esp
Environmental &
Safety Professionals

ENVIRONMENTAL NOISE MONITORING
QUARTER 1, 2018

Northparkes Mines
PO Box 995
Parkes NSW 2870

Job No: J38252
Report issued: 25 June 2018

ESP – ENVIRONMENTAL & SAFETY PROFESSIONALS

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All works carried out in preparing this report have been conducted on a fully professional basis with due care and attention utilising ESP professional knowledge and understanding of relevant and current National and State Standards, Compliance Codes, Regulations and Acts. The findings of this report represent the professional opinion of the current workplace situation from experienced technicians, professional scientists and HS&E consultants.

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This report relates to specific conditions existing at the time of undertaking the work. Current or future conditions of the areas reviewed may not be able to be assumed or inferred from information contained in this report.

REVISION HISTORY

Revision	Revision Description	Issued	Recipient
1	*Final version*	*4/6/2018*	*N. Jones*

EXECUTIVE SUMMARY

ESP – Environmental and Safety Professionals (ESP) – was commissioned by Northparkes Mines (NPM) to undertake Environmental Noise Assessments at four residential/farming properties (Hubberstone, Lone Pine, Milpose and Hillview) all within the vicinity of the NPM mine site. Monitoring was conducted to assess noise levels, resulting from NPM operations, at four key receivers around the site.

Attended noise monitoring was undertaken from the 21st to the 23rd of March 2018.

Weather conditions for the day monitoring were not favourable and adequate noise measurements could not be obtained during this period. Weather conditions for the evening and night were within range with all results indicating compliance at all locations.

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1. INTRODUCTION

ESP was commissioned by Northparkes Mines (NPM) to undertake an Environmental Noise Assessment during Quarter 1, 2018 as part of their regular noise monitoring program in accordance with Project Approval 11_0060.

This report presents:

- results of attended measurements from day, evening and night operation of the mine for the period from the 21st to the 23rd March 2018;
- an assessment of the results against Project Approval 11_0060 (DC 06-0026) requirements and the criteria described in Northparkes Mine Step Change Project Approval.

2. BACKGROUND

The NPM site is located approximately 27 kilometres NNW of the town of Parkes, NSW.

ESP was asked to conduct attended and unattended monitoring at four locations as per the following table.

Location name	Type
Hillview	Residential & farming
Hubberstone	Residential & farming
Milpose	Residential & farming
Lone Pine	Residential & farming

Table 1: Monitoring location and type

A map showing monitoring locations in relation to the mine site is presented in Appendix A of this report.

3. NOISE LIMITS

Noise Management Plan

NPM has implemented a Noise and Vibration Management Plan (NVMP) which requires noise to be monitored at key locations adjacent to the mine site.

The NVMP requires that attended noise monitoring be conducted once per quarter for three consecutive 15-minute periods at each monitoring location for each of the day, evening and night time periods. In addition, unattended noise monitoring must be conducted continuously for seven days per quarter.

Project Specific Criteria

According to PA 11_0060and the Northparkes Mine Step Change Project Approval, the project specific criteria at each location are as follows:

Period		Project Specific Criteria dB*	
Day	0700 - 1800	$L_{Aeq(15min)}$	35
Evening	1800 – 2200	$L_{Aeq(15min)}$	35
Night	2200 – 0700	$L_{Aeq(15min)}$	35
		$L_{A1(1min)}$	45

Table 2: Project specific criteria for day, evening & night periods.

* Note: All noise measurements are “A-weighted” sound pressure level measurements, hence, the notation “dB” has been used in this report without the additional qualifier “(A)” for purposes of brevity and readability.

4. NOISE LEVEL MEASUREMENT

Methodology - Equipment

Attended noise measurements were carried out using a Rion Class 1 sound level meter. Unattended noise measurement results were provided by NPM.

Calibration details are attached in Appendix B.

The equipment used is listed below:

Equipment	Model	Serial Number	Calibration due
Sound level meter (SLM)	Rion NL-52	00375605	24/05/2019

Table 3: Noise monitoring equipment details

Measurements were conducted in accordance with AS1055.1-1997 *Acoustics - Description and measurement of environmental noise - General procedures*.

Methodology – Meteorological Conditions

The noise limits in PA 11_0060 apply only in wind speeds up to 3m/s. Meteorological data from NPM's weather station, corresponding with the entire monitoring period, is attached in Appendix C.

It is noted that noise limits apply during relatively calm conditions (wind speeds up to 3 m/s equates to 10.8 km/h). Where wind speeds have exceeded this limit, measurements are marked as being not applicable using "NA". Comparison with the documented limit should only be made when measurement of wind speed conforms to the maximum allowable wind speed.

Observations

The noise output from the mine site was found to be continuous. No adjustments were required to the measured noise level for intermittent, tonal or impulsive characteristics. Additionally, the measurement points were chosen so that no adjustment was required for reflection or indoor measurement.

It is noted that at various times during attended monitoring, extraneous noise sources, i.e. sources other than the mine, were the primary contributor to measured noise levels. Commonly, these noise sources include wildlife (e.g. birds, frogs and insects), livestock (e.g. sheep and cattle), road traffic, overhead aircraft, farm machinery and vegetation noise (i.e. rustling of foliage). Where possible, extraneous noise was excluded from the result either by pausing the sound level meter until the extraneous noise event had ceased (such as for traffic or aircraft noise) or by removing the extraneous noise via frequency analysis – i.e. subtracting the contribution to the overall sound pressure level at key frequencies not related to noise emissions from NPM. Adjusting via frequency analysis is not possible with LA1 results.

Frequency analysis can only be utilised at frequencies where there is no overlap between the frequencies of NPM noise and extraneous noise. Peaks in the frequency spectrum of received noise are present but not caused by NPM noise (e.g. insect, frog and bird noise) at frequencies of approximately 2 kHz and above.

