ESMAPBD BDFE2
Data Report WINDCUBEv2 S/N WLS7-598
at the site Feni,
Chittagong District, Bangladesh
for the period from
2019-01-01 to 2019-01-31

2019-02-19

Summary report: SG17010KB24

Frimmersdorfer Str. 73a · D-41517 Grevenbroich · Phone +49 (0) 2181 2278-0 · Fax +49 (0) 2181 2278-11 · info@windtest-nrw.de · www.windtest-nrw.de

ESMAPBD BDFE2
Data Report WINDCUBEv2 S/N WLS7-598
at the site Feni,
Chittagong District, Bangladesh

Summary report: SG17010KB24

Location or measuring site:	E 91.358190, N 22.800290, Feni, Chittagong District / Bangladesh
Client:	**Suntrace GmbH** Große Elbstraße 145c D-22767 Hamburg On behalf of **Worldbank Group** 1818 H Street, NW Washington, DC 20433
Contractor:	windtest grevenbroich gmbh Frimmersdorfer Str. 73a **D-41517 Grevenbroich**

Date of order:	2017-09-12	**Contract number:**	17 0091 09

Auditor:	**Editor:**
Dipl.-Ing. Frank Albers Division manager energy assessment	Dipl.-Ing. Florian Schmidt Project manager site assessment

Grevenbroich, 2019-02-19

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1 Introduction

windtest grevenbroich gmbh (wtg) was instructed by Suntrace GmbH to evaluate the data of the LiDAR wind measurement system at the location Feni. This report only contains the data measured by the LiDAR device ranging from 2019-01-01 until 2019-01-31 at the present site. In parallel an environmental measurement including a small meteorological mast (10 m) is being performed by the customer. The results of these measurements can be taken from a separate report provided by the customer.

2 Measurement statistics

Table 1: Mean measurement values during the evaluation period

Mean Values	Wind speed [m/s]	Wind speed max [m/s]	Wind speed min [m/s]	Wind direction [°]	Weibull A [m/s]	Weibull k [ ]	Availability [%]
40 m	3.94	7.74	0.27	357.0	4.43	3.698	96.6
60 m	4.77	9.39	0.35	0.0	5.40	3.125	96.6
80 m	5.30	11.04	0.50	2.0	6.00	2.852	96.6
100 m	5.59	12.18	0.54	2.9	6.35	2.774	96.5
110 m	5.70	12.59	0.56	3.1	6.46	2.755	96.4
120 m	5.77	12.97	0.59	3.1	6.54	2.710	96.4
130 m	5.83	13.55	0.64	3.1	6.61	2.691	96.4
140 m	5.86	14.03	0.68	2.9	6.64	2.633	96.2
150 m	5.88	14.47	0.69	2.7	6.65	2.603	96.0
160 m	5.89	14.94	0.72	2.6	6.66	2.571	96.0
180 m	5.90	16.11	0.69	2.3	6.64	2.463	95.8
200 m	5.88	16.62	0.66	2.2	6.60	2.429	95.5

Table 2: Availability during the evaluation period

Availability per day [%]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
40 m	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	98	100	100	100	100	100	100	100	100	100	1	97	100	100
60 m	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	98	100	100	100	100	100	100	100	100	100	1	97	100	100
80 m	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	97	100	100	100	100	100	100	100	100	100	1	97	100	100
100 m	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	95	100	100	100	100	100	100	100	100	100	1	97	100	100
110 m	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	92	100	100	100	100	100	100	100	100	100	1	97	100	100
120 m	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	92	100	100	100	99	100	100	100	100	100	1	97	100	100
130 m	100	100	100	100	100	100	99	100	100	100	100	100	100	100	100	100	100	92	100	100	100	98	100	100	100	100	100	1	97	100	100
140 m	100	100	100	100	100	100	98	100	100	100	100	100	100	100	100	100	100	91	100	100	100	98	99	100	100	100	100	1	97	100	98
150 m	100	100	100	100	100	100	97	100	100	100	100	100	100	100	100	100	100	91	100	100	100	98	99	100	100	100	100	1	97	100	95
160 m	100	100	100	100	100	100	96	100	100	100	100	100	100	100	100	100	100	92	100	100	100	98	99	100	99	100	100	1	97	100	94
180 m	100	100	100	100	100	100	95	100	100	100	100	100	100	100	100	100	100	90	100	100	100	97	99	100	99	100	100	1	97	99	94
200 m	100	100	99	100	100	100	95	100	100	100	100	100	99	99	100	100	100	90	100	100	100	97	99	100	99	100	100	1	97	94	93

