

Noise Monitoring Field Data Sheet

Project Title	Craig Watch Wind Farm	Project Number	14138
Client	Craig Watch Wind Farm Limited	Surveyor	EW

MONITORING LOCATION

Location Name	NML05 - Rhinturk
Description	The noise monitoring equipment was installed to the south of the property due to the influence of large trees swaying in the wind to the north of the property. The noise monitoring equipment was installed on a small, concreted area for stability as the grassy area was quite undulating.
Approximate National Grid Reference	336625, 832908
Noise sources noted during installation, weekly inspection and removal	Birdsong and slight wind in the surrounding foliage were the only sources of noise noted.

NOISE MONITORING EQUIPMENT DETAILS

	Kit Number	Model	Serial Number	Last Calibrated/ Conformance Checked
Sound Level Meter	SLM047	NL-52	00386760	10/09/2020
Pre Amplifier	SLM047	NL-52	33387	10/09/2020
Microphone	SLM047	NL-52	317048	10/09/2020
Calibrator	CAL008	Rion NC-75	35002724	04/02/2021

NOISE MONITORING EQUIPMENT SETTINGS

	Network (A,B,Z)	Index and Time	Time Weighting (Slow, Fast)	Range (dB)	Audio
Parameters Recorded	A	LA9010min, LAeq10min	Fast	20-110	No

DATA

File Name	Start Time	End Time	Cal. at Start	Cal. at End	Drift	Observations
0501	14:20 18/03/21	1:30 25/03/21	94.0	93.9	-0.1	Installation <ul style="list-style-type: none"> - Birdsong - Wind in trees - Tractor in distance - Occasional car passing on road to south - Hens clucking Maintenance Visit <ul style="list-style-type: none"> - Faint noise from wind in trees - Sheep Bleating - Hens clucking
0502	12:10 15/04/21	12:24 04/05/21	94.0	93.9	-0.1	Maintenance Visit <ul style="list-style-type: none"> - Wind in trees dominant - Occasional sheep bleating - Some birdsong/hens crowing
0503	12:30 04/05/21	13:10 18/05/21	94.0	94.0	0.0	Decommissioning <ul style="list-style-type: none"> - Sheep bleating - Occasional car passing by on road to south - Very faint distant vegetation rustle - Hens clucking/crowing

PHOTOGRAPHS



NML05 - S



NML05 - E



NML05 - W

Annex 4 – Calibration/ Conformance Certificates for Sound Level Meters and Calibrator



CERTIFICATE OF CALIBRATION



Date of Issue: 04 February 2021

Certificate Number: UCRT21/1160

Calibrated at & Certificate issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages	
Approved Signatory	
K. Mistry	

Customer TNEI
7th Floor
West One
Forth Banks
Newcastle Upon Tyne
NE1 3PA

Order No. 1674

Test Procedure Procedure TP 1 Calibration of Sound Calibrators

Description Acoustic Calibrator

Identification	Manufacturer	Instrument	Model	Serial No.
	Rion	Calibrator	NC-75	35002724

The calibrator has been tested as specified in Annex B of IEC 60942:2003. As public evidence was available from a testing organisation (PTB) responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2003.

ANV Job No. UKAS21/02081

Date Received 03 February 2021

Date Calibrated 04 February 2021

Previous Certificate *Dated* Initial Calibration
Certificate No.
Laboratory

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION

Certificate Number

UCRT21/1160

UKAS Accredited Calibration Laboratory No. 0653

Page 2 of 2 Pages

Measurements

The sound pressure level generated by the calibrator in its WS2 configuration was measured five times by the Insert Voltage Method using a microphone as detailed below. The mean of the results obtained is shown below. It is corrected to the standard atmospheric pressure of 101.3 kPa (1013 mBar) using original manufacturers information.

Test Microphone	Manufacturer	Type
	Brüel & Kjær	4134

Results

The level of the calibrator output under the conditions outlined above was

93.98 ± 0.10 dB rel 20 µPa

Functional Tests and Observations

The frequency of the sound produced was	1000.00 Hz	±	0.13 Hz
The total distortion was	0.11 %	±	16.3 % of Reading

During the measurements environmental conditions were

Temperature	22	to	23 °C
Relative Humidity	39	to	46 %
Barometric Pressure	99.8	to	100.0 kPa

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

The uncertainties refer to the measured values only with no account being taken of the ability of the instrument to maintain its calibration.

A small correction factor may need to be applied to the sound pressure level quoted above if the device is used to calibrate a sound level meter which is fitted with a free-field response microphone. See manufacturers handbook for details.

..... END

Note:

Calibrator adjusted prior to calibration?	NO
Initial Level	N/A dB
Initial Frequency	N/A Hz

Additional Comments The results on this certificate only relate to the items calibrated as identified above.

None

Calibrated by: B. Giles

R 2



CERTIFICATE OF CALIBRATION

Date of Issue: 17 September 2020

Certificate Number: TCRT20/1547

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

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Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 3 Pages

Approved Signatory

K. Mistry

Customer TNEI Services Ltd
7th Floor
West One
Forth Banks
Newcastle upon Tyne
NE1 3PA

Order No. 5001

Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification	Manufacturer	Instrument	Type	Serial No. / Version
	Rion	Sound Level Meter	NL-32	00703291
	Rion	Firmware		1.400
	Rion	Pre Amplifier	NH-21	33382
	Rion	Microphone	UC-53A	317043
	Rion	Calibrator	NC-74	34536109
		Calibrator adaptor type if applicable		NC-74-002

Performance Class 1

Test Procedure TP 2.SLM 61672-3 TPS-49

Procedures from IEC 61672-3:2006 were used to perform the periodic test.

Type Approved to IEC 61672-1:2002 No **Approval Number**

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 16 September 2020

ANV Job No. TRAC20/09312

Date Calibrated 17 September 2020

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. However, no general statement or conclusion can be made about conformance of the sound level meter to the full requirements of IEC 61672-1:2002 because evidence was not publicly available, from an independent testing organisation responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002 and because the periodic tests of IEC 61672-3:2006 cover only a limited subset of the specifications in IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	15 April 2019	TCRT19/1307	ANV Measurement Systems

This certificate provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION



Certificate Number

TCRT20/1547

Page 2 of 3 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	NL-22 NL-32 Instruction Manual		
SLM instruction manual ref / issue	33625 09-06		
SLM instruction manual source	Manufacturer		
Internet download date if applicable	N/A		
Case corrections available	Yes		
Uncertainties of case corrections	No	See comment on page 3	
Source of case data	Manufacturer		
Wind screen corrections available	Yes		
Uncertainties of wind screen corrections	No	See comment on page 3	
Source of wind screen data	Manufacturer		
Mic pressure to free field corrections	Yes		
Uncertainties of Mic to F.F. corrections	No	See comment on page 3	
Source of Mic to F.F. corrections	Manufacturer		
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes		
Specified or equivalent Calibrator	Specified		
Customer or Lab Calibrator	Lab Calibrator		
Calibrator adaptor type if applicable	NC-74-002		
Calibrator cal. date	19 August 2020		
Calibrator cert. number	UCRT20/1789		
Calibrator cal cert issued by Lab.	ANV Measurement Systems		
Calibrator SPL @ STP	94.02	dB	Calibration reference sound pressure level
Calibrator frequency	1001.89	Hz	Calibration check frequency
Reference level range	30 - 120	dB	

Accessories used or corrected for during calibration - None
 Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	23.10	23.27	± 0.30 °C
Humidity	60.7	59.9	± 3.00 %RH
Ambient Pressure	101.99	101.99	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.2	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than	N/A	dB	A Weighting
Uncertainty of the microphone installed self generated noise ±	N/A	dB	

Microphone replaced with electrical input device -	UR = Under Range indicated					
Weighting	A		C		Z	
	12.7	dB UR	19.3	dB	24.5	dB
Uncertainty of the electrical self generated noise ±					0.12	dB

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with the Guide to the Expression of Uncertainty in Measurement published by the International Organisation for Standards (ISO).

Comments

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

CERTIFICATE OF CALIBRATION



Certificate Number

TCRT20/1547

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If any of the "Uncertainties of" are set to NO above, then the following applies.

No information on the uncertainty of measurement, required by 11.7 of IEC 61672-3:2006, of the adjustment data given in the instruction manual or obtained from the manufacturer or supplier of the sound level meter, or the manufacturer of the microphone, or the manufacturer of the multi-frequency sound calibrator, or the manufacturer of the electrostatic actuator was published in the instruction manual or made available by the manufacturer or supplier. The uncertainty of the measurement of the adjustment data has therefore been assumed to be numerically zero for the purpose of this periodic test. If these uncertainties are not actually zero, there is a possibility that the frequency response of the sound level meter may not conform to the requirements of IEC 61672-1:2002.

Calibrated by: B. Bogdan

R 3

..... END

Additional Comments

None



CERTIFICATE OF CALIBRATION

Date of Issue: 10 September 2020

Certificate Number: TCRT20/1518

Issued by:
 ANV Measurement Systems
 Beaufort Court
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 Web: www.noise-and-vibration.co.uk

Page 1 of 2 Pages
 Approved Signatory

K. Mistry

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Customer TNEI Services Ltd
 7th Floor
 West One
 Forth Banks
 Newcastle upon Tyne
 NE1 3PA

Order No. 5001
Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
Identification

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	00386758
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	76908
Rion	Microphone	UC-59	12755
Rion	Calibrator	NC-74	34536109
	Calibrator adaptor type if applicable		NC-74-002

Performance Class 1
Test Procedure TP 2.SLM 61672-3 TPS-49

Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002 YES Approval Number 21.21 / 13.02

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 09 September 2020 ANV Job No. TRAC20/09299
Date Calibrated 10 September 2020

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	03 June 2019	TCRT19/1436	ANV Measurement Systems

This certificate provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION



Certificate Number

TCRT20/1518

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source	Manufacturer	
Internet download date if applicable		N/A
Case corrections available	Yes	
Uncertainties of case corrections	Yes	
Source of case data	Manufacturer	
Wind screen corrections available	Yes	
Uncertainties of wind screen corrections	Yes	
Source of wind screen data	Manufacturer	
Mic pressure to free field corrections	Yes	
Uncertainties of Mic to F.F. corrections	Yes	
Source of Mic to F.F. corrections	Manufacturer	
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator	Specified	
Customer or Lab Calibrator	Lab Calibrator	
Calibrator adaptor type if applicable	NC-74-002	
Calibrator cal. date	19 August 2020	
Calibrator cert. number	UCRT20/1789	
Calibrator cal cert issued by	ANV Measurement Systems	
Calibrator SPL @ STP	94.02	dB Calibration reference sound pressure level
Calibrator frequency	1001.89	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - None
 Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	22.66	22.68	± 0.30 °C
Humidity	43.9	42.4	± 3.00 %RH
Ambient Pressure	101.13	101.10	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.			
Initial indicated level	94.1	dB	Adjusted indicated level 94.0 dB
The uncertainty of the associated calibrator supplied with the sound level meter ±		0.10	dB

Self Generated Noise	This test is currently not performed by this Lab.		
Microphone installed (if requested by customer) = Less Than	N/A	dB	A Weighting
Uncertainty of the microphone installed self generated noise ±	N/A	dB	

Microphone replaced with electrical input device -	UR = Under Range indicated		
Weighting	A	C	Z
	10.8 dB UR	15.4 dB UR	21.1 dB UR
Uncertainty of the electrical self generated noise ±	0.12 dB		

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with the Guide to the Expression of Uncertainty in Measurement published by ISO.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: C. Hirlav

R 2

Additional Comments

None



CERTIFICATE OF CALIBRATION

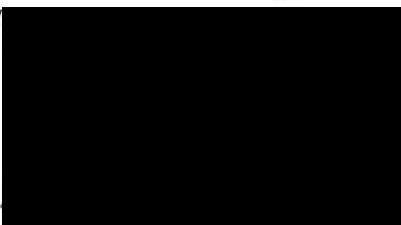
Date of Issue: 10 September 2020

Certificate Number: TCRT20/1516

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Page 1 of 2 Pages

Approved Signatory



K. Mistry

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Customer TNEI Services Ltd
 7th Floor
 West One
 Forth Banks
 Newcastle upon Tyne
 NE1 3PA

Order No. 5001
Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
Identification

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	00386759
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	76909
Rion	Microphone	UC-59	12756
Rion	Calibrator	NC-74	34536109
	Calibrator adaptor type if applicable		NC-74-002

Performance Class 1
Test Procedure TP 2.SLM 61672-3 TPS-49
Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002 YES **Approval Number** 21.21 / 13.02
If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 09 September 2020 **ANV Job No.** TRAC20/09299
Date Calibrated 10 September 2020

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	03 June 2019	TCRT19/1439	ANV Measurement Systems

This certificate provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION



Certificate Number

TCRT20/1516

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Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source	Manufacturer	
Internet download date if applicable		N/A
Case corrections available	Yes	
Uncertainties of case corrections	Yes	
Source of case data	Manufacturer	
Wind screen corrections available	Yes	
Uncertainties of wind screen corrections	Yes	
Source of wind screen data	Manufacturer	
Mic pressure to free field corrections	Yes	
Uncertainties of Mic to F.F. corrections	Yes	
Source of Mic to F.F. corrections	Manufacturer	
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator	Specified	
Customer or Lab Calibrator	Lab Calibrator	
Calibrator adaptor type if applicable	NC-74-002	
Calibrator cal. date	19 August 2020	
Calibrator cert. number	UCRT20/1789	
Calibrator cal cert issued by	ANV Measurement Systems	
Calibrator SPL @ STP	94.02	dB Calibration reference sound pressure level
Calibrator frequency	1001.89	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - None
 Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	22.74	22.74	± 0.30 °C
Humidity	50.1	49.8	± 3.00 %RH
Ambient Pressure	101.30	101.26	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.2	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than	N/A	dB	A Weighting
Uncertainty of the microphone installed self generated noise ±	N/A	dB	

Microphone replaced with electrical input device -	UR = Under Range indicated					
Weighting	A		C		Z	
	13.5	dB UR	17.3	dB UR	22.5	dB UR
Uncertainty of the electrical self generated noise ±			0.12		dB	

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with the Guide to the Expression of Uncertainty in Measurement published by ISO.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

..... END

Calibrated by: C. Hirlav

R 2

Additional Comments

None



CERTIFICATE OF CALIBRATION

Date of Issue: 10 September 2020

Certificate Number: TCRT20/1515

Issued by:
 ANV Measurement Systems
 Beaufort Court
 17 Roebuck Way
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Page 1 of 2 Pages
 Approved Signatory

K. Mistry

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Customer TNEI Services Ltd
 7th Floor
 West One
 Forth Banks
 Newcastle upon Tyne
 NE1 3PA

Order No. 5001
Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
Identification