Attended Noise Monitoring Results

Measurements conducted during excessive winds do not conform to the maximum wind speed requirements of PA11_0060 and are not to be compared against the criteria. These levels are marked with the notation "NA" in the tables overleaf. Where noise levels have been adjusted due to the presence of extraneous noise such as insect or bird noise, these levels are marked with the notation "adj.".

Location	Date and Time	L_{A1} dB	L_{A10} dB	L_{Aeq} dB	L_{A90} dB	Compliance?	Notes
Hillview	21/03/2018 15:30	52.3	48.3	**46.3**	42.9	NA	
	21/03/2018 15:45	52.8	48.7	**46.7**	43.7	NA	Wind gust continually in excess of 3m/s Mine inaudible
	21/03/2018 16:00	56.5	49.8	**48.2**	42.1	NA	
Hubberstone	21/03/2018 16:50	55.1	48.2	**45.6**	38.8	NA	
	21/03/2018 17:05	55.9	48.9	**46.3**	38.5	NA	Wind gust continually in excess of 3m/s Mine inaudible
	21/03/2018 17:20	53.3	48.2	**45.0**	38.6	NA	
Milpose	21/03/2018 14:28	52.2	45.7	**42.9**	35.7	NA	
	21/03/2018 14:43	51.1	44.0	**40.7**	31.8	NA	Wind gust continually in excess of 3m/s Mine inaudible
	21/03/2018 14:58	45.0	39.0	**36.6**	30.7	NA	
Lonepine	21/03/2018 13:25	59.3	56.1	**53.5**	49.8	NA	
	21/03/2018 13:40	60.2	56.7	**53.3**	47.3	NA	Wind gust continually in excess of 3m/s Mine inaudible
	21/03/2018 13:55	62.5	56.9	**53.9**	45.8	NA	

Table 4: Daytime Attended Noise Results

Location	Date and Time	L_{A1} dB	L_{A10} dB	L_{Aeq} dB	L_{A90} dB	Compliance?	Notes
Hillview	22/03/2018 18:55	41.0	36.2	**34.1**	30.5	Yes	
	22/03/2018 19:10	44.8	36.4	**34.9**	30.9	Yes	Wildlife Noise Mine inaudible
	22/03/2018 19:25	42.5	35.3	**34.3**	30.2	Yes	
Hubberstone	21/03/2018 18:00	61.4	54.5	**51.4**	44.1	NA	
	21/03/2018 15:15	60.3	54.6	**51.7**	45.9	NA	Wind gust continually in excess of 3m/s Mine inaudible
	21/03/2018 18:30	60.3	53.8	**50.8**	44.3	NA	
Milpose	22/03/2018 20:00	48.9	47.7	**28.3**	36.9	Yes (adj)	
	22/03/2018 20:15	48.0	47.4	**28.2**	36.4	Yes (adj)	Frogs and insects from adjacent pond – due to this adjustment made to LAeq Mine slightly audible
	22/03/2018 20:30	50.2	47.8	**29.1**	36.4	Yes (adj)	
Lonepine	22/03/2018 21:00	37.3	31.3	**30.5**	25.5	Yes	
	22/03/2018 21:15	41.4	53.3	**28.5**	32.9	Yes	Insect noise necessitating adjustment Dogs barking Wind noise Mine inaudible
	22/03/2018 21:30	49.0	45.1	**34.4**	36.4	Yes (adj)	

Table 5: Evening Attended Noise Results

Location	Date and Time	L_{A1} dB	L_{A10} dB	L_{Aeq} dB	L_{A90} dB	Compliance?	Notes
Hillview	23/03/2018 01:25	**33.3**	30.5	**28.2**	23.5	Yes	
	23/03/2018 01:40	**34.8**	32.2	**32.2**	27.4	Yes	Mine inaudible
	23/03/2018 01:55	**34.5**	31.0	**29.6**	25.3	Yes	
Hubberstone	23/03/2018 00:22	**20.6**	37.0	**34.5**	29.0	Yes (adj)	
	23/03/2018 00:37	**41.0**	34.3	**32.0**	27.9	Yes	Sheep bleating Mine inaudible
	23/03/2018 00:52	**41.1**	34.9	**32.9**	26.4	Yes	
Milpose	22/03/2018 23:00	**47.9**	40.7	**29.3**	28.4	Yes (adj)	
	22/03/2018 23:15	**40.7**	37.6	**33.9**	28.3	Yes	Inspects Might slightly audible
	22/03/2018 23:30	**47.3**	43.7	**34.8**	28.4	Yes (adj)	
Lonepine	22/03/2018 22:00	**50.8**	43.7	**34.8**	38.1	Yes (adj)	
	22/03/2018 22:15	**50.7**	48.2	**33.7**	40.6	Yes (adj)	Dogs barking windy Mine inaudible
	22/03/2018 22:30	**50.4**	47.3	**33.9**	38.6	Yes (adj)	

Table 6: Night Attended Noise Results

5. DISCUSSION

Measurements indicate compliance with the 15-minute L_{Aeq} limitation of 35 dB at all locations during conforming weather conditions.

No noise result could be obtained during the day period due to constant wind noise with wind speed continually in excess of 3m/s.

