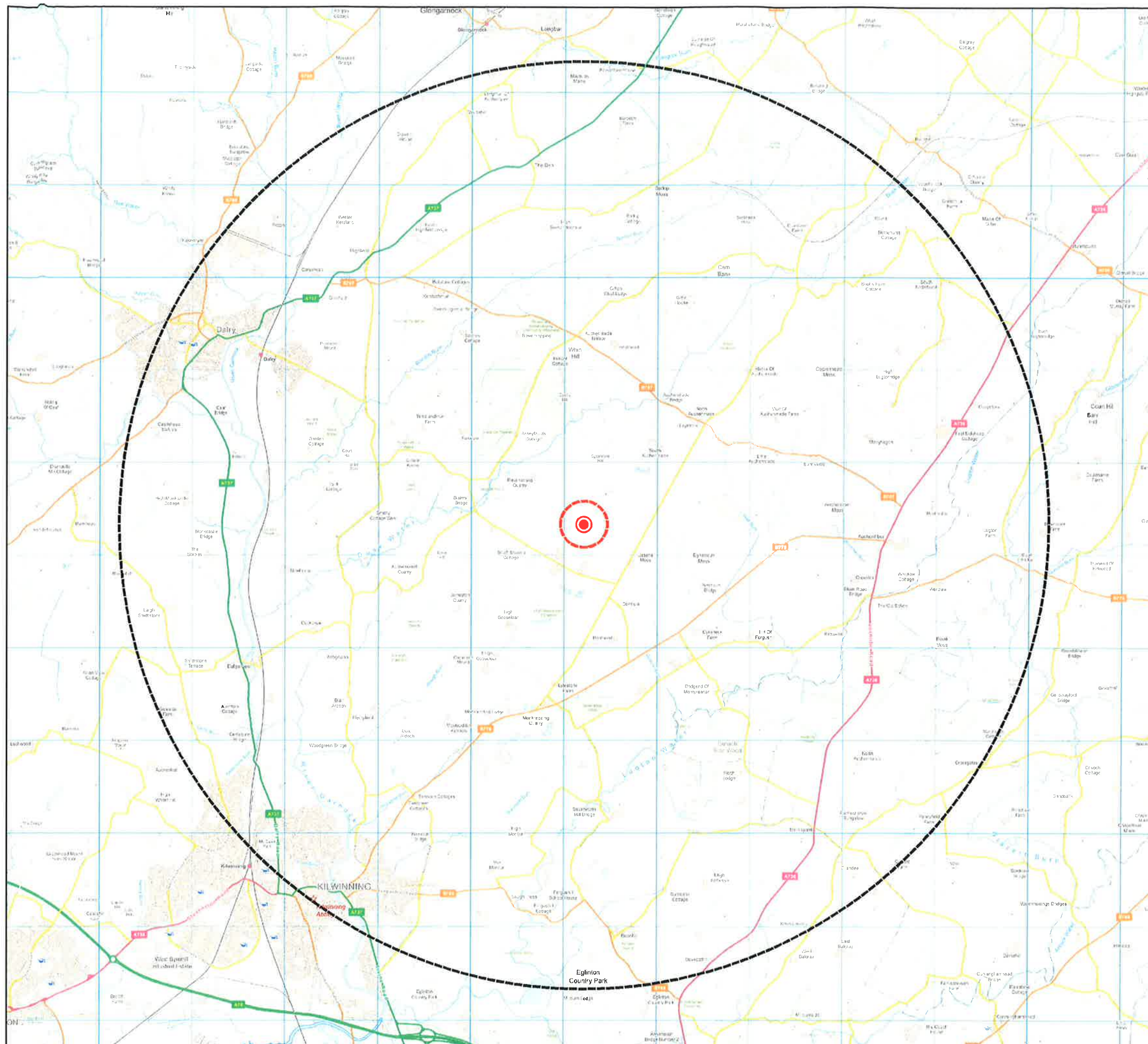
1:2,000

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Site Name: Jameston Moss
Client Name: Mr Miller
Site Reference: P07471
Drawing Reference: 07471/028/B
Date: 26/10/2016
User: CE





Appendix 10.1: Site and Buffers Location Map

Legend:

-  Proposed Turbine Location
E:233210 N:647332
-  5km Buffer
-  250m Buffer

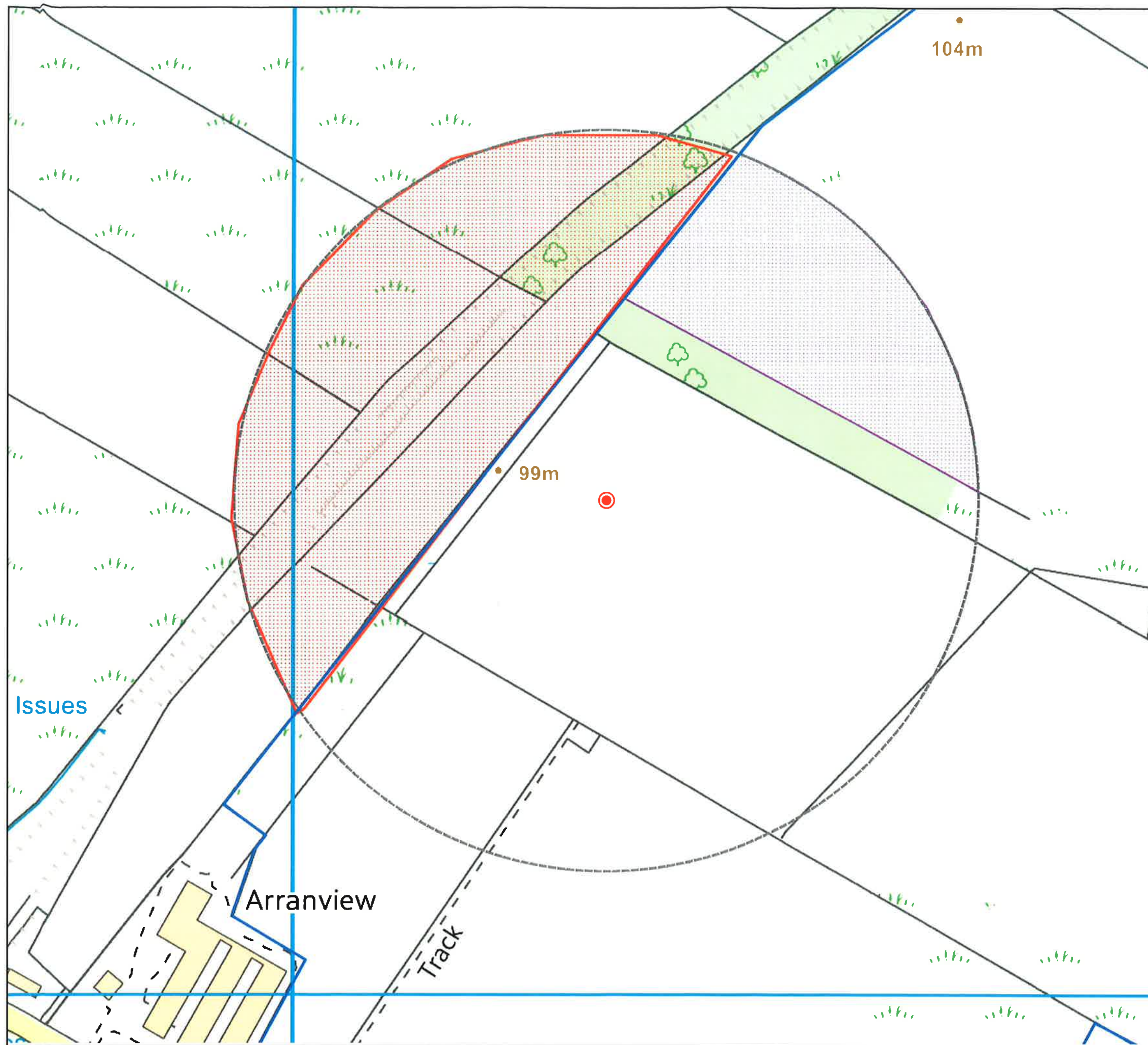
0 0.5 1 2 Kilometers

1:40,000

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Client Name: Mr Miller
Site Reference: 07471
Drawing Reference: 07471/024/b
Date: 04/11/2016
User: T.W



Appendix 10.2: Restricted Access Location Map

Legend:

-  Proposed Turbine Location
E:233210 N:647332
-  250m Buffer
-  Land Ownership Boundary
-  Access Denied
-  Cattle in Field