3 Time series

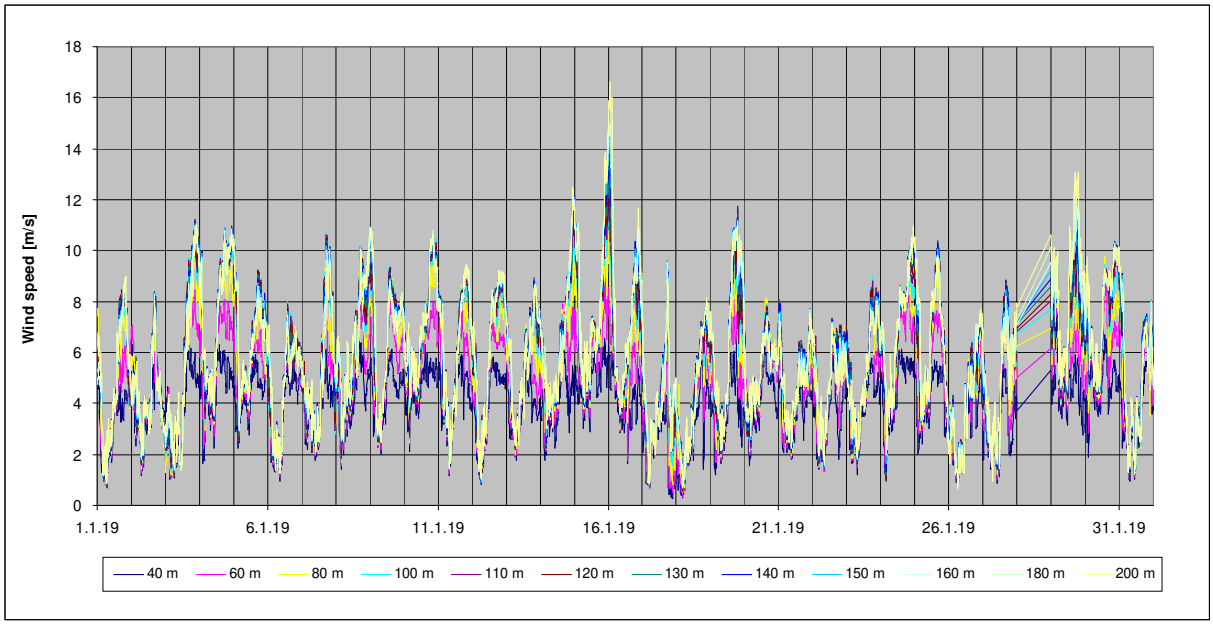

Figure 1: Time series of wind speed during the evaluation period

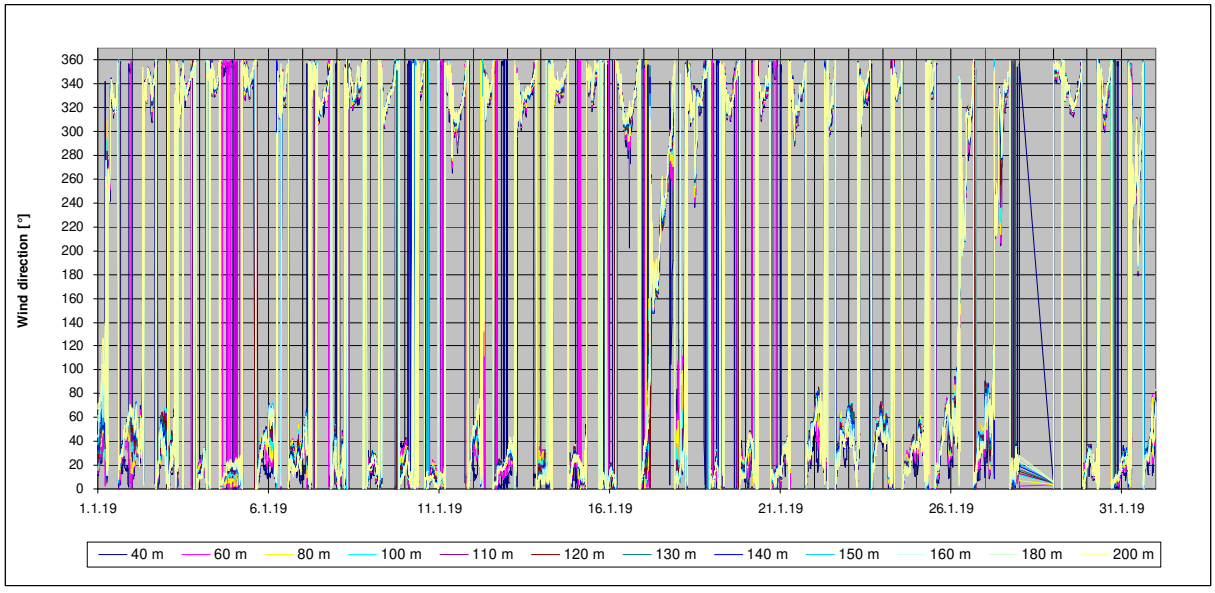

Figure 2: Time series of wind direction during the evaluation period

4 Daily profile

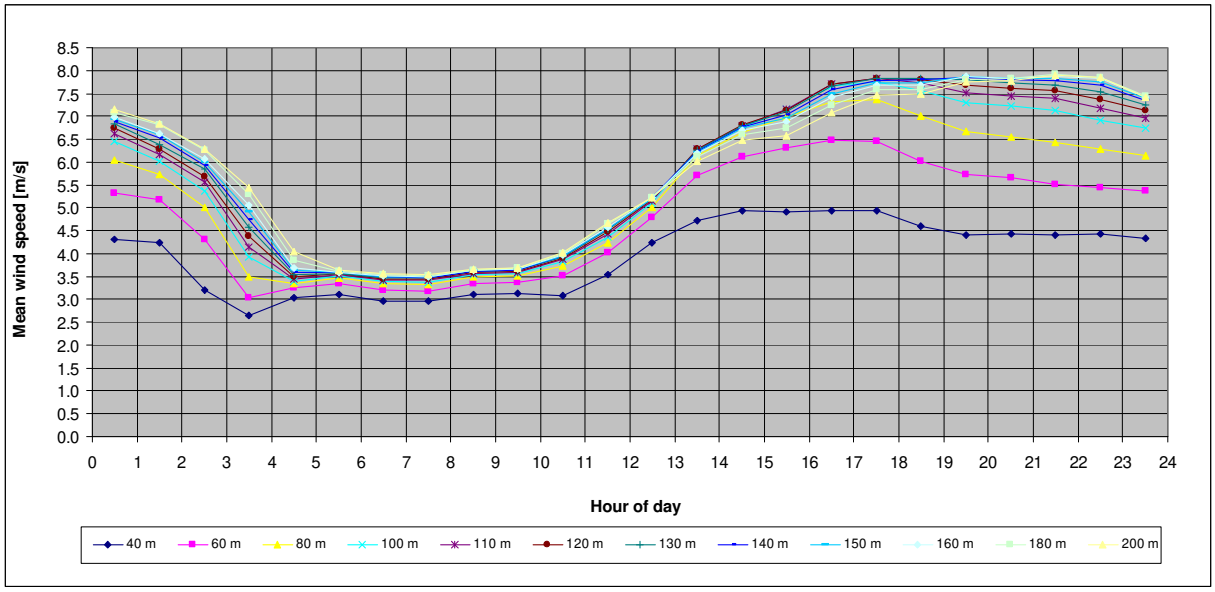

Figure 3: Daily profile of wind speed during the evaluation period

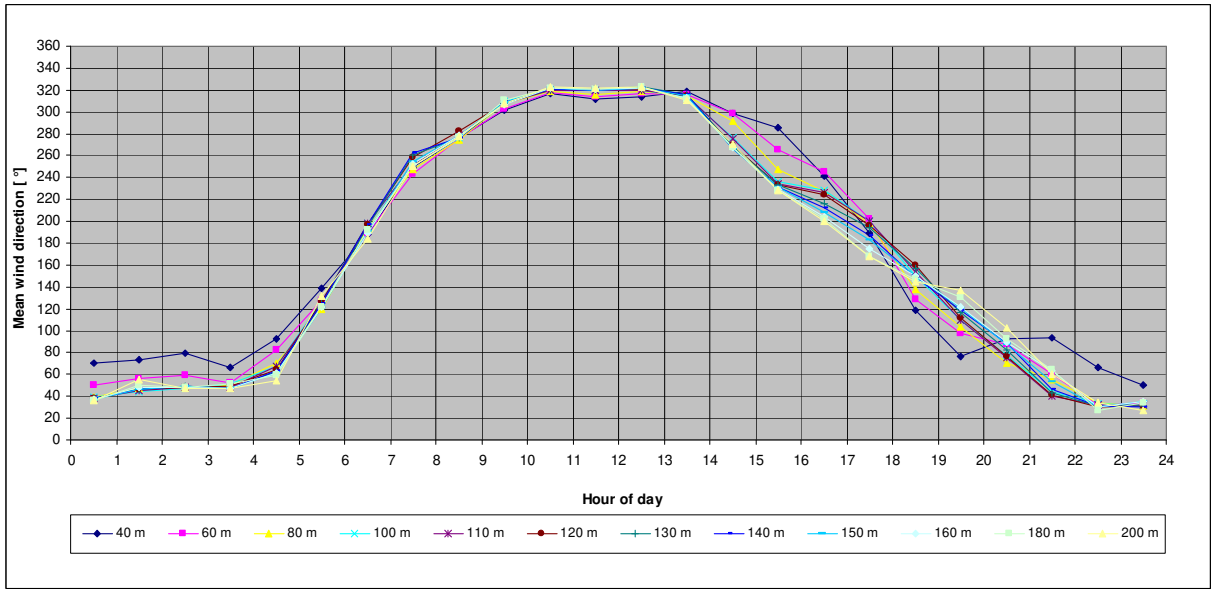

Figure 4: Daily profile of wind direction during the evaluation period

5 Wind direction distribution

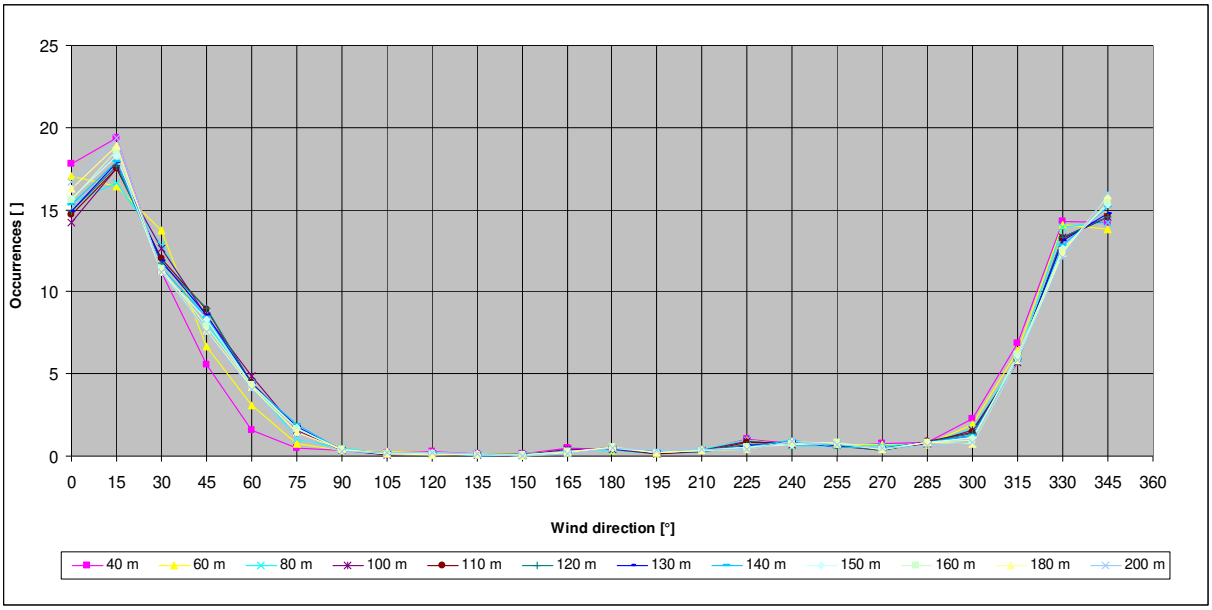

Figure 5: Frequency distribution of wind direction during the evaluation period