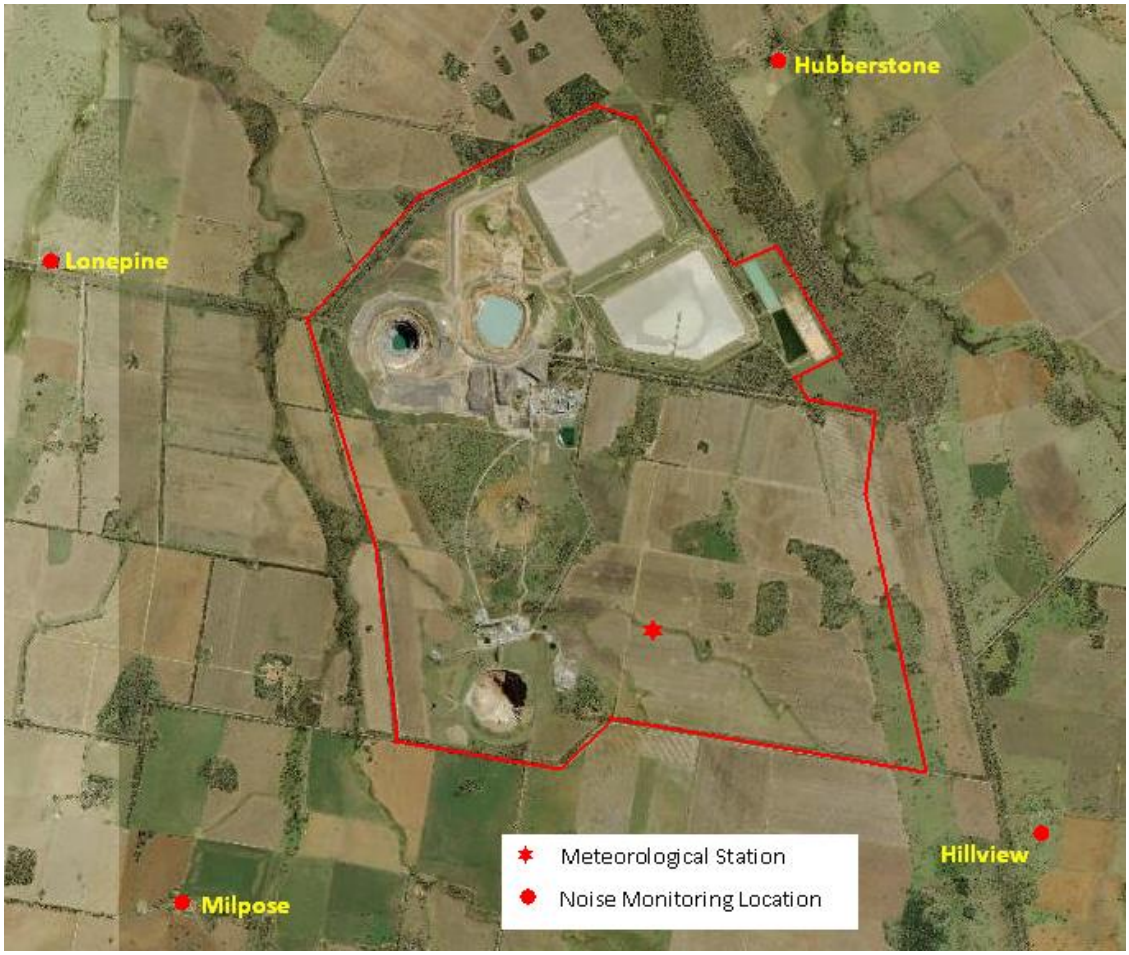
Where possible, extraneous noise sources have been excluded from attended measurements by pausing the sound level meter when non-NPM sources predominate (e.g. passing traffic or aircraft) and/or subtracting the component of the frequency spectrum that is caused by non-NPM sources (e.g. wildlife noise, livestock noise or foliage noise). Extraneous noise sources may contribute as much as 15 to 20 dB to the overall measured noise levels.

6. CONCLUSION

Environmental noise monitoring was conducted at four noise sensitive receivers around adjacent properties to Northparkes Mine site. attended monitoring was conducted from the 21st to the 23rd March 2018.

Attended noise monitoring results indicate noise emissions from the mine site comply with the development consent criteria. Weather conditions overall were not favourable for noise monitoring; however, measurements indicate compliance at all locations during conforming conditions.

Appendix A – Map of Monitoring Locations



Appendix B – Equipment Calibration Details

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Sound Level Meter
IEC 61672-3.2013

Calibration Certificate

Calibration Number C17244

Client Details	ESP Environmental & Safety Professionals Unit 2, 2B Parker Street FOOTSCRAY VIC 3011
Equipment Tested/ Model Number :	Rion NL-52EX
Instrument Serial Number :	00375605
Microphone Serial Number :	11074
Pre-amplifier Serial Number :	65732

Pre-Test Atmospheric Conditions		**Post-Test Atmospheric Conditions**	
Ambient Temperature :	22.1°C	**Ambient Temperature :**	22.2°C
Relative Humidity :	53.1%	**Relative Humidity :**	53.1%
Barometric Pressure :	99.31kPa	**Barometric Pressure :**	99.29kPa

Calibration Technician : Vicky Jaiswal
Calibration Date : 24/05/2017
Secondary Check: Sandra Minto
Report Issue Date : 24/05/2017
Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
12: Acoustical Sig. tests of a frequency weighting	*Pass*	17: Level linearity incl. the level range control	*Pass*
13: Electrical Sig. tests of frequency weightings	*Pass*	18: Toneburst response	*Pass*
14: Frequency and time weightings at 1 kHz	*Pass*	19: C Weighted Peak Sound Level	*Pass*
15: Long Term Stability	*Pass*	20: Overload Indication	*Pass*
16: Level linearity on the reference level range	*Pass*	21: High Level Stability	*Pass*

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 test 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.

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	*±0.16dB*	*Temperature*	*±0.05°C*
12.5kHz	*±0.2dB*	*Relative Humidity*	*±0.46%*
16kHz	*±0.29dB*	*Barometric Pressure*	*±0.017kPa*
Electrical Tests			
31.5 Hz to 20 kHz	*±0.12dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

NATA
WORLD RECOGNISED ACCREDITATION

This calibration certificate is to be read in conjunction with the calibration test report.