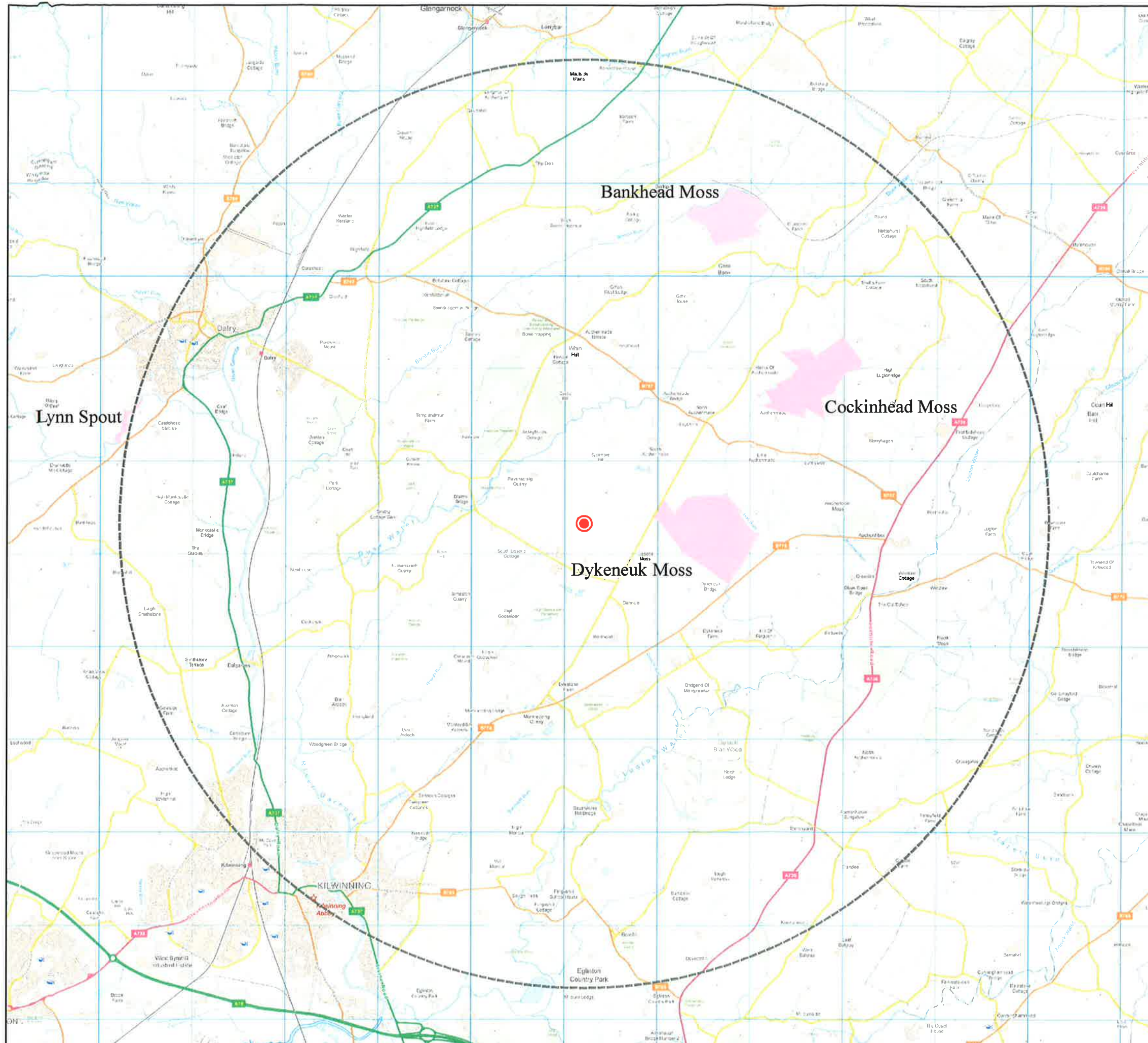
0 0.0325 0.065 0.13 Kilometers

1:2,500

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Client Name: Mr Miller
Site Reference: 07471
Drawing Reference: 07471/025/b
Date: 04/11/2016
User: T.W



Appendix 10.3: Ecological Sites within 5km

Legend:

-  Proposed Turbine Location
E:233210 N:647332
-  5km Buffer
-  SSSI

0 0.5 1 2 Kilometers

1:40,000

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Drawing Reference: 07471/026/b
Date: 04/11/2016
User: T.W



Appendix 10.4: Phase 1 Habitat Map

Legend:

-  Proposed Turbine Location
E:233210 N:647332
-  250m Buffer
-  Semi-improved Neutral Grassland
-  Improved Grassland
-  Marsh / Marshy Grassland
-  Broadleaved Plantation
-  Wet Modified Bog
-  Dry Ditch
-  Parkland / Scattered Trees
-  Fence
-  Defunct Hedge, Species Poor
-  Target Note

0 0.0325 0.065 0.13 Kilometers

1:2,500

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Client Name: Mr Miller
Site Reference: 07471
Drawing Reference: 07471/027/b
Date: 04/11/2016
User: T.W

Target Notes

TN	Species	Notes	Grid reference	X	Y
1	Hawthorn	Individual tree	NS 33214 47430	233214	647430
2	Hawthorn	Individual tree	NS 33209 47429	233209	647429
3	Birch	Individual tree	NS 33197 47411	233197	647411
4	Unknown	Individual tree	NS 33194 47408	233194	647408
5	Hawthorn	4 young grouped - <3m tall	NS 33188 47399	233188	647399
6	Unknown	Individual tree	NS 33168 47378	233168	647378
7	Hawthorn	End of linnear corridor	NS 33139 47342	233139	647342

Pictures from TN's 1-6







TN 7 Pictures





Indicative Plant List

Common Name	Latin name
Creeping thistle	<i>Cirsium arvense</i>
Meadow buttercup	<i>Ranunculus acris</i>
Dandelion	<i>Taraxacum officinale</i>
Dock	<i>Rumex sanguineas</i>
Nettle	<i>Urtica dioica</i>
Soft rush	<i>Juncus effuses</i>
Cuckoo flower	<i>Cardamine pratensis</i>
Silver birch	<i>Betula pendula</i>
Hawthorn	<i>Crataegus monogyna</i>
Cotton Grass	<i>Eriophorum angustifolium</i>
Heather	<i>Calluna vulgaris</i>