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	00386760
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	76910
Rion	Microphone	UC-59	12778
Rion	Calibrator	NC-74	34536109
	Calibrator adaptor type if applicable		NC-74-002

Performance Class 1
Test Procedure TP 2.SLM 61672-3 TPS-49
Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002 YES **Approval Number** 21.21 / 13.02
If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 09 September 2020 **ANV Job No.** TRAC20/09299
Date Calibrated 10 September 2020

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	03 June 2019	TCRT19/1437	ANV Measurement Systems

This certificate provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION



Certificate Number

TCRT20/1515

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source	Manufacturer	
Internet download date if applicable		N/A
Case corrections available	Yes	
Uncertainties of case corrections	Yes	
Source of case data	Manufacturer	
Wind screen corrections available	Yes	
Uncertainties of wind screen corrections	Yes	
Source of wind screen data	Manufacturer	
Mic pressure to free field corrections	Yes	
Uncertainties of Mic to F.F. corrections	Yes	
Source of Mic to F.F. corrections	Manufacturer	
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator	Specified	
Customer or Lab Calibrator	Lab Calibrator	
Calibrator adaptor type if applicable	NC-74-002	
Calibrator cal. date	19 August 2020	
Calibrator cert. number	UCRT20/1789	
Calibrator cal cert issued by	ANV Measurement Systems	
Calibrator SPL @ STP	94.02	dB Calibration reference sound pressure level
Calibrator frequency	1001.89	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - None
 Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	22.72	22.70	± 0.30 °C
Humidity	56.0	54.7	± 3.00 %RH
Ambient Pressure	101.46	101.43	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	94.1	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±			0.10 dB		

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than	N/A	dB	A Weighting
Uncertainty of the microphone installed self generated noise ±	N/A	dB	

Microphone replaced with electrical input device -	UR = Under Range indicated					
Weighting	A		C		Z	
	10.8	dB UR	15.5	dB UR	21.4	dB UR
Uncertainty of the electrical self generated noise ±			0.12		dB	

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with the Guide to the Expression of Uncertainty in Measurement published by ISO.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: C. Hirlav

Additional Comments

None

R 2



CERTIFICATE OF CALIBRATION

Date of Issue: 10 September 2020

Certificate Number: TCRT20/1512

Issued by:
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 Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages
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K. Mistry

Customer TNEI Services Ltd
 7th Floor
 West One
 Forth Banks
 Newcastle upon Tyne
 NE1 3PA

Order No. 5001
Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
Identification

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	00386761
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	76911
Rion	Microphone	UC-59	12788
Rion	Calibrator	NC-74	34536109
	Calibrator adaptor type if applicable		NC-74-002

Performance Class 1
Test Procedure TP 2.SLM 61672-3 TPS-49
Procedures from IEC 61672-3:2006 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2002 YES **Approval Number** 21.21 / 13.02
If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003

Date Received 09 September 2020 **ANV Job No.** TRAC20/09299
Date Calibrated 10 September 2020

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

Previous Certificate	Dated	Certificate No.	Laboratory
	03 June 2019	TCRT19/1440	ANV Measurement Systems

This certificate provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION



Certificate Number

TCRT20/1512

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source	Manufacturer	
Internet download date if applicable		N/A
Case corrections available	Yes	
Uncertainties of case corrections	Yes	
Source of case data	Manufacturer	
Wind screen corrections available	Yes	
Uncertainties of wind screen corrections	Yes	
Source of wind screen data	Manufacturer	
Mic pressure to free field corrections	Yes	
Uncertainties of Mic to F.F. corrections	Yes	
Source of Mic to F.F. corrections	Manufacturer	
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator	Specified	
Customer or Lab Calibrator	Lab Calibrator	
Calibrator adaptor type if applicable	NC-74-002	
Calibrator cal. date	19 August 2020	
Calibrator cert. number	UCRT20/1789	
Calibrator cal cert issued by	ANV Measurement Systems	
Calibrator SPL @ STP	94.02	dB Calibration reference sound pressure level
Calibrator frequency	1001.89	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - None
 Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	22.28	22.44	± 0.30 °C
Humidity	56.1	56.1	± 3.00 %RH
Ambient Pressure	101.47	101.46	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.			
Initial indicated level	93.9	dB	Adjusted indicated level
			94.0 dB
The uncertainty of the associated calibrator supplied with the sound level meter ±			0.10 dB

Self Generated Noise This test is currently not performed by this Lab.
 Microphone installed (if requested by customer) = Less Than N/A dB A Weighting
 Uncertainty of the microphone installed self generated noise ± N/A dB

Microphone replaced with electrical input device -	UR = Under Range indicated							
Weighting	A			C			Z	
	11.6	dB	UR	16.2	dB	UR	21.8	dB
Uncertainty of the electrical self generated noise ±							0.12	dB

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with the Guide to the Expression of Uncertainty in Measurement published by ISO.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: C. Hirlav

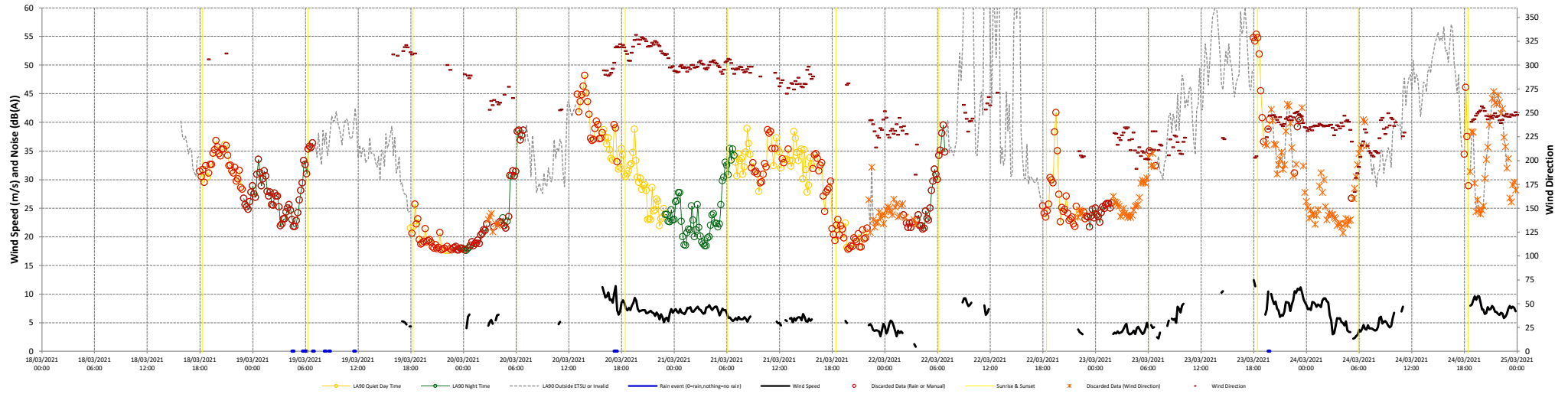
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Additional Comments

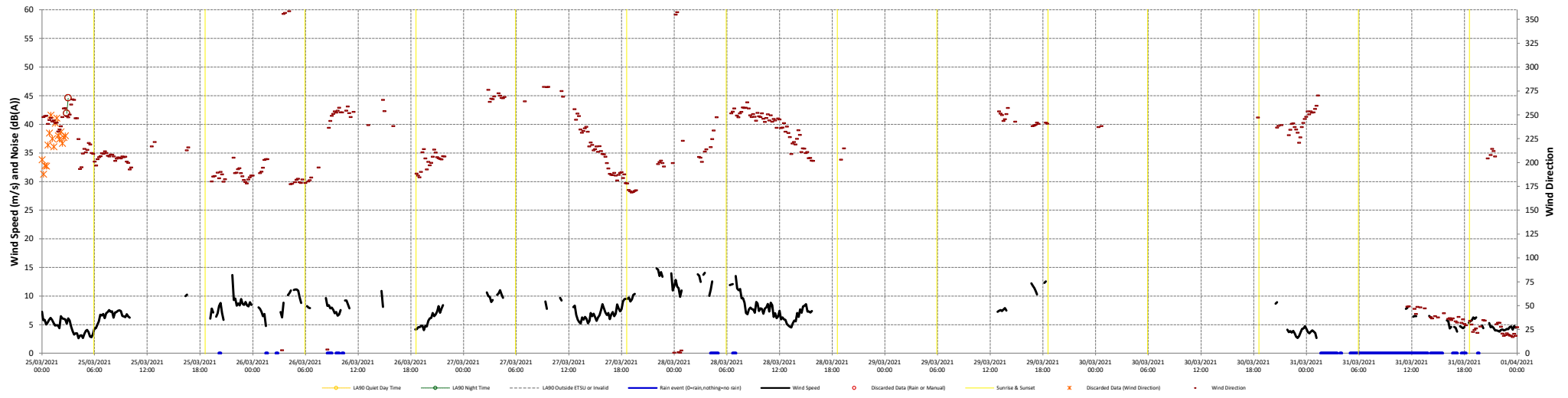
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Annex 5 – Time Series Graphs

18/03/2021 to 25/03/2021



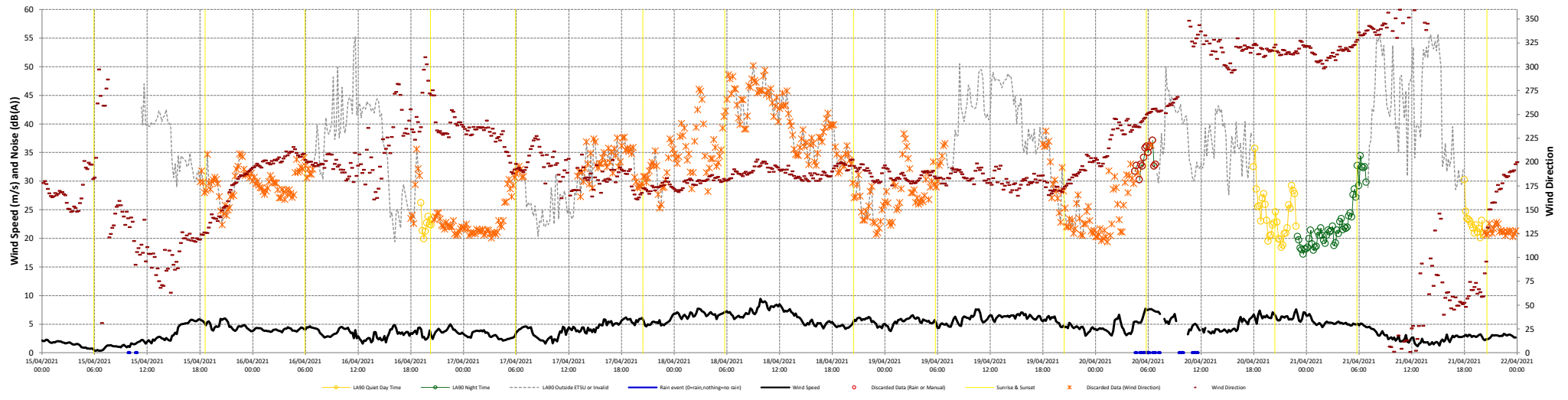
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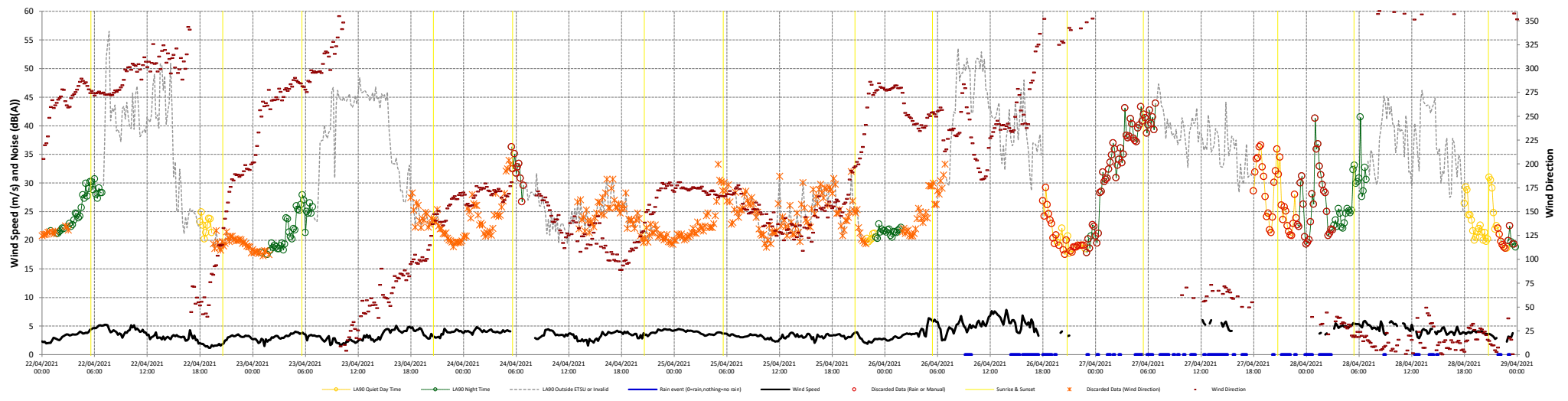
Project Craig Watch Wind Farm
 Client Craig Watch Wind Farm Limited
 Title Time Series for Tighnaid Page 1 of 4
 Date 21/06/2021