6 Natural turbulence

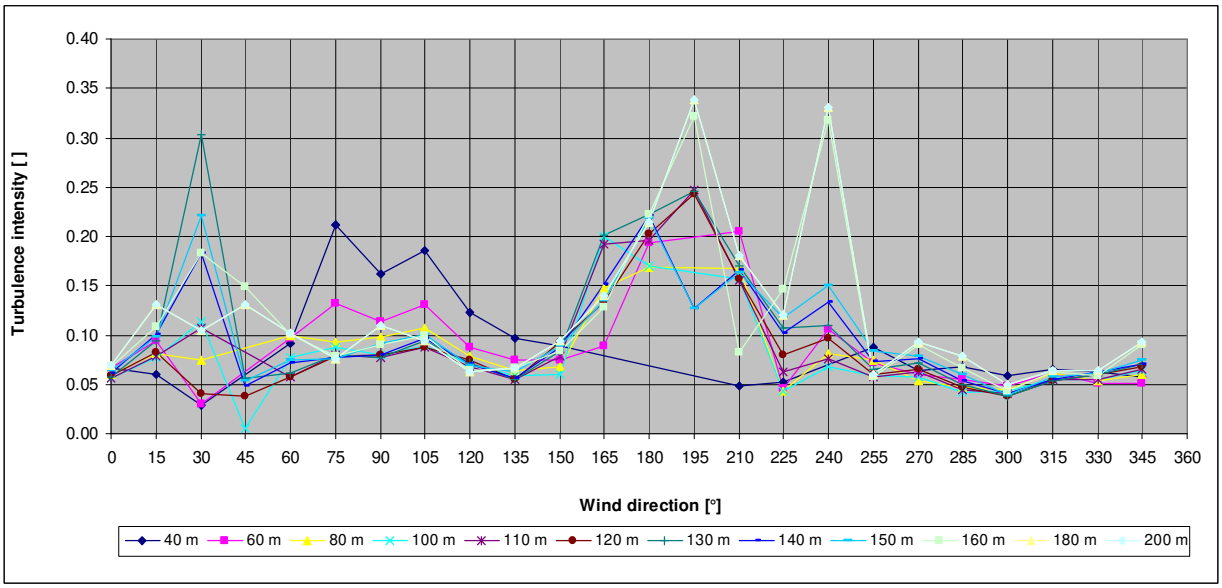

Figure 6: Directional mean turbulence during the evaluation period

7 Wind profile

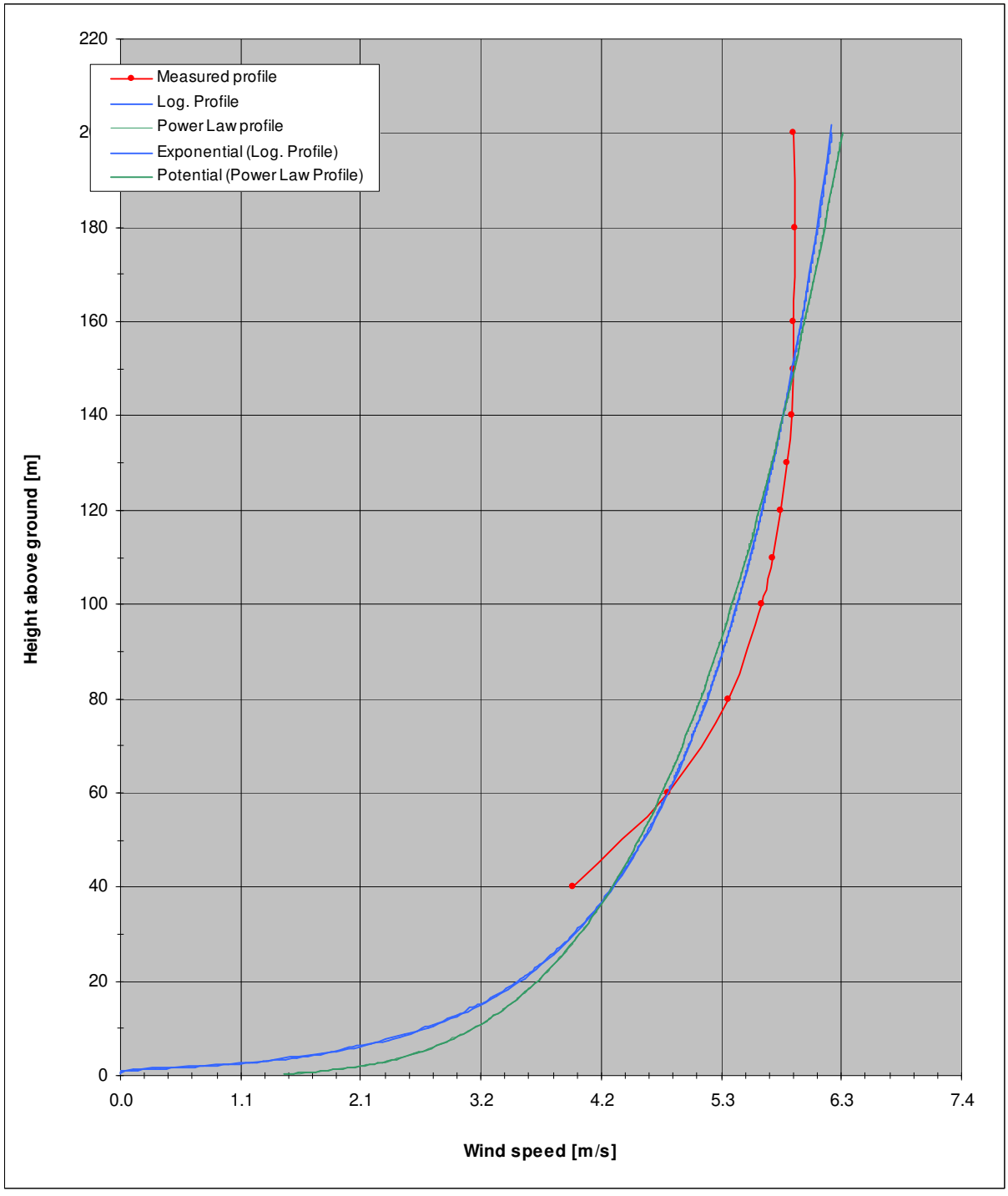

Figure 7: Wind profile during the evaluation period

8 Station Log

Date	Note	Issues
2017-06-04	Installation of LiDAR (Florian Schmidt, wtg) Connection to utility grid due to charger problems with 24 V	frequent restarts
2017-06-15	Manufacturer recommends to turn off LiDAR due to frequent restarts	frequent restarts
2017-06-16	LiDAR disconnected from Grid (Najmul Hossain, EQMS)	LiDAR disconnected