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
Accredited for compliance with ISO/IEC 17025.

The results of the tests, calibrations and/or measurements included in this document are traceable to Australian/national standards.

NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

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Octave Band Filter
AS 4476:1997
Calibration Certificate

Calibration Number C17244A

Client Details	ESP Environmental & Safety Professionals Unit 2, 2B Parker Street FOOTSCRAY VIC 3011
Filter Model Number :	Rion NL-52EX
Filter Serial Number :	N/A
Instrument Serial Number :	00375605
Microphone Serial Number :	11074
Pre-amplifier Serial Number :	65732

Atmospheric Conditions

Ambient Temperature :	21.8°C
Relative Humidity :	49.1%
Barometric Pressure :	99.27kPa

Calibration Technician : Vicky Jaiswal — **Secondary Check:** Sandra Minto
Calibration Date : 24/05/2017 — **Report Issue Date :** 24/05/2017

Approved Signatory : Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
4.4 & 5.3: 1/1 Octave relative attenuation	*Pass*	4.6 & 5.5: Linear operating range	*Pass*
4.4 & 5.3: 1/3 Octave relative attenuation	*Pass*	4.8 & 5.7: Anti-alias filters	*Pass*
		4.10 & 5.9: Flat frequency response	*Pass*

The fractional octave band meter under test has been shown to conform to the class 1 requirements for periodic testing as described in AS 4476:1997 for the tests stated above.

Least Uncertainties of Measurement -

Electrical Tests		Environmental Conditions	
< 16Hz	*±0.19dB*	*Temperature*	*±0.05°C*
16Hz-100Hz	*±0.11dB*	*Relative Humidity*	*±0.46%*
100Hz-1000Hz	*±0.09dB*	*Barometric Pressure*	*±0.017kPa*
1000Hz-10kHz	*±0.09dB*		
>10kHz	*±0.16dB*		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.

This calibration certificate is to be read in conjunction with the calibration test report.

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Appendix C – Weather Conditions during Monitoring Period

Note: Data provided by Northparkes Mine.