15/04/2021 to 22/04/2021



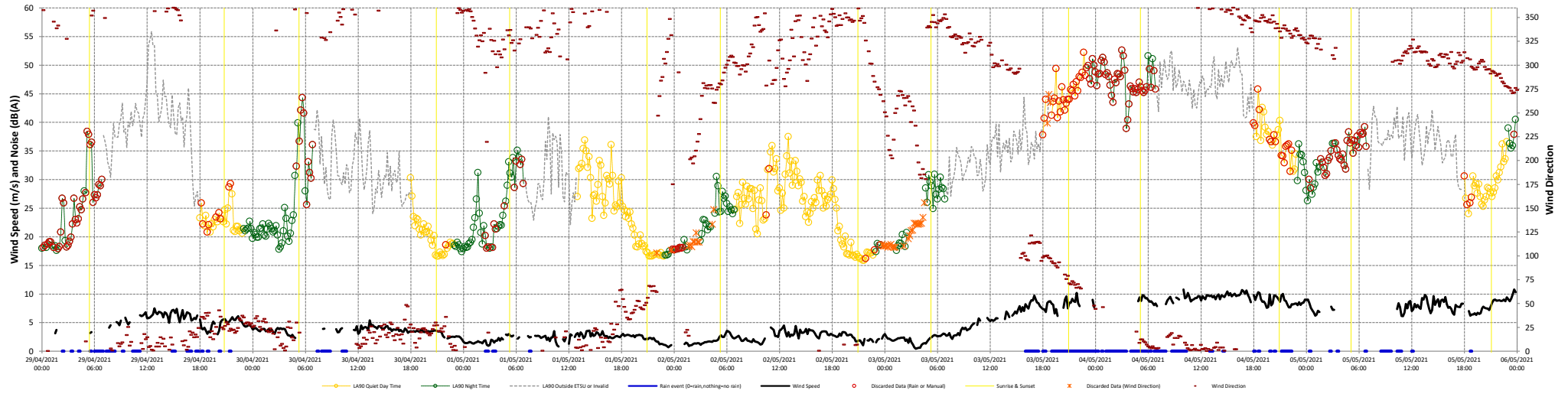
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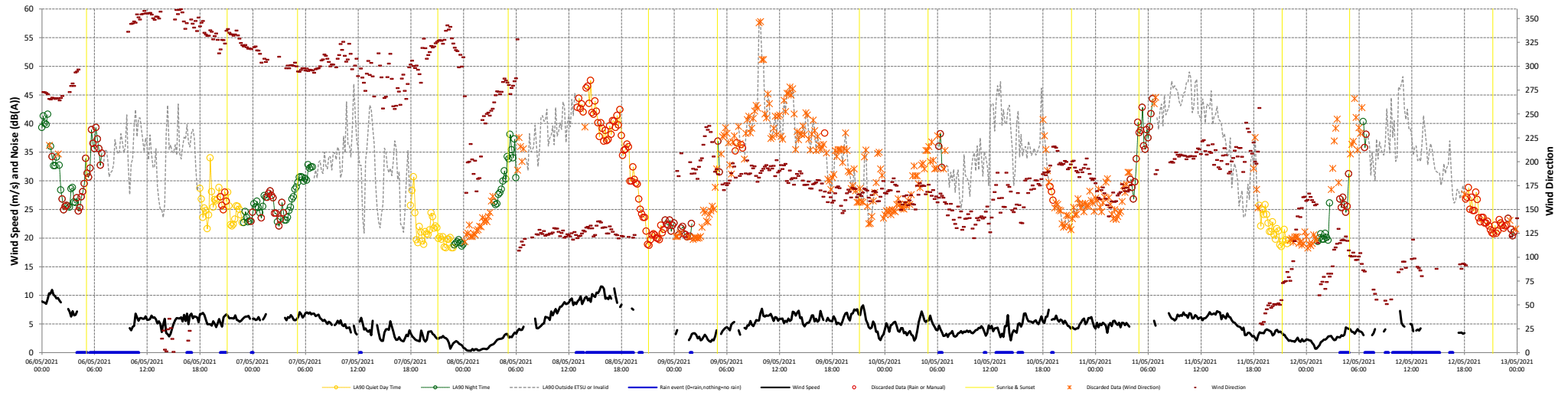
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 Client Craig Watch Wind Farm Limited
 Title Time Series for Tighnaid Page 2 of 4
 Date 21/06/2021



29/04/2021 to 06/05/2021



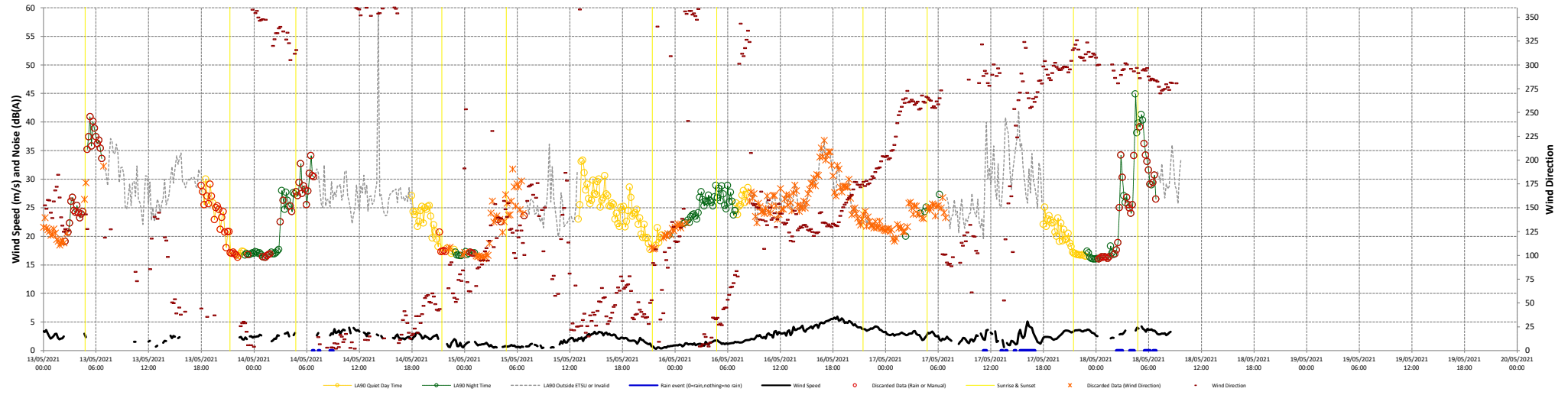
06/05/2021 to 13/05/2021



Project Craig Watch Wind Farm
 Client Craig Watch Wind Farm Limited
 Title Time Series for Tighnaird Page 3 of 4
 Date 21/06/2021



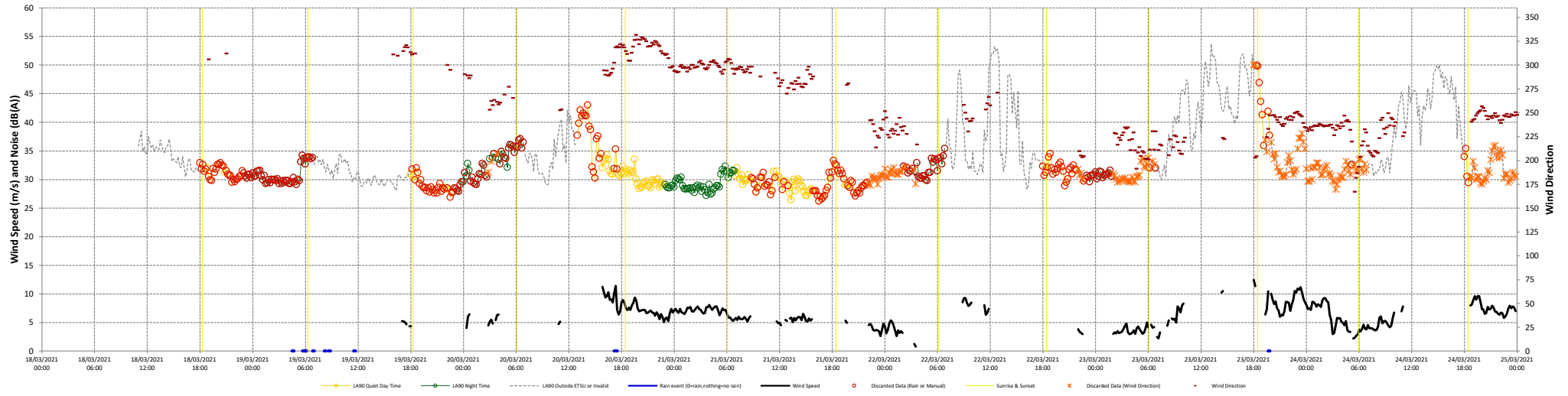
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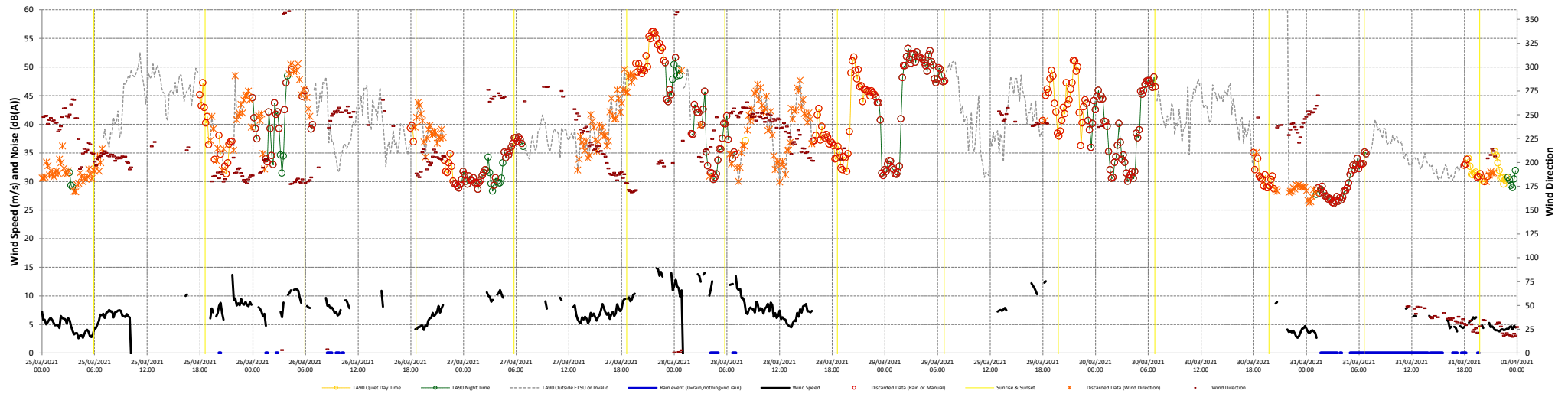
Project Craig Watch Wind Farm
 Client Craig Watch Wind Farm Limited
 Title Time Series for Tighnaid Page 4 of 4
 Date 21/06/2021



18/03/2021 to 25/03/2021



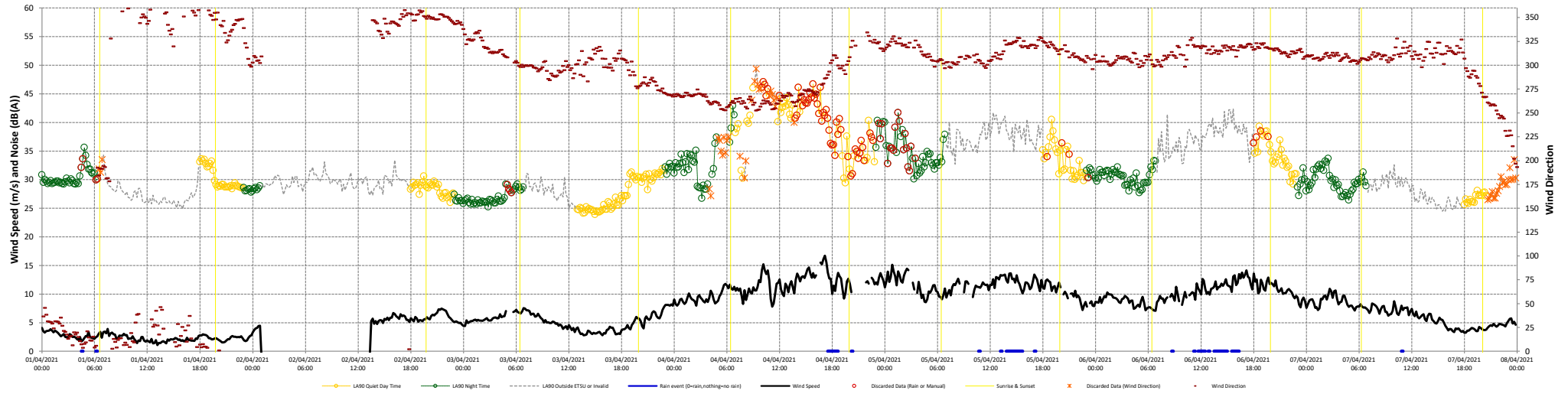
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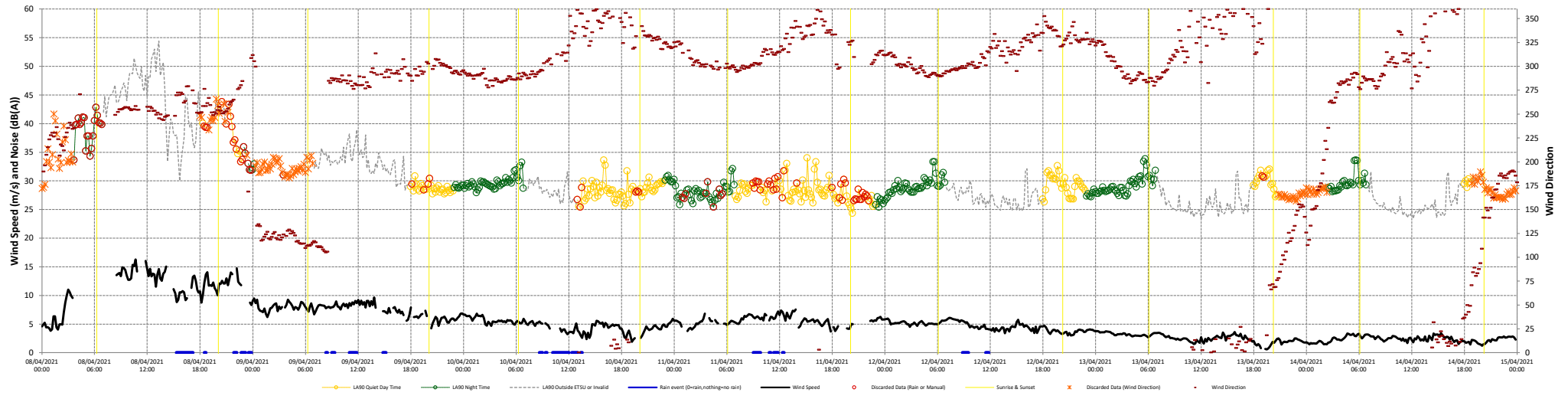
Project Craig Watch Wind Farm
 Client Craig Watch Wind Farm Limited
 Title Time Series for Lynebain Page 1 of 5
 Date 21/06/2021