2017-07-27	Installation of DC-AC converter to supply LiDAR (Najmul Hossain, EQMS) LiDAR connected to power supply Performance check via remote connection (Florian Schmidt, wtg)	-
2017-07-28	Performance check via remote connection (Florian Schmidt, wtg)	-
2017-07-31	Data and performance check (Florian Schmidt, wtg) No connection to LiDAR	According to sent data, most likely no present LiDAR issues
2017-08-08	Data connection restored Data and performance check (Florian Schmidt, wtg)	-
2017-09-05	No connection to LiDAR	According to sent data, most likely no present LiDAR issues
2017-09-09	Data connection restored Data and performance check (Florian Schmidt, wtg)	-
2017-12-04	No connection to LiDAR	According to sent data, most likely no present LiDAR issues
2017-12-05	Data connection restored Data and performance check (Florian Schmidt, wtg)	-
2018-01-02	No connection to LiDAR	According to sent data, most likely no present LiDAR issues
2018-01-03	Data connection restored Data and performance check (Florian Schmidt, wtg)	-
2018-01-30	No connection to LiDAR	According to sent data, most likely no present LiDAR issues
2018-02-06	Data connection restored Data and performance check (Florian Schmidt, wtg)	-
2018-05-01	LiDAR shut down (02:20 - 02:30) LiDAR shut down (04:30 - 06:10)	No power supply / Low solar radiation due to heavy rain
2018-05-04	LiDAR shut down (10:50 - 12:10)	No power supply / Low solar radiation due to heavy rain
2018-05-07	LiDAR shut down (02:10 - 03:20) LiDAR shut down (11:20 - 12:30)	No power supply / Low solar radiation due to heavy rain
2018-05-15	LiDAR shut down (10:30 - 12:40)	No power supply / Low solar radiation due to heavy rain
2018-06-05	LiDAR shut down (10:50 - 12:10)	No power supply / Low solar radiation due to heavy rain
2018-07-11	LiDAR shut down (10:10 - 13:20)	No power supply / Low solar radiation due to cloudy conditions
2018-07-13	LiDAR shut down (09:50 - 13:00)	No power supply / Low solar radiation due to cloudy conditions