Wind-Rose

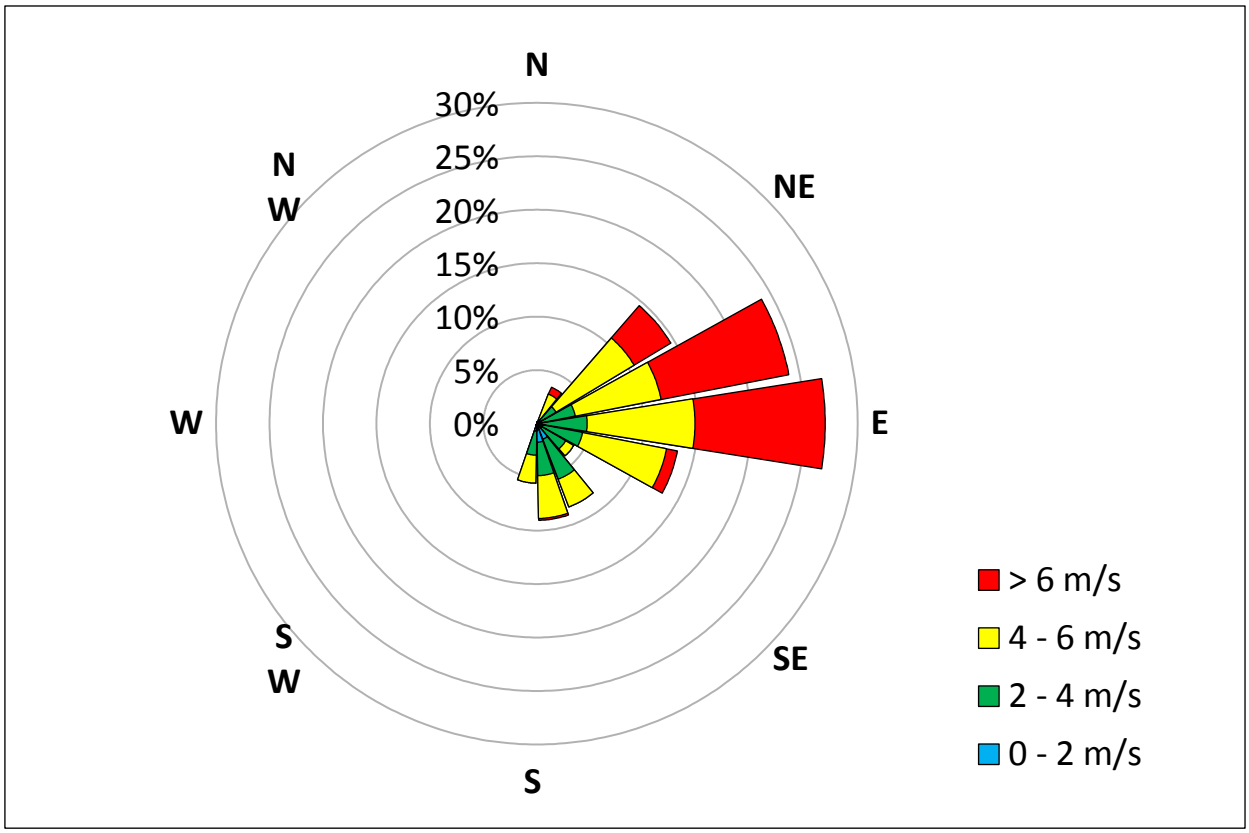

Figure 1 - Wind rose for period 20/03/2018 – 23/03/2018

Tabulated Meteorological Conditions

Date & time	Wind speed (m/s)	Wind Direction (°)
20/03/2018 0:00	2.411	180.7
20/03/2018 0:10	1.952	184.7
20/03/2018 0:20	1.725	177.8
20/03/2018 0:30	1.759	180.4
20/03/2018 0:40	1.88	182.3
20/03/2018 0:50	1.958	175.5
20/03/2018 1:00	2.223	170.5
20/03/2018 1:10	2.283	174.1
20/03/2018 1:20	2.599	176.3
20/03/2018 1:30	2.803	188.4
20/03/2018 1:40	2.055	185.7
20/03/2018 1:50	1.368	174
20/03/2018 2:00	1.959	144
20/03/2018 2:10	2.319	143.4
20/03/2018 2:20	1.79	156.1
20/03/2018 2:30	2.244	150.8
20/03/2018 2:40	2.013	153.2
20/03/2018 2:50	1.893	164.5
20/03/2018 3:00	2.08	164.3
20/03/2018 3:10	2.162	168.1
20/03/2018 3:20	1.582	150.5
20/03/2018 3:30	1.628	130.8
20/03/2018 3:40	1.444	144.8
20/03/2018 3:50	1.51	167.5
20/03/2018 4:00	1.44	149.3
20/03/2018 4:10	1.74	130
20/03/2018 4:20	2.441	152.2
20/03/2018 4:30	2.069	154.4
20/03/2018 4:40	2.206	163.3
20/03/2018 4:50	2.508	169.7
20/03/2018 5:00	2.671	164
20/03/2018 5:10	2.85	158.1
20/03/2018 5:20	2.679	155.7
20/03/2018 5:30	2.696	156.6
20/03/2018 5:40	2.407	152.9
20/03/2018 5:50	2.325	157.1
20/03/2018 6:00	2.721	162.3
20/03/2018 6:10	2.819	157.3
20/03/2018 6:20	2.393	152
20/03/2018 6:30	2.623	150
20/03/2018 6:40	2.706	150.6
20/03/2018 6:50	2.211	156.6
20/03/2018 7:00	2.081	163.3
20/03/2018 7:10	1.953	162.8
20/03/2018 7:20	1.447	155.8
20/03/2018 7:30	1.596	167.3
20/03/2018 7:40	1.328	179.9
20/03/2018 7:50	1.968	170.7

Date & time	Wind speed (m/s)	Wind Direction (°)
20/03/2018 8:00	2.51	166
20/03/2018 8:10	2.679	159.9
20/03/2018 8:20	3.251	146.1
20/03/2018 8:30	4.083	145.8
20/03/2018 8:40	5.342	139.1
20/03/2018 8:50	5.771	148.6
20/03/2018 9:00	4.372	147.9
20/03/2018 9:10	5.865	146.3
20/03/2018 9:20	5.892	154.7
20/03/2018 9:30	5.941	153.3
20/03/2018 9:40	5.702	142.9
20/03/2018 9:50	6.602	162.9
20/03/2018 10:00	5.858	160.4
20/03/2018 10:10	5.225	159.1
20/03/2018 10:20	4.736	163.6
20/03/2018 10:30	5.01	157.8
20/03/2018 10:40	4.755	165.1
20/03/2018 10:50	5.291	156
20/03/2018 11:00	4.82	171.3
20/03/2018 11:10	5.333	169.8
20/03/2018 11:20	5.244	158.8
20/03/2018 11:30	4.835	162.8
20/03/2018 11:40	4.913	165.7
20/03/2018 11:50	4.601	155.5
20/03/2018 12:00	4.964	161.1
20/03/2018 12:10	4.797	178.7
20/03/2018 12:20	5.392	166.3
20/03/2018 12:30	5.135	178.4
20/03/2018 12:40	5.11	175.7
20/03/2018 12:50	5.086	174
20/03/2018 13:00	4.504	187.1
20/03/2018 13:10	4.493	148.2
20/03/2018 13:20	3.638	164.1
20/03/2018 13:30	4.314	162.9
20/03/2018 13:40	3.963	185
20/03/2018 13:50	4.322	190.7
20/03/2018 14:00	4.617	182.8
20/03/2018 14:10	3.713	180.9
20/03/2018 14:20	4.58	191.7
20/03/2018 14:30	5.157	198.7
20/03/2018 14:40	4.142	160.4
20/03/2018 14:50	4.224	178.2
20/03/2018 15:00	3.828	150.3
20/03/2018 15:10	4.274	171.4
20/03/2018 15:20	4.617	150
20/03/2018 15:30	4.369	158.2
20/03/2018 15:40	4.247	171.9
20/03/2018 15:50	4.934	157.6

Date & time	Wind speed (m/s)	Wind Direction (°)
20/03/2018 16:00	4.277	196.1
20/03/2018 16:10	4.584	163.8
20/03/2018 16:20	5.222	164.4
20/03/2018 16:30	4.377	177.4
20/03/2018 16:40	4.606	176.7
20/03/2018 16:50	4.751	165.6
20/03/2018 17:00	4.794	196.6
20/03/2018 17:10	4.716	181.1
20/03/2018 17:20	4.858	180.3
20/03/2018 17:30	4.546	181.8
20/03/2018 17:40	4.529	184.1
20/03/2018 17:50	5.137	187.4
20/03/2018 18:00	5.384	186.6
20/03/2018 18:10	4.717	183.9
20/03/2018 18:20	4.106	187.4
20/03/2018 18:30	3.663	189.3
20/03/2018 18:40	3.608	194.5
20/03/2018 18:50	3.425	193.6
20/03/2018 19:00	3.369	194
20/03/2018 19:10	3.514	197.1
20/03/2018 19:20	3.287	195.2
20/03/2018 19:30	3.038	190.8
20/03/2018 19:40	1.756	167.6
20/03/2018 19:50	1.961	169.3
20/03/2018 20:00	2.171	170.9
20/03/2018 20:10	1.846	152.9
20/03/2018 20:20	1.825	157
20/03/2018 20:30	2.257	169.3
20/03/2018 20:40	2.669	161.6
20/03/2018 20:50	2.716	146.8
20/03/2018 21:00	3.954	149.4
20/03/2018 21:10	4.482	122.8
20/03/2018 21:20	5.445	82.3
20/03/2018 21:30	6.284	75.11
20/03/2018 21:40	7.851	78.26
20/03/2018 21:50	8.65	69.03
20/03/2018 22:00	8.71	70.51
20/03/2018 22:10	7.59	68
20/03/2018 22:20	7.936	77.59
20/03/2018 22:30	8.28	79.86
20/03/2018 22:40	8.04	75.2
20/03/2018 22:50	6.666	70.01
20/03/2018 23:00	5.198	74.48
20/03/2018 23:10	7.452	73.99
20/03/2018 23:20	7.361	74.79
20/03/2018 23:30	8.06	80.6
20/03/2018 23:40	8.52	78.8
20/03/2018 23:50	7.116	79.64
21/03/2018 0:00	5.591	79.43
21/03/2018 0:10	4.563	79.52
21/03/2018 0:20	4.83	83.9