01/04/2021 to 08/04/2021



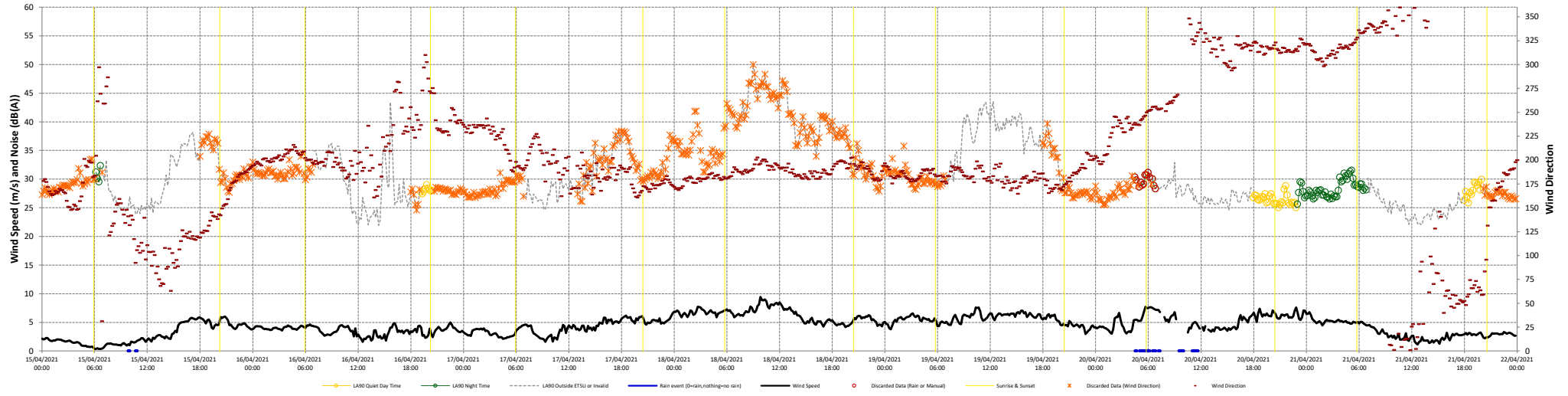
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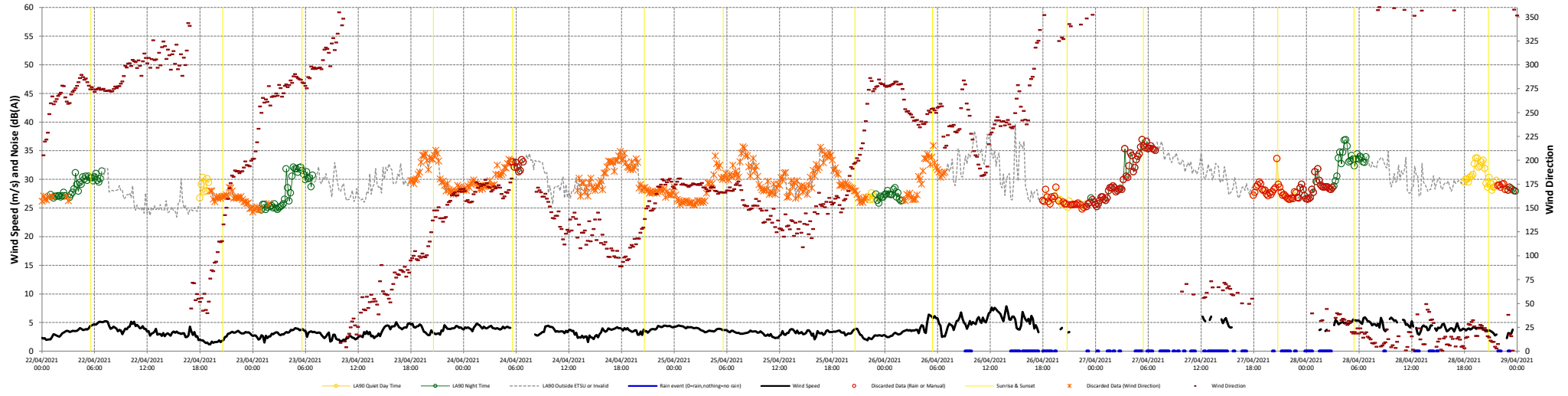
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 Client Craig Watch Wind Farm Limited
 Title Time Series for Lynebain Page 2 of 5
 Date 21/06/2021



15/04/2021 to 22/04/2021



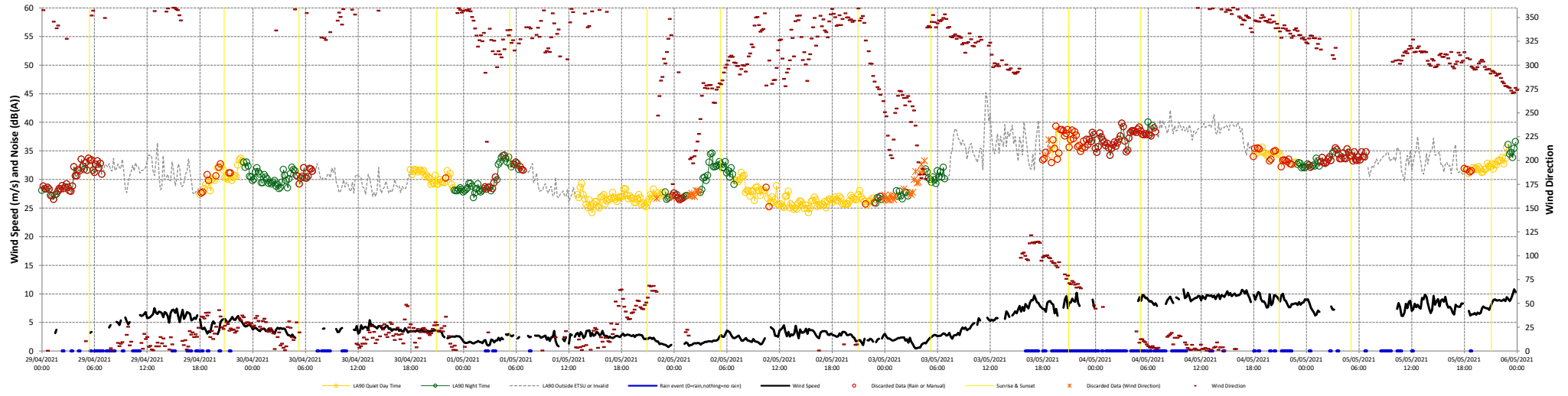
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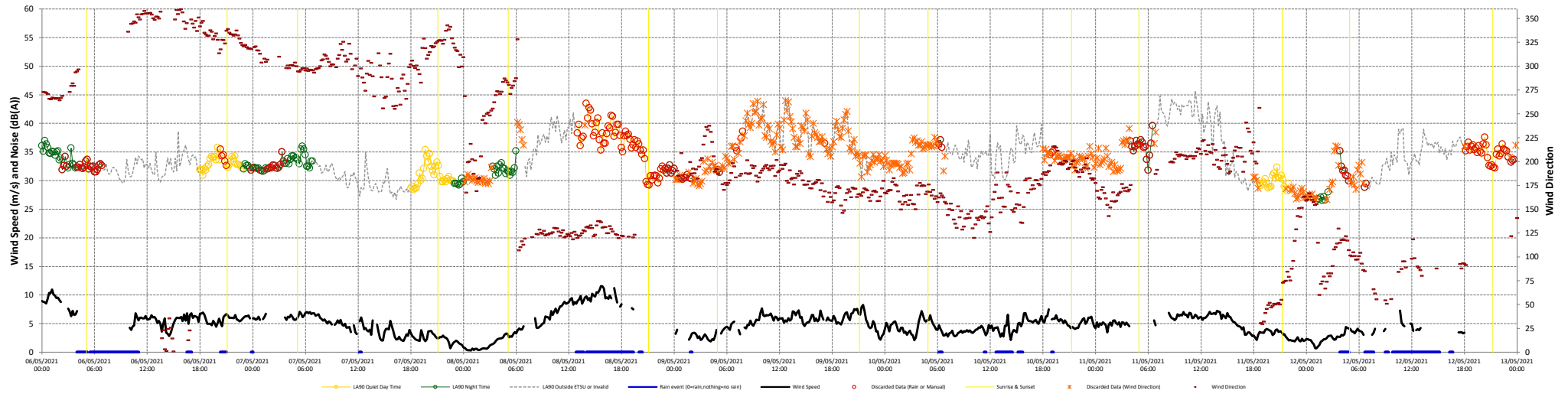
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 Client Craig Watch Wind Farm Limited
 Title Time Series for Lynebain Page 3 of 5
 Date 21/06/2021



29/04/2021 to 06/05/2021



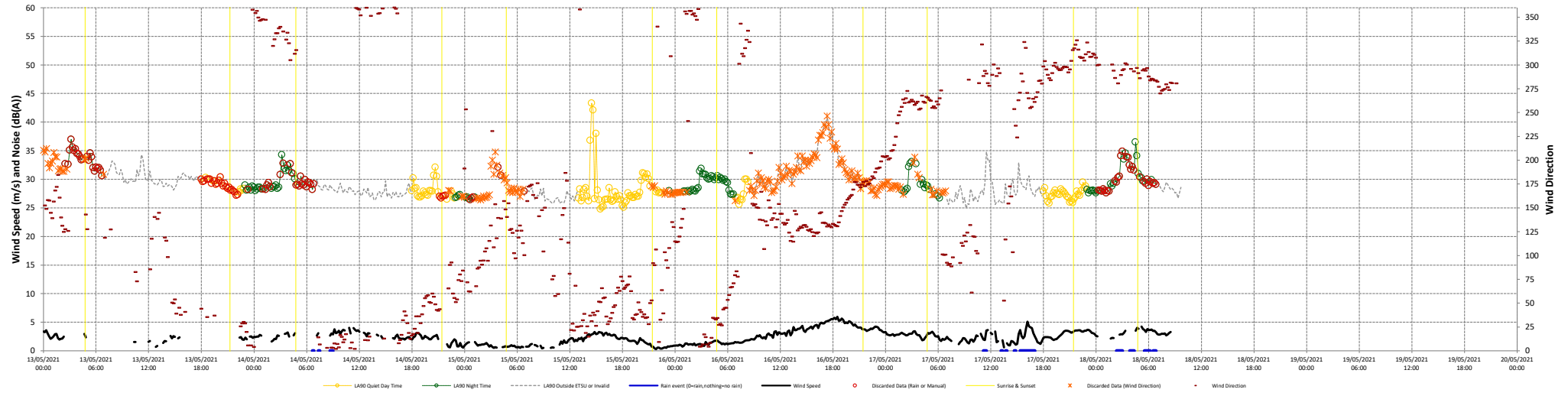
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 Client Craig Watch Wind Farm Limited
 Title Time Series for Lynebain Page 4 of 5
 Date 21/06/2021



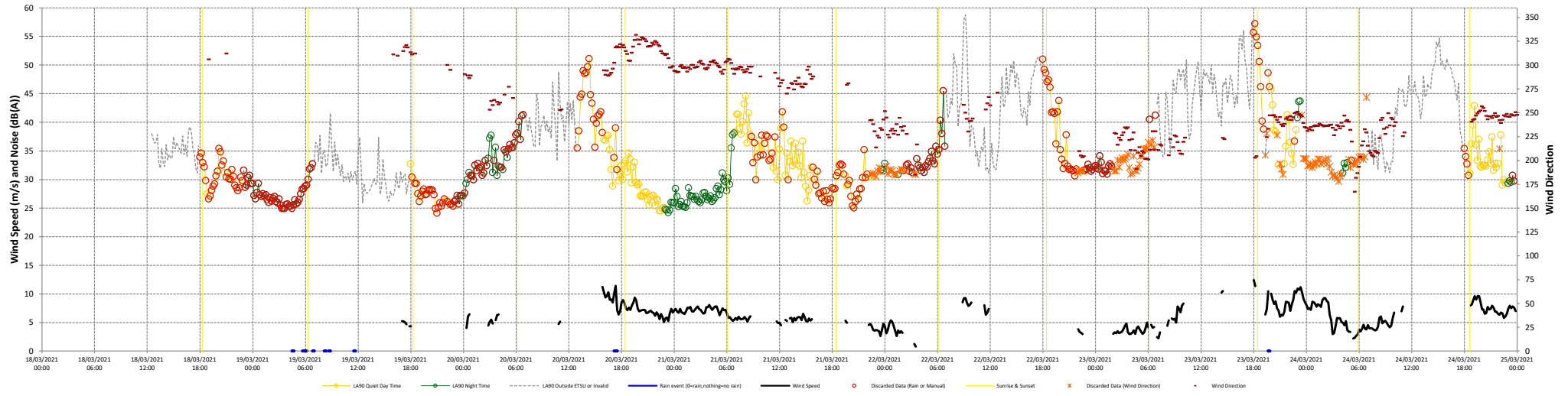
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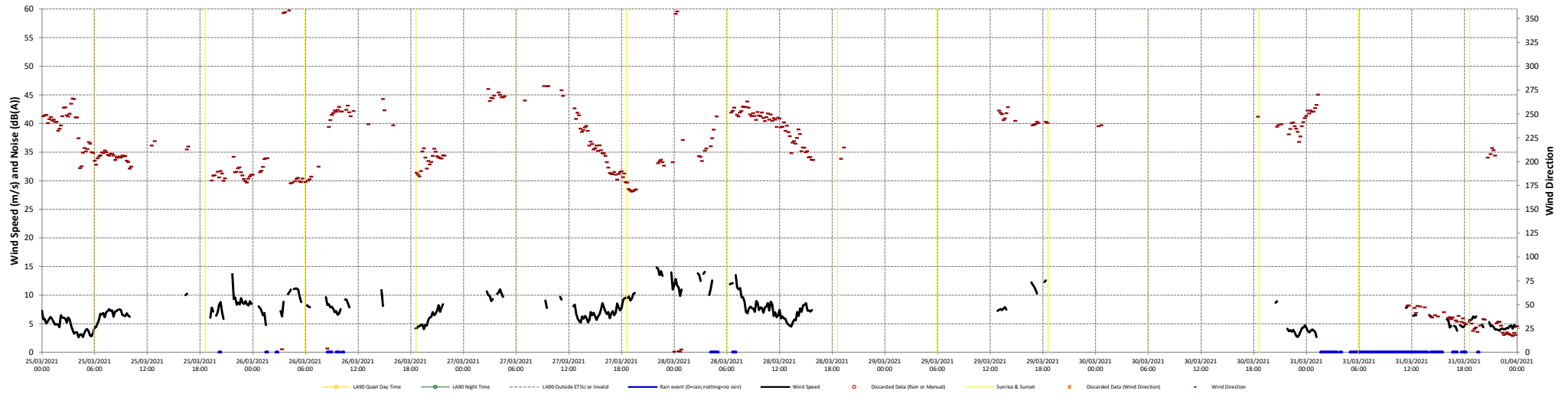
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Title Time Series for Lynebain Page 5 of 5
Date 21/06/2021