Date	Note	Issues
2018-07-15	LiDAR shut down (10:40 - 13:20)	No power supply / Low solar radiation due to cloudy conditions
2018-08-02	LiDAR shut down (10:40 - 10:50)	No power supply / Low solar radiation due to cloudy conditions
2018-08-06	LiDAR shut down (12:50 - 14:10)	No power supply / Low solar radiation due to cloudy conditions
2018-09-11	LiDAR shut down (11:20 - 12:40)	No power supply / Low solar radiation due to cloudy conditions
2018-09-16	LiDAR shut down (10:10 - 12:20)	No power supply / Low solar radiation due to cloudy conditions
2018-09-29	LiDAR shut down (9:50 - 10:20)	No power supply / Low solar radiation due to cloudy conditions
2018-10-25	No connection to LiDAR	According to sent data, most likely no present LiDAR issues
2018-10-26	Data connection restored Data and performance check (Florian Schmidt, wtg)	-
2018-11-01	Wiper nozzle is blocked Station keeper is manually cleaning the window with a special cleaning cloth until repair	Low data availability
2018-11-21	No connection to LiDAR	According to sent data, most likely no present LiDAR issues
2018-11-26	Data connection restored Data and performance check (Florian Schmidt, wtg)	-
2018-12-21	No connection to LiDAR	According to sent data, most likely no present LiDAR issues
2018-12-22	Data connection restored Data and performance check (Florian Schmidt, wtg)	-
2019-01-28	No connection to LiDAR	According to sent data, most likely no present LiDAR issues
2019-01-28	LiDAR shut down (0:00 - 24:00)	No power supply / Low solar radiation due to cloudy conditions
2019-01-29	LiDAR shut down (17:50 - 18:40)	No power supply / Low solar radiation due to cloudy conditions
2019-02-05	Data connection restored Data and performance check (Florian Schmidt, wtg)	-

Note: Weekly and other frequently performed checks as well as data backup will not be listed in the station log.

We hereby affirm that the evaluation was performed in accordance with the latest state of the art, impartially and to the best of our knowledge and belief.

Grevenbroich. 2019-02-19

Dipl.-Ing. Florian Schmidt
Project Manager

9 Appendix

9.1 Processing

Version	*Date*	*Content*
SG17010B1	2017-04-25	Verification of the remote sensing device type Leosphere WINDCUBE v2 S/N WLS7-598 performed at the verification station Grevenbroich
SG17010B2	2017-06-22	Installation of the Remote Sensing Device Type Leosphere WINDCUBE v2 S/N WLS7-598 at the site Feni
SG17010KB1	2017-08-31	ESMAPBD BDFE2 Cumulative Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni
SG17010KB2	2017-09-11	ESMAPBD BDFE2 Cumulative Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni
SG17010KB3	2017-10-06	ESMAPBD BDFE2 Cumulative Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni
SG17010KB4	2017-11-08	ESMAPBD BDFE2 Cumulative Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni
SG17010KB5	2017-12-18	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2017-11-01 to 2017-11-30
SG17010KB6	2018-01-17	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2017-12-01 to 2017-12-31
SG17010KB7	2018-03-02	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-01-01 to 2018-01-31
SG17010KB8	2018-03-02	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-02-01 to 2018-02-30
SG17010KB9	2018-04-13	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2017-06-01 to 2017-06-30
SG17010KB10	2018-04-13	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2017-07-01 to 2017-07-31
SG17010KB11	2018-04-13	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-03-01 to 2018-03-31
SG17010KB12	2018-05-24	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2017-08-01 to 2017-08-31
SG17010KB13	2018-05-24	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2017-09-01 to 2017-09-30
SG17010KB14	2018-05-24	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2017-10-01 to 2017-09-31
SG17010KB15	2018-05-24	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-04-01 to 2018-04-30
SG17010KB16	2018-06-06	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-05-01 to 2018-05-31
SG17010KB17	2018-07-03	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-06-01 to 2018-06-30
SG17010KB18	2018-08-10	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-07-01 to 2018-07-30
SG17010KB19	2018-09-03	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-08-01 to 2018-08-31

Version	*Date*	*Content*
SG17010KB20	2018-10-01	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-09-01 to 2018-09-30
SG17010KB21	2018-11-02	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-10-01 to 2018-10-31
SG17010KB22	2018-12-03	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-11-01 to 2018-11-30
SG17010KB23	2019-01-08	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2018-12-01 to 2018-12-31
SG17010KB24	2019-02-19	ESMAPBD BDFE2 Data Report WINDCUBEv2 S/N WLS7-598 at the site Feni for the period 2019-01-01 to 2019-01-31

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