Date & time	Wind speed (m/s)	Wind Direction (°)
21/03/2018 0:30	4.948	87.2
21/03/2018 0:40	4.222	93.1
21/03/2018 0:50	4.163	100.6
21/03/2018 1:00	3.4	103.5
21/03/2018 1:10	3.744	91.2
21/03/2018 1:20	4.321	90.8
21/03/2018 1:30	4.774	95.8
21/03/2018 1:40	4.872	100.3
21/03/2018 1:50	4.454	101.6
21/03/2018 2:00	2.508	102.3
21/03/2018 2:10	3.386	102.3
21/03/2018 2:20	3.734	94
21/03/2018 2:30	4.048	91.3
21/03/2018 2:40	4.411	88.2
21/03/2018 2:50	4.632	85.9
21/03/2018 3:00	5.053	92.3
21/03/2018 3:10	4.273	89.9
21/03/2018 3:20	4.765	97.4
21/03/2018 3:30	4.372	94.3
21/03/2018 3:40	4.672	95.4
21/03/2018 3:50	5.988	95.1
21/03/2018 4:00	5.878	98
21/03/2018 4:10	5.036	104
21/03/2018 4:20	5.465	103.1
21/03/2018 4:30	4.589	101.4
21/03/2018 4:40	3.511	114.9
21/03/2018 4:50	3.384	128.5
21/03/2018 5:00	2.383	142.8
21/03/2018 5:10	2.132	138
21/03/2018 5:20	1.847	139.8
21/03/2018 5:30	2.501	119.7
21/03/2018 5:40	2.847	116.7
21/03/2018 5:50	2.844	122.5
21/03/2018 6:00	2.461	117.5
21/03/2018 6:10	3.353	111.8
21/03/2018 6:20	4.261	109.8
21/03/2018 6:30	3.318	108.8
21/03/2018 6:40	4.18	113
21/03/2018 6:50	4.297	115.4
21/03/2018 7:00	3.639	121.4
21/03/2018 7:10	4.314	115.5
21/03/2018 7:20	5.382	108.8
21/03/2018 7:30	6.05	101
21/03/2018 7:40	6.555	100.4
21/03/2018 7:50	6.352	98.7
21/03/2018 8:00	6.582	99.9
21/03/2018 8:10	5.929	91.8
21/03/2018 8:20	7.092	88.1
21/03/2018 8:30	7.887	86
21/03/2018 8:40	7.309	82.3
21/03/2018 8:50	7.741	75.92

Date & time	Wind speed (m/s)	Wind Direction (°)
21/03/2018 9:00	7.145	65.24
21/03/2018 9:10	7.36	70.41
21/03/2018 9:20	7.555	81.7
21/03/2018 9:30	8.49	79.68
21/03/2018 9:40	7.925	71.4
21/03/2018 9:50	7.588	75.96
21/03/2018 10:00	6.906	73.34
21/03/2018 10:10	8.67	67.52
21/03/2018 10:20	7.773	71.86
21/03/2018 10:30	7.694	60.1
21/03/2018 10:40	7.696	74.73
21/03/2018 10:50	8.93	83.3
21/03/2018 11:00	8.96	68.14
21/03/2018 11:10	8.64	70.16
21/03/2018 11:20	9.66	83.6
21/03/2018 11:30	8.95	74.7
21/03/2018 11:40	7.12	71.86
21/03/2018 12:00	8.59	63.91
21/03/2018 12:10	7.815	72.93
21/03/2018 12:20	8.95	67.1
21/03/2018 12:30	8.06	71.84
21/03/2018 12:40	7.854	69.53
21/03/2018 12:50	7.039	73.41
21/03/2018 13:00	7.457	54.16
21/03/2018 13:10	7.56	54.93
21/03/2018 13:20	7.116	66.56
21/03/2018 13:30	6.645	47.41
21/03/2018 13:40	6.198	59.81
21/03/2018 13:50	6.215	61.15
21/03/2018 14:00	5.668	60.5
21/03/2018 14:10	7.064	51.76
21/03/2018 14:20	6.184	56.4
21/03/2018 14:30	6.766	59.97
21/03/2018 14:40	6.956	59.77
21/03/2018 14:50	6.993	52.69
21/03/2018 15:00	7.638	71.2
21/03/2018 15:10	7.499	71.54
21/03/2018 15:20	6.553	62.44
21/03/2018 15:30	7.656	66.03
21/03/2018 15:40	7.456	71.32
21/03/2018 15:50	7.137	73.91
21/03/2018 16:00	7.041	75.3
21/03/2018 16:10	6.868	67.53
21/03/2018 16:20	7.488	71.01
21/03/2018 16:30	6.968	61.54
21/03/2018 16:40	7.279	61.89
21/03/2018 16:50	7.856	61.11
21/03/2018 17:00	8.12	64.34
21/03/2018 17:10	7.704	60.28
21/03/2018 17:20	7.957	62.71
21/03/2018 17:30	8.93	66.34