18/03/2021 to 25/03/2021



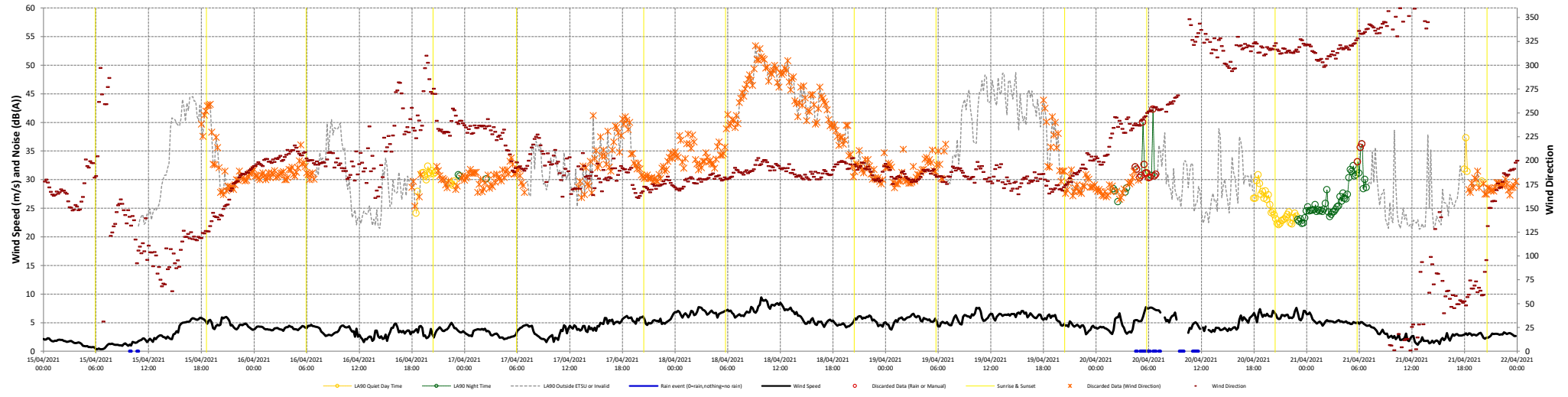
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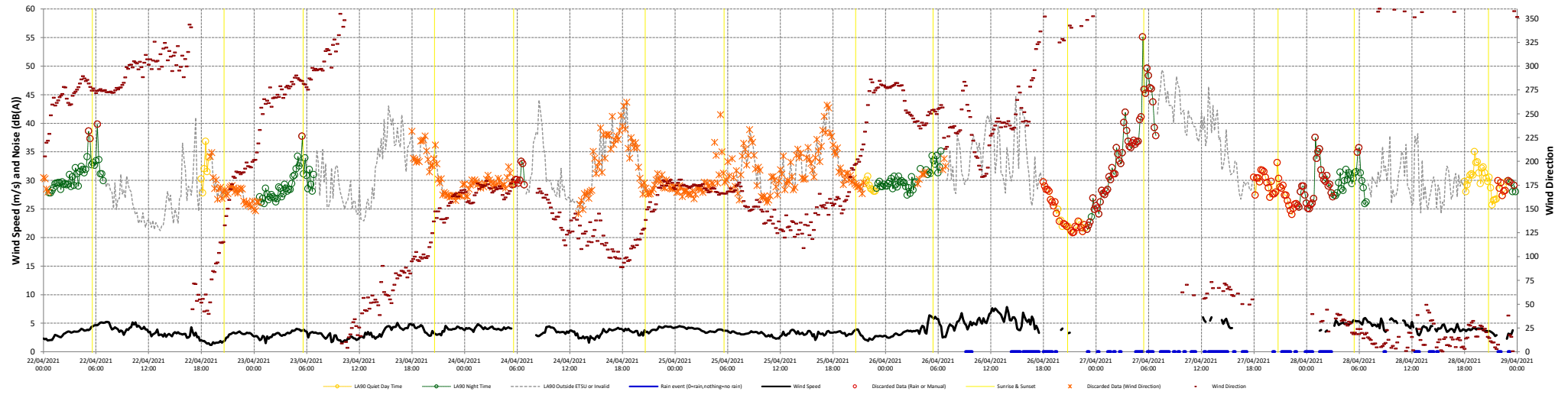
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 Title Time Series for Belcherrie Page 1 of 4
 Date 21/06/2021



15/04/2021 to 22/04/2021



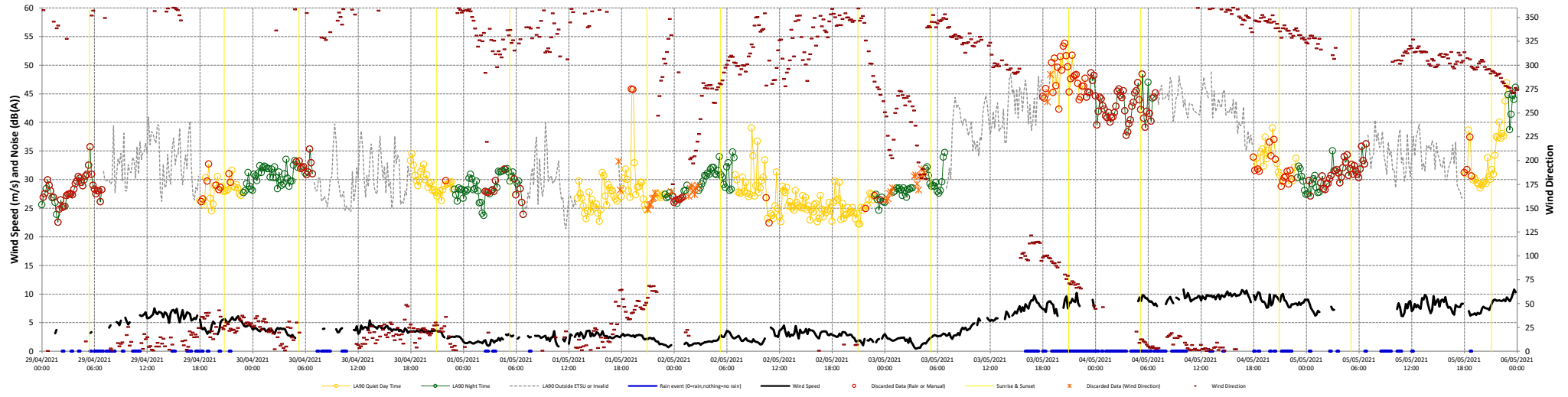
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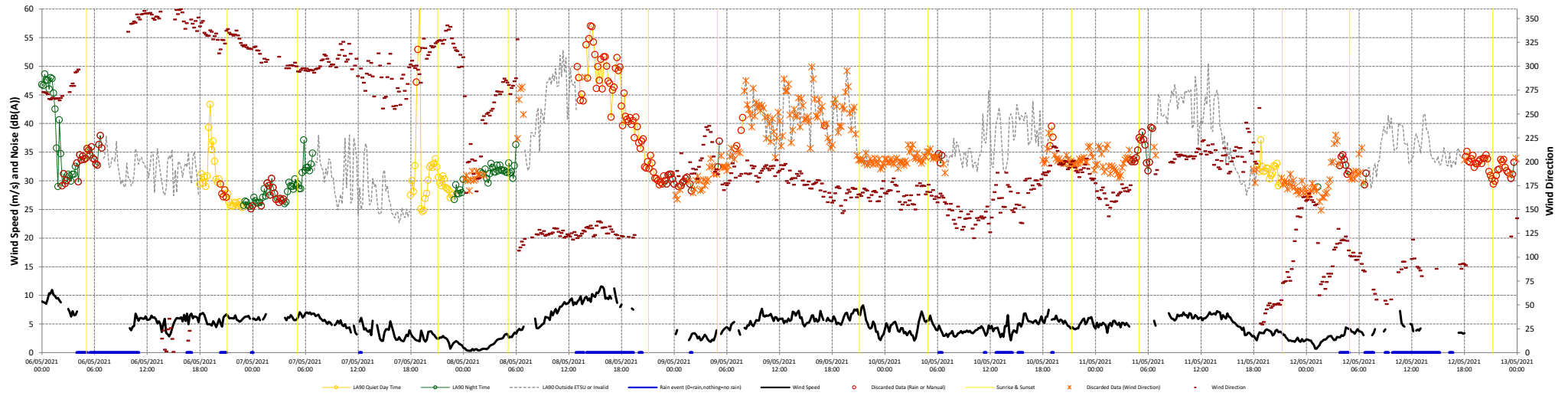
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 Title Time Series for Belcherrie Page 2 of 4
 Date 21/06/2021



29/04/2021 to 06/05/2021



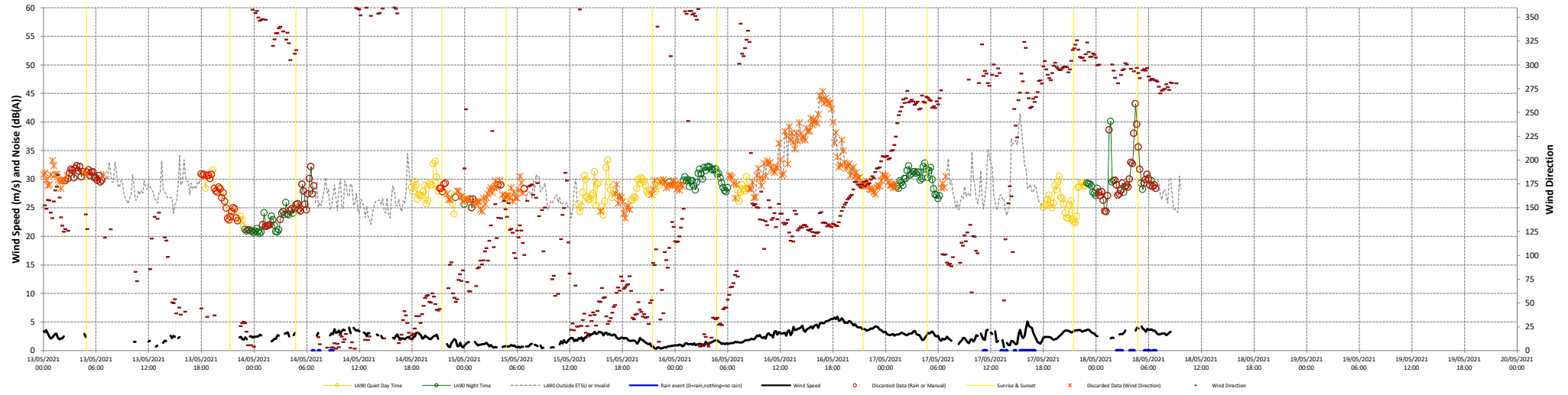
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Project Craig Watch Wind Farm
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 Title Time Series for Belcherrie Page 3 of 4
 Date 21/06/2021



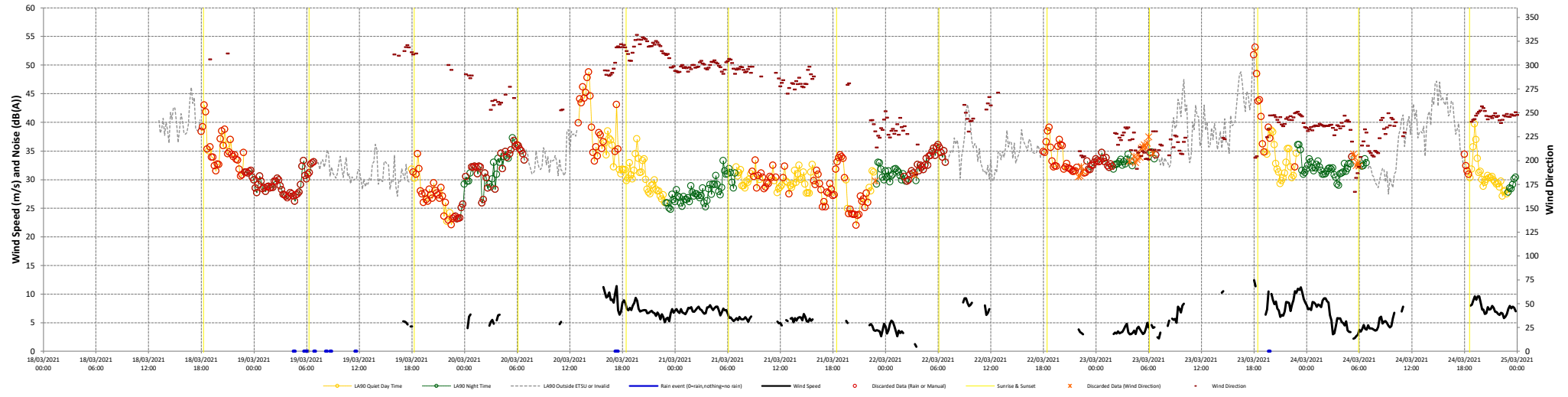
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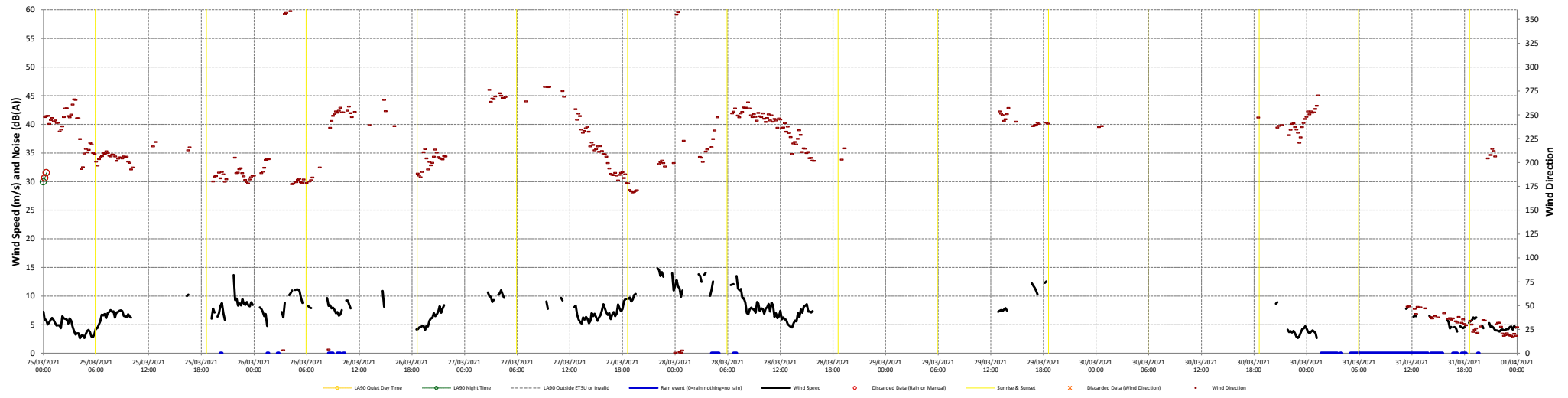
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Title Time Series for Belcherrie Page 4 of 4
Date 21/06/2021