Date & time	Wind speed (m/s)	Wind Direction (°)
21/03/2018 17:40	8.52	64.05
21/03/2018 17:50	8.57	60.55
21/03/2018 18:00	7.481	66.04
21/03/2018 18:10	7.875	70
21/03/2018 18:20	8.49	61.64
21/03/2018 18:30	8.64	69.84
21/03/2018 18:40	7.718	76.23
21/03/2018 18:50	8.03	76.41
21/03/2018 19:00	8.49	73.59
21/03/2018 19:10	8.48	76.61
21/03/2018 19:20	8	71.85
21/03/2018 19:30	6.15	75.83
21/03/2018 19:40	8.16	79.07
21/03/2018 19:50	8.41	82.6
21/03/2018 20:00	6.95	77.3
21/03/2018 20:10	5.654	88.8
21/03/2018 20:20	4.363	100.9
21/03/2018 20:30	5.724	102.1
21/03/2018 20:40	5.533	102.8
21/03/2018 20:50	5.474	104.9
21/03/2018 21:00	5.357	107
21/03/2018 21:10	5.454	109.1
21/03/2018 21:20	5.374	110.3
21/03/2018 21:30	5.9	111.5
21/03/2018 21:40	5.866	106.3
21/03/2018 21:50	5.721	101.8
21/03/2018 22:00	6.045	101.6
21/03/2018 22:10	6.984	100.9
21/03/2018 22:20	5.787	102.7
21/03/2018 22:30	5.404	98.5
21/03/2018 22:40	5.813	101.5
21/03/2018 22:50	5.467	102.9
21/03/2018 23:00	5.511	104.5
21/03/2018 23:10	5.452	101.4
21/03/2018 23:20	5.203	101.5
21/03/2018 23:30	5.08	95
21/03/2018 23:40	4.455	91.1
21/03/2018 23:50	4.922	90.4
22/03/2018 0:00	5.486	96.6
22/03/2018 0:10	4.592	93.6
22/03/2018 0:20	4.173	99.1
22/03/2018 0:30	3.565	111.7
22/03/2018 0:40	2.446	118.7
22/03/2018 0:50	2.244	157.4
22/03/2018 1:00	2.623	145.9
22/03/2018 1:10	3.259	134.3
22/03/2018 1:20	4.165	127.5
22/03/2018 1:30	4.95	119.7
22/03/2018 1:40	4.442	112.1
22/03/2018 1:50	3.439	109.3
22/03/2018 2:00	4.244	96.7

Date & time	Wind speed (m/s)	Wind Direction (°)
22/03/2018 2:10	5.39	90.8
22/03/2018 2:20	5.262	87.1
22/03/2018 2:30	4.355	87.5
22/03/2018 2:40	3.95	92.8
22/03/2018 2:50	3.432	98.5
22/03/2018 3:00	2.866	123
22/03/2018 3:10	2.971	131.2
22/03/2018 3:20	3.432	126.1
22/03/2018 3:30	2.283	192.3
22/03/2018 3:40	2.986	205.1
22/03/2018 3:50	3.335	174.1
22/03/2018 4:00	4.941	124.2
22/03/2018 4:10	6.713	103
22/03/2018 4:20	4.846	109
22/03/2018 4:30	2.892	129.3
22/03/2018 4:40	2.389	159.6
22/03/2018 4:50	2.953	144.1
22/03/2018 5:00	4.098	116.7
22/03/2018 5:10	4.138	114.2
22/03/2018 5:20	4.105	117.3
22/03/2018 5:30	3.605	118.2
22/03/2018 5:40	3.196	116.2
22/03/2018 5:50	3.46	120.7
22/03/2018 6:00	3.94	124
22/03/2018 6:10	3.699	121.3
22/03/2018 6:20	4.089	110.8
22/03/2018 6:30	3.084	107.2
22/03/2018 6:40	3.322	104.8
22/03/2018 6:50	3.156	104.5
22/03/2018 7:00	3.507	98.3
22/03/2018 7:10	4.05	102.2
22/03/2018 7:20	4.577	98.5
22/03/2018 7:30	4.917	107.9
22/03/2018 7:40	4.09	114.8
22/03/2018 7:50	3.743	116.7
22/03/2018 8:00	4.545	104.9
22/03/2018 8:10	4.42	94.2
22/03/2018 8:20	4.135	101
22/03/2018 8:30	3.064	81.3
22/03/2018 8:40	2.837	83.9
22/03/2018 8:50	4.014	73.77
22/03/2018 9:00	2.787	77.04
22/03/2018 9:10	1.888	109.6
22/03/2018 9:20	1.637	92.8
22/03/2018 9:30	2.591	87.1
22/03/2018 9:40	3.244	93.1
22/03/2018 9:50	3.547	91.3
22/03/2018 10:00	3.062	69.39
22/03/2018 10:10	3.124	60.4
22/03/2018 10:20	3.239	54.23
22/03/2018 10:30	5.54	71.71