18/03/2021 to 25/03/2021



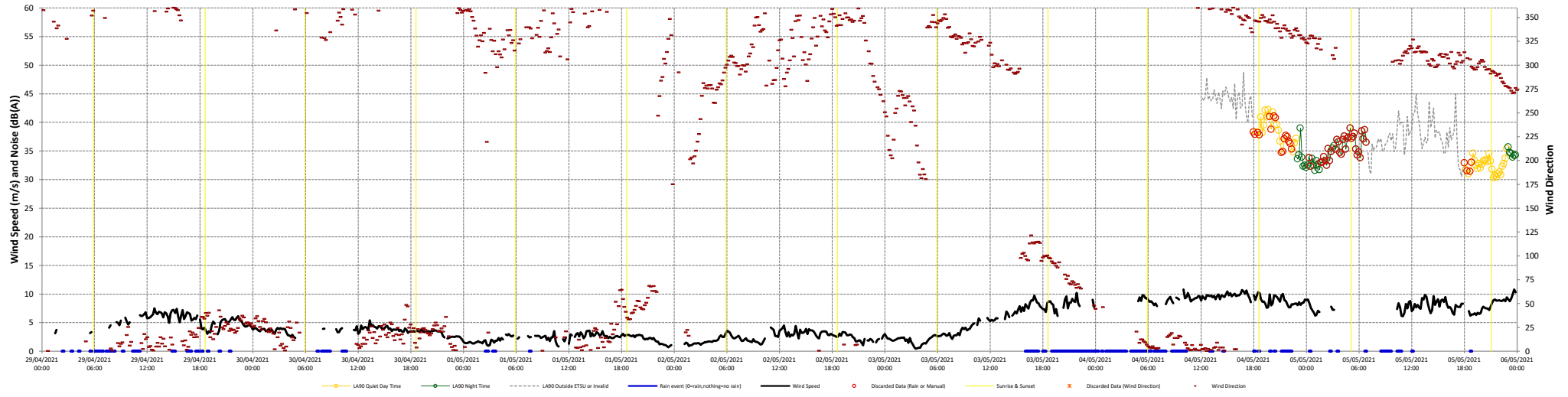
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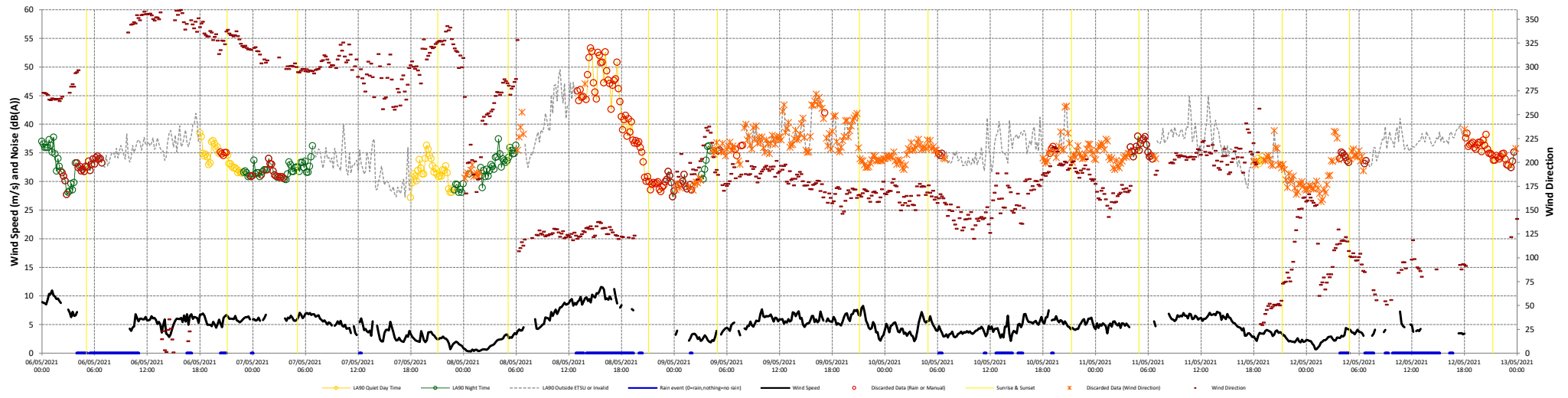
Project Craig Watch Wind Farm
 Client Craig Watch Wind Farm Limited
 Title Time Series for Easterton Page 1 of 3
 Date 21/06/2021



29/04/2021 to 06/05/2021



06/05/2021 to 13/05/2021



Project Craig Watch Wind Farm

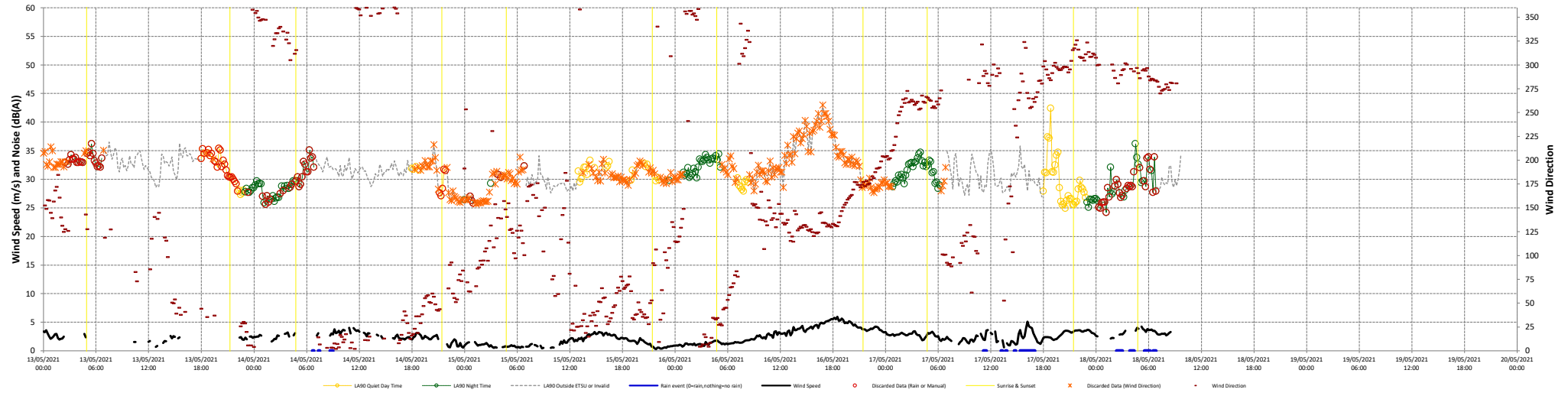
Client Craig Watch Wind Farm Limited

Title Time Series for Easterton Page 2 of 3

Date 21/06/2021



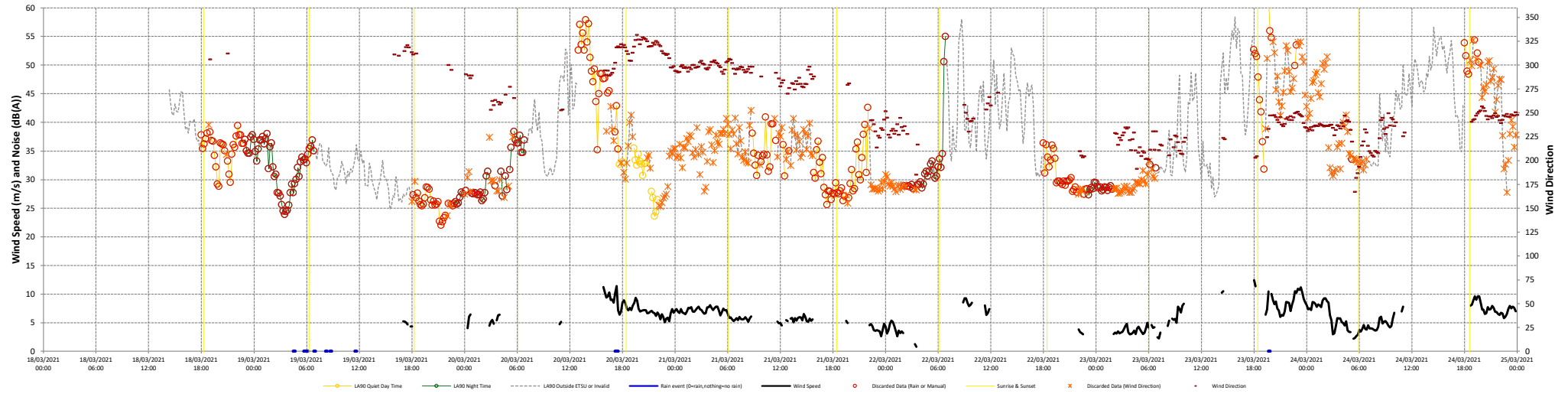
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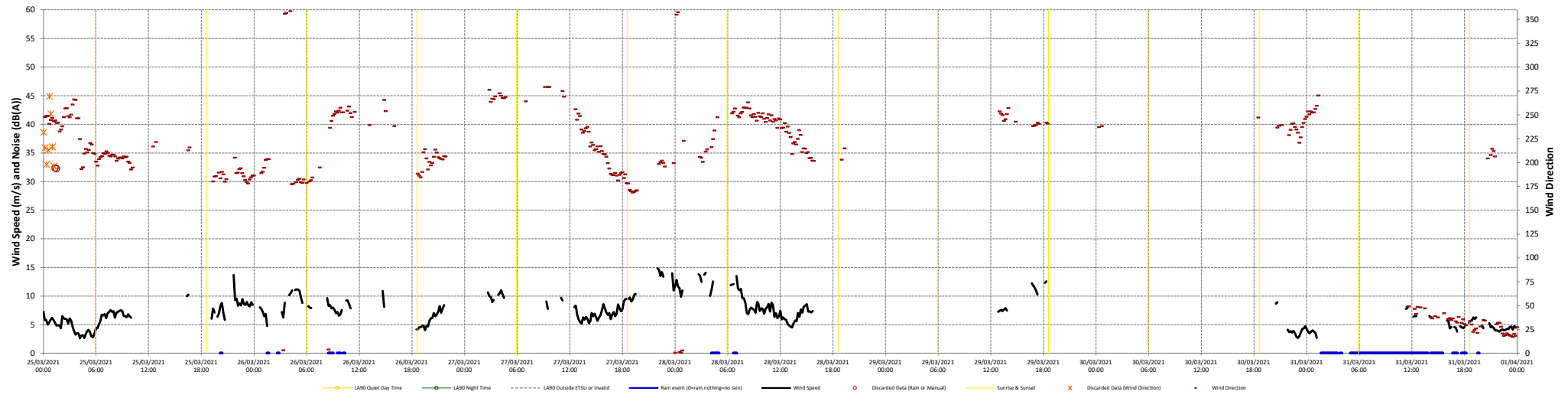
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 Title Time Series for Easterton Page 3 of 3
 Date 21/06/2021



18/03/2021 to 25/03/2021



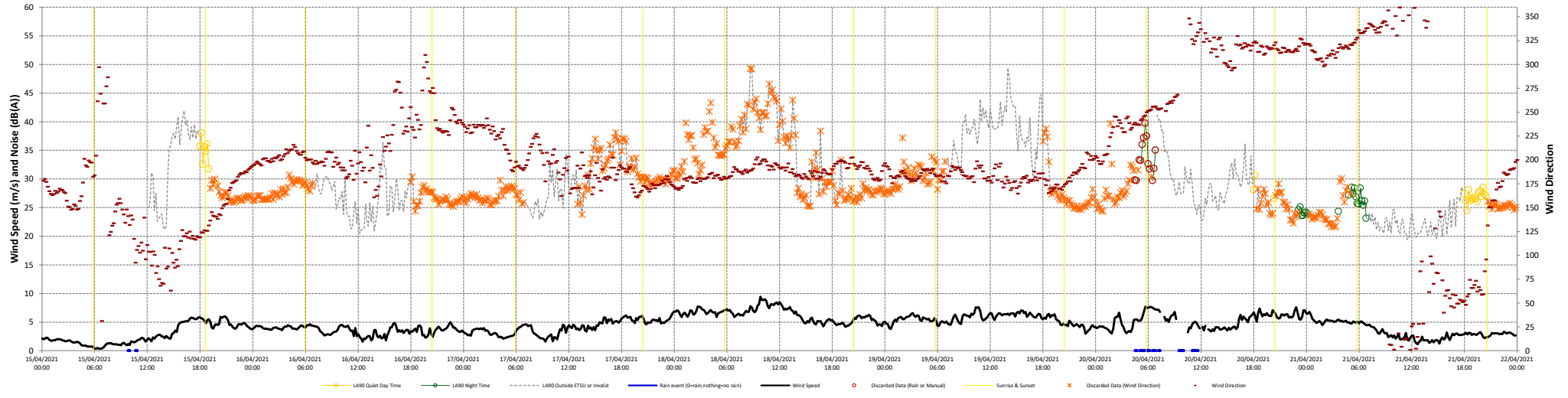
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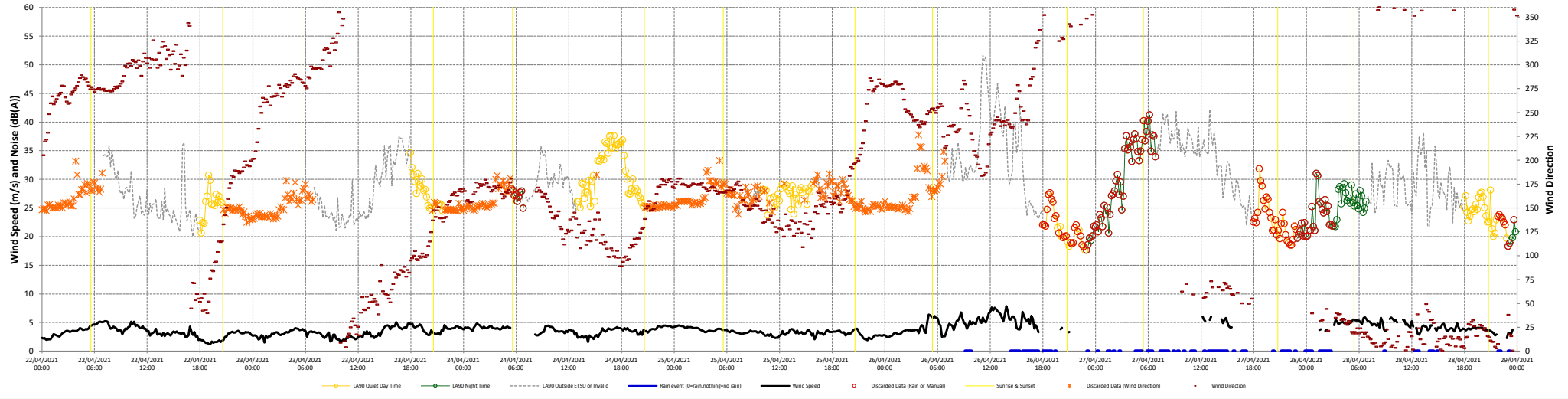
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 Title Time Series for Rhinturk Page 1 of 4
 Date 21/06/2021



15/04/2021 to 22/04/2021



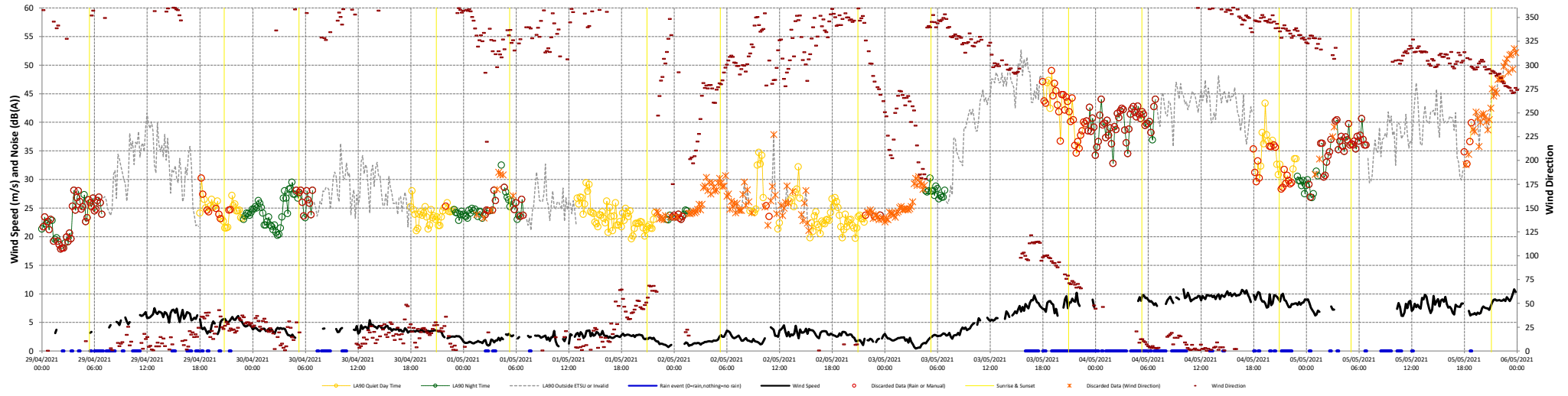
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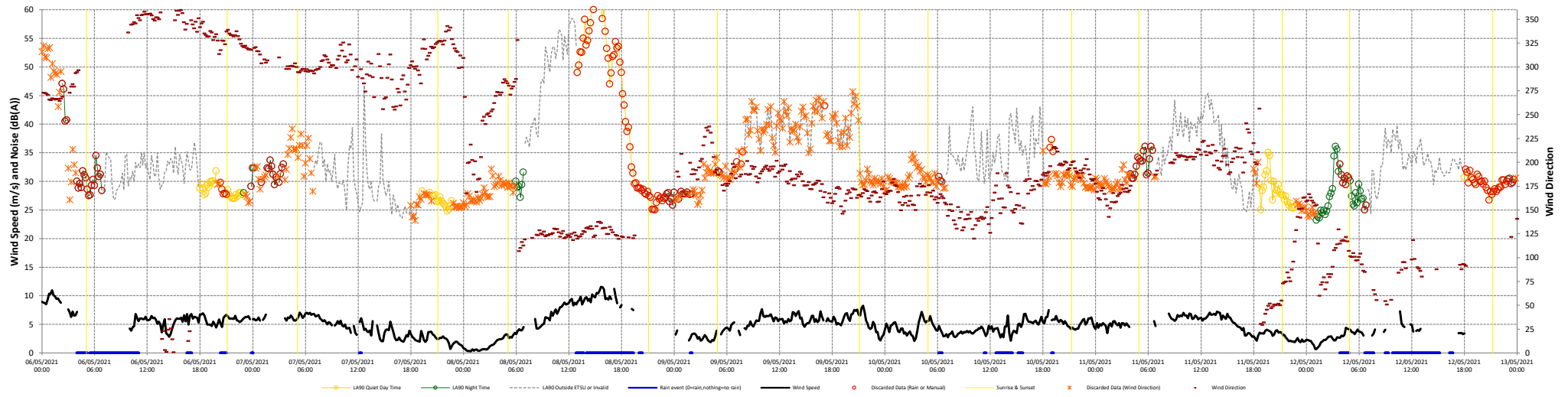
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 Title Time Series for Rhinturk Page 2 of 4
 Date 21/06/2021



29/04/2021 to 06/05/2021



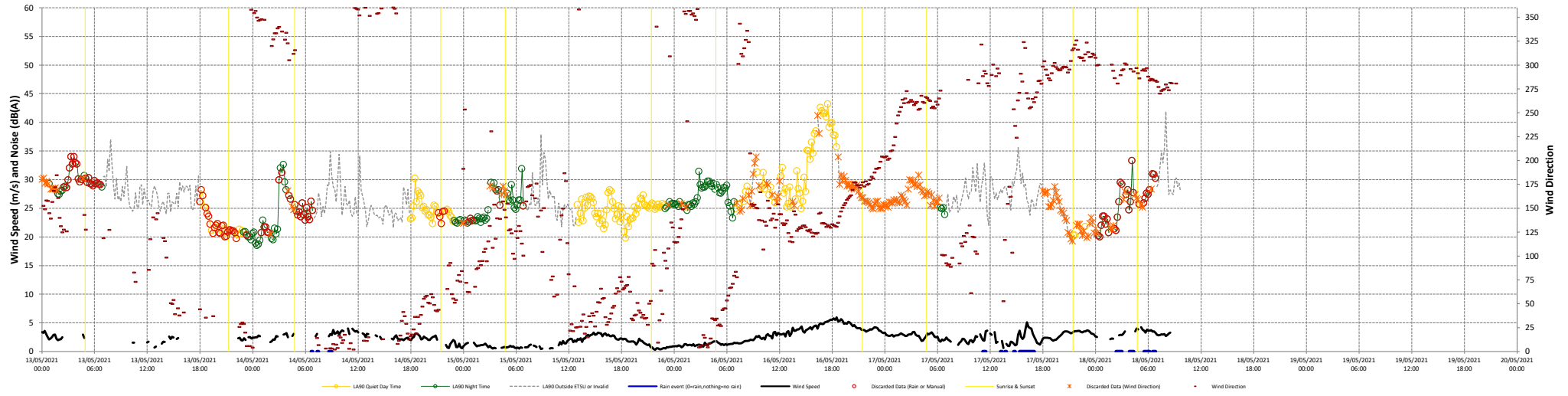
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Project Craig Watch Wind Farm
 Client Craig Watch Wind Farm Limited
 Title Time Series for Rhinturk Page 3 of 4
 Date 21/06/2021



13/05/2021 to 20/05/2021



Project Craig Watch Wind Farm
 Client Craig Watch Wind Farm Limited
 Title Time Series for Rhinturk Page 4 of 4
 Date 21/06/2021



Annex 6 – Topographical Corrections/ Turbine Coordinates/ Cumulative Noise Predictions

Table 1: Topographical (concave ground/ barrier) Noise Prediction Adjustment Table

Notes/Comments

Requirement to include a concave ground profile correction of +3dB has been calculated in accordance with section 4.3.9 of the IOA GPG (July 2011)

A barrier correction of -2dB is included where the landform completely obscures a turbine at the noise assessment location

Where analysis indicates that both are required the barrier correction take precedence and a correction of -2dB is applied

Wind Farm	Hub	Noise Assessment Locations																							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Dorenell	81	0	0	0	0	0	0	0	0	0	0	-2	3	3	0	0	0	0	0	0	0	0	0	0	0
Dorenell	81	0	0	0	0	0	0	0	0	0	0	-2	-2	0	-2	0	0	0	0	0	0	0	0	0	0
Dorenell	81	0	0	0	0	0	0	0	0	0	0	-2	-2	-2	-2	0	0	0	0	0	0	0	0	0	0
Dorenell	81	0	0	0	0	0	0	0	0	0	0	0	-2	-2	-2	0	0	0	0	0	0	0	0	0	0
Dorenell	81	0	0	0	0	0	0	0	0	0	0	-2	3	3	0	-2	0	0	0	0	0	0	0	0	3
Dorenell	81	0	0	0	0	0	0	0	0	0	0	-2	3	0	-2	-2	0	0	0	0	0	0	0	0	0
Dorenell	81	0	0	0	0	0	0	0	0	0	0	-2	3	-2	-2	-2	0	0	0	0	0	0	0	0	0
Dorenell	81	0	0	0	0	0	0	0	0	0	0	-2	-2	-2	-2	-2	0	0	0	0	0	0	0	0	0
Dorenell	81	0	0	0	0	0	0	0	0	0	-2	-2	-2	3	-2	-2	0	0	0	0	0	0	0	0	-2
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Dorenell	81	0	0	0	0	0	0	0	0	0	0	-2	3	3	0	-2	0	0	0	0	0	0	0	0	3
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Dorenell	81	0	0	0	0	0	-2	-2	-2	-2	3	-2	3	3	-2	-2	3	0	0	0	0	0	-2	-2	3
Dorenell	81	0	0	0	0	0	-2	-2	-2	-2	3	-2	3	3	0	-2	3	0	0	0	0	0	-2	3	3
Dorenell	81	0	0	0	0	0	-2	-2	-2	-2	3	-2	3	3	0	-2	-2	0	0	0	0	0	-2	3	3
Dorenell	81	0	0	0	0	-2	-2	-2	-2	-2	3	-2	3	3	0	-2	-2	0	0	0	0	-2	-2	-2	3
Dorenell	81	0	0	0	0	0	3	-2	-2	-2	3	-2	3	3	3	-2	3	0	0	0	0	0	-2	3	3
Dorenell	81	0	0	0	0	0	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	0	0	0	0	-2	-2	-2
Dorenell	81	0	0	0	0	0	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	0	0	0	-2	-2	-2
Dorenell	81	0	0	-2	0	-2	3	-2	-2	-2	3	-2	3	3	3	-2	-2	-2	0	0	0	-2	-2	3	3
Dorenell	81	0	0	-2	0	-2	-2	-2	-2	-2	3	-2	3	3	3	-2	-2	-2	0	0	0	-2	-2	3	3
Dorenell	81	0	0	-2	0	-2	-2	-2	-2	-2	3	-2	3	3	0	-2	-2	-2	0	-2	0	-2	-2	-2	-2
Dorenell	81	0	0	-2	-2	-2	-2	-2	-2	-2	0	-2	0	0	0	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Dorenell	81	0	0	-2	-2	-2	-2	-2	-2	-2	3	-2	3	3	3	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Dorenell	81	0	0	-2	0	-2	-2	-2	-2	-2	3	-2	0	-2	-2	3	-2	0	0	0	0	0	-2	-2	-2
Dorenell	81	0	0	0	0	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	0	0	0	0	-2	-2	-2
Dorenell	81	0	0	0	0	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	0	0	0	0	-2	-2	-2
Dorenell	81	0	0	-2	0	-2	3	-2	-2	-2	-2	-2	3	3	3	-2	3	-2	-2	-2	-2	-2	-2	-2	-2
Dorenell	81	-2	0	-2	-2	-2	3	-2	-2	-2	3	-2	3	3	3	-2	3	-2	-2	-2	-2	-2	-2	-2	3
Dorenell	81	-2	0	-2	0	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Dorenell	81	-2	0	-2	0	-2	-2	-2	-2	-2	-2	-2	-2	0	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Dorenell	81	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	0	0	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Dorenell	81	0	0	0	0	0	0	0	0	0	-2	-2	-2	3	-2	-2	0	0	0	0	0	0	0	0	-2
Dorenell	81	0	0	0	0	0	0	0	0	0	0	-2	3	3	-2	-2	0	0	0	0	0	0	0	0	-2
Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	0	0	0	0	0	0	0
Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	-2	0	0	0	0	0	0
Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	0	0	0	0	0	0	0
Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	-2	0	0	0	0	0	0
Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	-2	0	0	0	0	0	0
Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	0	0	0	0	0	0	0
Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	0	0	0	0	0	0	0
Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	0	0	0	0	0	0	0

Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	0	0	0	0	0	0
Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	0	0	0	0	0	0
Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	0	0	0	0	0	0
Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	0	0	0	0	0	0
Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	0	0	0	0	0	0
Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	-2	-2	0	-2	0	0	0
Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	-2	-2	0	0	0	0	0
Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	-2	-2	0	0	0	0	0
Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	-2	-2	0	-2	0	0	0
Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	0	0	0	0	0
Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	0	0	0	0	0	0
Hill of Towie	59	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	0	0	0	0	0	0
Hill of Towie II	80	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	3	-2	-2	-2	-2	0	0	0
Hill of Towie II	80	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	-2	-2	-2	0	0	0
Hill of Towie II	80	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	-2	3	-2	-2	-2	-2	0	0	0
Hill of Towie II	80	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	-2	-2	0	0	0	0	0
Hill of Towie II	80	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	-2	-2	0	-2	0	0	0
Hill of Towie II	80	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	-2	-2	-2	-2	0	0	0
Hill of Towie II	80	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	-2	-2	-2	-2	0	0	0
Hill of Towie II	80	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	-2	3	-2	-2	-2	-2	0	0	0
Hill of Towie II	80	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	-2	3	-2	-2	0	0	0	0	0
Hill of Towie II	80	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	-2	3	-2	-2	-2	-2	0	0	0
Hill of Towie II	80	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	-2	-2	-2	-2	0	0	0
Hill of Towie II	80	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	-2	-2	-2	-2	0	0	0
Clashindarroch	69	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	-2	-2	0	0	-2	-2	-2	-2	-2	-2
Clashindarroch	69	-2	-2	-2	-2	-2	0	3	3	-2	-2	-2	-2	3	-2	-2	0	0	-2	3	-2	-2	-2	-2
Clashindarroch	69	-2	-2	3	-2	-2	3	3	3	3	-2	-2	-2	3	-2	-2	-2	0	-2	3	-2	-2	-2	-2
Clashindarroch	69	-2	-2	-2	-2	-2	-2	3	3	3	0	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	-2
Clashindarroch	69	-2	-2	-2	-2	-2	-2	-2	0	3	-2	-2	-2	3	-2	-2	0	0	-2	-2	-2	-2	-2	-2
Clashindarroch	69	-2	-2	-2	-2	-2	-2	-2	0	3	-2	-2	-2	3	-2	-2	0	0	-2	-2	-2	-2	-2	-2
Clashindarroch	69	-2	-2	-2	-2	-2	-2	-2	-2	3	-2	-2	-2	-2	-2	0	0	0	-2	-2	-2	-2	-2	-2
Clashindarroch	69	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	0	0	-2	-2	-2	-2	-2	-2
Clashindarroch	69	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	0	-2	-2	-2	-2	-2	-2
Clashindarroch	69	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	-2	-2	-2	-2	-2	-2

Clashindarroch	69	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Clashindarroch	69	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	0	0	-2	-2	-2	-2	-2	-2	-2
Clashindarroch	69	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	-2	-2	-2	-2	-2	-2	-2
Clashindarroch	69	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	0	-2	-2	-2	-2	-2	-2	-2
Clashindarroch	69	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Clashindarroch	69	-2	-2	3	3	-2	3	3	3	3	0	-2	-2	3	-2	-2	-2	-2	-2	3	-2	-2	0	0
Clashindarroch	69	-2	-2	3	3	-2	3	3	3	3	-2	-2	-2	3	-2	-2	-2	0	-2	3	-2	-2	0	0
Cairnborrow	60	3	3	-2	3	-2	0	0	0	0	0	0	0	0	0	0	0	0	3	-2	3	-2	0	0
Cairnborrow	60	3	3	-2	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	3	-2	3	-2	0	0
Cairnborrow	60	-2	3	-2	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	-2	0	0
Cairnborrow	60	3	3	-2	-2	-2	0	0	0	0	0	0	0	0	0	0	0	0	3	-2	3	-2	0	0
Cairnborrow	60	3	3	-2	3	-2	0	0	0	0	0	0	0	0	0	0	0	0	3	-2	3	-2	0	0
Clashindarroch II	110	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	0	-2	0	-2	0	-2	-2	-2	-2
Clashindarroch II	110	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	0	0	-2	-2	-2	-2	-2	-2	-2
Clashindarroch II	110	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Clashindarroch II	110	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	0	0	-2	-2	-2	-2	-2	-2	-2
Clashindarroch II	110	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	0	0	-2	-2	-2	-2	-2	-2	-2
Clashindarroch II	110	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	0	-2	-2	-2	-2	-2	-2	-2	-2
Clashindarroch II	110	-2	-2	-2	0	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	3	-2	-2	-2
Clashindarroch II	110	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	0	-2	-2	-2	-2	-2	-2	-2	-2
Clashindarroch II	110	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	0	0	-2	3	3	-2	-2	-2	-2
Clashindarroch II	110	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2
Clashindarroch II	110	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	0	-2	-2	-2	-2	-2	-2	-2	-2
Clashindarroch II	110	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	0	0	-2	-2	-2	-2	-2	-2	-2
Clashindarroch II	110	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	0	0	-2	-2	-2	-2	-2	-2	-2
Garbet	112.5	3	3	-2	-2	-2	-2	-2	-2	0	0	-2	-2	-2	-2	-2	-2	0	-2	0	0	0	0	-2
Garbet	112.5	0	0	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	-2	0	0	-2	-2	-2
Garbet	112.5	0	0	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	-2	0	-2	0	-2	-2
Garbet	112.5	0	3	0	-2	-2	-2	-2	-2	0	0	-2	-2	-2	-2	-2	-2	0	-2	0	-2	0	0	-2
Garbet	112.5	0	3	-2	-2	-2	-2	-2	-2	0	0	-2	-2	-2	-2	-2	-2	0	-2	0	-2	0	0	-2
Garbet	112.5	0	3	0	0	-2	0	0	0	0	0	-2	0	-2	-2	-2	-2	0	-2	0	0	0	0	-2
Clashindarroch Extension	102.5	3	3	3	3	-2	3	3	3	3	0	0	-2	-2	-2	-2	-2	-2	3	-2	0	0	0	0
Clashindarroch Extension	102.5	3	3	3	3	0	3	3	3	3	0	3	-2	-2	-2	-2	-2	-2	3	-2	0	0	0	0
Clashindarroch Extension	102.5	-2	3	3	3	3	3	3	3	3	0	0	-2	3	-2	-2	-2	-2	3	-2	0	0	0	0
Clashindarroch Extension	102.5	3	3	0	0	-2	3	3	3	3	0	0	-2	3	-2	-2	-2	-2	3	-2	-2	0	0	0
Clashindarroch Extension	115	3	3	3	3	3	3	3	3	3	0	0	-2	3	-2	-2	-2	-2	3	-2	0	3	0	0
Clashindarroch Extension	102.5	-2	3	3	3	3	3	3	3	3	0	0	-2	3	-2	-2	-2	-2	3	-2	-2	3	0	0

Clashindarroch Extension	115	3	3	3	3	-2	3	3	3	3	0	-2	-2	3	-2	-2	-2	-2	-2	3	-2	-2	0	0	0
Clashindarroch Extension	115	-2	-2	3	0	-2	3	0	0	0	0	-2	-2	0	-2	-2	-2	-2	-2	3	-2	-2	0	0	0
Clashindarroch Extension	115	-2	-2	0	0	-2	0	0	0	0	-2	-2	-2	0	-2	-2	-2	0	-2	0	-2	-2	0	-2	-2
Clashindarroch Extension	115	-2	-2	0	0	-2	0	0	0	0	-2	-2	-2	0	-2	-2	-2	0	-2	-2	-2	-2	0	-2	-2
Clashindarroch Extension	115	-2	-2	0	-2	-2	0	0	0	0	-2	-2	-2	0	-2	-2	0	0	-2	0	-2	-2	-2	-2	-2
Clashindarroch Extension	115	-2	-2	0	0	-2	0	0	0	0	-2	-2	-2	0	-2	-2	0	0	-2	0	-2	-2	-2	-2	-2
Clashindarroch Extension	115	-2	-2	0	0	-2	0	0	0	0	-2	-2	-2	3	-2	-2	-2	0	-2	-2	-2	-2	-2	-2	-2
Clashindarroch Extension	115	0	0	0	-2	-2	0	0	0	0	-2	-2	-2	3	-2	0	0	0	-2	0	-2	-2	-2	-2	-2
Clashindarroch Extension	115	0	0	0	0	-2	3	0	0	3	-2	-2	-2	3	-2	-2	0	0	-2	3	-2	-2	-2	-2	-2
Clashindarroch Extension	115	0	0	0	0	-2	3	0	0	0	-2	-2	-2	3	-2	-2	0	0	-2	3	-2	-2	-2	-2	-2
Clashindarroch Extension	115	0	0	0	0	-2	0	0	3	3	-2	-2	-2	3	-2	0	0	0	-2	3	-2	-2	-2	-2	-2
Clashindarroch Extension	102.5	0	0	0	-2	-2	3	3	3	3	-2	-2	-2	3	-2	0	0	0	-2	3	-2	-2	-2	-2	-2
Clashindarroch Extension	102.5	0	0	3	0	-2	-2	-2	-2	-2	-2	-2	3	3	-2	0	0	0	-2	3	-2	-2	-2	-2	-2
Clashindarroch Extension	102.5	0	0	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	-2	0	0	0	-2	0	-2	-2	-2	-2	-2
Clashindarroch Extension	102.5	0	0	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	3	-2	0	0	0	-2	3	-2	-2	-2	-2	-2
Craig Watch	118	0	0	0	0	-2	0	0	0	0	0	-2	0	0	-2	-2	0	-2	0	-2	0	-2	0	0	0
Craig Watch	118	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	0	-2	0	0	0	-2	0	0	0
Craig Watch	118	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	0	-2	0	0	0	-2	0	0	0
Craig Watch	118	0	0	0	0	-2	0	0	0	0	0	-2	0	0	-2	-2	0	-2	0	0	0	0	0	0	0
Craig Watch	118	0	0	0	0	0	0	0	0	0	0	0	0	0	-2	-2	0	-2	0	0	0	0	3	0	0
Craig Watch	118	0	0	0	0	-2	0	0	0	0	0	-2	0	0	-2	-2	0	-2	0	0	0	0	3	0	0
Craig Watch	118	0	0	0	0	-2	0	0	0	0	0	-2	0	0	-2	-2	-2	-2	0	0	0	0	0	0	0
Craig Watch	118	3	3	0	0	-2	0	0	0	0	0	-2	0	-2	-2	-2	-2	0	0	0	0	0	0	0	0
Craig Watch	118	0	3	0	0	-2	0	0	0	0	0	-2	0	-2	-2	-2	-2	0	0	0	0	0	0	0	0
Craig Watch	118	0	0	0	0	-2	0	0	0	0	0	-2	-2	-2	-2	-2	-2	0	0	0	0	0	0	0	0

Table 2: Wind Farms/ Turbines Modelled

Wind Farm	Easting	Northing	Height
Dorenell	330808	825801	540
Dorenell	330446	826034	533
Dorenell	329929	826270	559
Dorenell	329612	826603	585
Dorenell	331212	826124	546
Dorenell	330662	826428	559
Dorenell	330256	826531	560
Dorenell	329978	826774	581
Dorenell	331823	826480	476
Dorenell	331454	826480	522
Dorenell	331064	826525	576
Dorenell	330378	826964	624
Dorenell	330708	826819	640
Dorenell	330950	827181	637
Dorenell	331374	826891	527
Dorenell	331738	826884	487
Dorenell	332130	826858	453
Dorenell	331966	827287	497
Dorenell	331665	827466	546
Dorenell	332424	827624	489
Dorenell	332062	827702	548
Dorenell	331671	827905	615
Dorenell	332418	828056	504
Dorenell	332003	828173	560
Dorenell	332799	828280	474
Dorenell	331962	828578	565
Dorenell	331600	828590	616
Dorenell	331267	828742	649
Dorenell	332970	828726	433
Dorenell	332075	829217	620
Dorenell	331704	829252	635
Dorenell	331447	829592	595
Dorenell	331125	829314	591
Dorenell	331862	829711	602
Dorenell	333180	829114	443
Dorenell	332418	829399	584
Dorenell	332827	829334	510
Dorenell	333481	829449	440
Dorenell	333035	829692	544
Dorenell	332601	829769	603
Dorenell	331649	830064	515
Dorenell	331506	830481	461
Dorenell	331917	830688	454
Dorenell	333105	830122	580
Dorenell	333432	829960	504
Dorenell	333762	829821	432
Dorenell	333926	830254	413
Dorenell	333594	830419	485
Dorenell	333277	830655	551
Dorenell	332686	830778	534
Dorenell	332314	831040	465
Dorenell	332156	831424	395

Dorenell	332948	831153	551
Dorenell	333529	831008	552
Dorenell	332666	831554	446
Dorenell	332340	831970	393
Dorenell	332709	832042	420
Dorenell	331943	826082	453
Dorenell	331573	826090	499
Hill of Towie	334968	845961	348
Hill of Towie	335198	845631	332
Hill of Towie	334838	846283	354
Hill of Towie	335251	846265	361
Hill of Towie	335484	845921	339
Hill of Towie	335893	846063	310
Hill of Towie	335030	846620	359
Hill of Towie	335527	846561	346
Hill of Towie	335235	846965	350
Hill of Towie	335943	846640	312
Hill of Towie	335353	847362	353
Hill of Towie	335770	847241	366
Hill of Towie	335515	847898	358
Hill of Towie	335700	847572	361
Hill of Towie	336404	845963	289
Hill of Towie	336979	846592	281
Hill of Towie	337316	846748	290
Hill of Towie	337706	846486	262
Hill of Towie	337686	846966	310
Hill of Towie	337763	847346	309
Hill of Towie	338105	847091	325
Hill of Towie II	336329	845559	304
Hill of Towie II	335845	845571	284
Hill of Towie II	336044	845212	259
Hill of Towie II	334788	845528	313
Hill of Towie II	334983	845222	307
Hill of Towie II	335363	845179	290
Hill of Towie II	335667	844979	271
Hill of Towie II	335979	844793	255
Hill of Towie II	335520	844500	277
Hill of Towie II	335263	844762	274
Hill of Towie II	334765	844838	295
Hill of Towie II	334359	845006	321
Hill of Towie II	333952	844909	336
Hill of Towie II	334383	844614	325
Hill of Towie II	334615	844337	289
Hill of Towie II	334961	844200	256
Clashindarroch	341828	829449	452
Clashindarroch	341676	829803	477
Clashindarroch	341421	830069	488
Clashindarroch	341677	831253	442
Clashindarroch	341648	830730	437
Clashindarroch	341879	830337	446
Clashindarroch	342096	829956	460
Clashindarroch	342506	830261	477
Clashindarroch	343016	830360	477
Clashindarroch	342342	830618	424
Clashindarroch	342141	830999	417

Clashindarroch	342146	831465	418
Clashindarroch	342875	830866	398
Clashindarroch	342576	831261	413
Clashindarroch	342973	831420	425
Clashindarroch	342607	831729	429
Clashindarroch	341281	830898	478
Clashindarroch	341224	830424	483
Cairnborrow	346495	842716	279
Cairnborrow	346085	842077	251
Cairnborrow	346087	842612	284
Cairnborrow	346351	842376	254
Cairnborrow	346501	841966	255
Clashindarroch II	344086	833617	387
Clashindarroch II	343640	831705	360
Clashindarroch II	343415	832583	388
Clashindarroch II	344357	832735	371
Clashindarroch II	344076	831659	360
Clashindarroch II	344821	833268	341
Clashindarroch II	344002	832977	342
Clashindarroch II	343603	833107	394
Clashindarroch II	344460	833440	351
Clashindarroch II	344118	832206	400
Clashindarroch II	343713	832298	418
Clashindarroch II	342964	832151	388
Clashindarroch II	343286	831912	386
Clashindarroch II	344533	832177	382
Garbet	338974	837035	339
Garbet	338557	836911	320
Garbet	338121	836738	355
Garbet	337802	836448	381
Garbet	338261	836362	355
Garbet	337943	835964	374
Garbet	338358	835949	394
Clashindarroch Extension	341579	831868	463
Clashindarroch Extension	340981	831854	435
Clashindarroch Extension	340479	831362	417
Clashindarroch Extension	341208	831333	433
Clashindarroch Extension	340685	830904	471
Clashindarroch Extension	340060	830903	443
Clashindarroch Extension	340823	830421	467
Clashindarroch Extension	340313	830392	412
Clashindarroch Extension	340926	829909	423
Clashindarroch Extension	340328	829847	384
Clashindarroch Extension	339892	829579	367
Clashindarroch Extension	341356	829505	428
Clashindarroch Extension	340667	829256	398
Clashindarroch Extension	340168	829149	366
Clashindarroch Extension	341574	829006	472
Clashindarroch Extension	341071	828735	468
Clashindarroch Extension	340405	828650	423
Clashindarroch Extension	340876	828161	473
Clashindarroch Extension	341432	828086	506
Clashindarroch Extension	340315	827675	430
Clashindarroch Extension	341282	827620	458
Clashindarroch Extension	340790	827510	448

Craig Watch	337646	834471	440
Craig Watch	337964	834056	417
Craig Watch	338322	834426	425
Craig Watch	338385	835034	438
Craig Watch	338763	834664	430
Craig Watch	338723	835353	452
Craig Watch	339154	835115	397
Craig Watch	339062	835738	447
Craig Watch	339393	836115	404
Craig Watch	339779	836354	361