Date & time	Wind speed (m/s)	Wind Direction (°)
22/03/2018 10:40	4.755	64.95
22/03/2018 10:50	4.914	71.54
22/03/2018 11:00	3.742	74.92
22/03/2018 11:10	4.017	95.1
22/03/2018 11:20	5.163	113.5
22/03/2018 11:30	4.9	111.5
22/03/2018 11:40	4.716	96.9
22/03/2018 11:50	4.699	108
22/03/2018 12:00	5.678	87.5
22/03/2018 12:10	5.654	100.8
22/03/2018 12:20	5.37	105
22/03/2018 12:30	5.541	92.5
22/03/2018 12:40	6.006	82.4
22/03/2018 12:50	5.504	84.3
22/03/2018 13:00	4.384	72.18
22/03/2018 13:10	5.643	73.09
22/03/2018 13:20	3.93	98.8
22/03/2018 13:30	4.025	91.9
22/03/2018 13:40	5.72	67.89
22/03/2018 13:50	5.382	70.26
22/03/2018 14:00	4.666	65.75
22/03/2018 14:10	4.332	88.6
22/03/2018 14:20	5.17	112.1
22/03/2018 14:30	5.03	111.6
22/03/2018 14:40	4.25	96.8
22/03/2018 14:50	5.863	89
22/03/2018 15:00	5.72	80.1
22/03/2018 15:10	5.449	85.1
22/03/2018 15:20	5.382	90.9
22/03/2018 15:30	5.297	95.9
22/03/2018 15:40	5.181	95.9
22/03/2018 15:50	5.835	103.1
22/03/2018 16:00	5.656	95.5
22/03/2018 16:10	5.712	91.4
22/03/2018 16:20	5.64	94.4
22/03/2018 16:30	5.659	93.4
22/03/2018 16:40	5.486	94
22/03/2018 16:50	5.878	95.3
22/03/2018 17:00	5.63	94.2
22/03/2018 17:10	5.646	99.3
22/03/2018 17:20	5.288	97
22/03/2018 17:30	5.059	94.9
22/03/2018 17:40	4.989	75.43
22/03/2018 17:50	5.913	62.64
22/03/2018 18:00	4.826	65.48
22/03/2018 18:10	4.27	66.27
22/03/2018 18:20	3.918	65.12
22/03/2018 18:30	2.958	71.9
22/03/2018 18:40	2.151	60.65
22/03/2018 18:50	1.869	56.9
22/03/2018 19:00	1.819	68.18

Date & time	Wind speed (m/s)	Wind Direction (°)
22/03/2018 19:10	1.536	98.9
22/03/2018 19:20	2.54	88.6
22/03/2018 19:30	3.11	91.3
22/03/2018 19:40	2.813	97.5
22/03/2018 19:50	2.58	116.9
22/03/2018 20:00	2.304	125.9
22/03/2018 20:10	2.296	120.3
22/03/2018 20:20	2.574	102
22/03/2018 20:30	2.732	95.2
22/03/2018 20:40	2.713	89.4
22/03/2018 20:50	3.132	82.5
22/03/2018 21:00	3.003	67.48
22/03/2018 21:10	3.697	65.43
22/03/2018 21:20	4.28	70.43
22/03/2018 21:30	4.323	67.86
22/03/2018 21:40	4.318	66.15
22/03/2018 21:50	3.573	67.76
22/03/2018 22:00	3.261	76.71
22/03/2018 22:10	2.144	88.3
22/03/2018 22:20	2.118	90.1
22/03/2018 22:30	3.138	77.2
22/03/2018 22:40	4.077	61.85
22/03/2018 22:50	3.772	66.62
22/03/2018 23:00	3.608	65.5
22/03/2018 23:10	5.263	69.97
22/03/2018 23:20	5.824	68.83
22/03/2018 23:30	5.963	69.76
22/03/2018 23:40	4.99	72.5
22/03/2018 23:50	4.677	78.59
23/03/2018 0:00	4.713	77.69
23/03/2018 0:10	5.162	77.67
23/03/2018 0:20	4.959	76.8
23/03/2018 0:30	4.442	81.7
23/03/2018 0:40	4.06	77.44
23/03/2018 0:50	2.747	67.36
23/03/2018 1:00	1.636	66.52
23/03/2018 1:10	2.445	85.8
23/03/2018 1:20	3.025	87.1
23/03/2018 1:30	4.344	91.3
23/03/2018 1:40	3.898	95
23/03/2018 1:50	2.856	95.5
23/03/2018 2:00	2.721	90.2
23/03/2018 2:10	2.52	104.2
23/03/2018 2:20	2.643	102.3
23/03/2018 2:30	1.781	118.4
23/03/2018 2:40	1.556	119.3
23/03/2018 2:50	1.683	119.8
23/03/2018 3:00	2.054	100.1
23/03/2018 3:10	2.685	85.7
23/03/2018 3:20	3.912	72.26
23/03/2018 3:30	4.581	58.15

Date & time	Wind speed (m/s)	Wind Direction (°)
23/03/2018 3:40	5.372	61.52
23/03/2018 3:50	4.545	63.23
23/03/2018 4:00	3.768	58.84
23/03/2018 4:10	4.738	58.27
23/03/2018 4:20	5.383	60.43
23/03/2018 4:30	5.586	59.73
23/03/2018 4:40	5.421	58.42
23/03/2018 4:50	4.832	57.69
23/03/2018 5:00	4.646	56.82
23/03/2018 5:10	5.764	61.87
23/03/2018 5:20	5.707	68.13
23/03/2018 5:30	5.881	68.96
23/03/2018 5:40	6.91	65.57
23/03/2018 5:50	5.182	61.09
23/03/2018 6:00	5.652	57.46
23/03/2018 6:10	5.48	60.86
23/03/2018 6:20	5.668	55.11
23/03/2018 6:30	5.663	51.56
23/03/2018 6:40	5.535	48.57
23/03/2018 6:50	5.744	51.72
23/03/2018 7:00	5.752	49.52
23/03/2018 7:10	6.011	61.71
23/03/2018 7:20	5.732	54.97
23/03/2018 7:30	4.651	57.94
23/03/2018 7:40	5.002	49.82
23/03/2018 7:50	5.035	42.14
23/03/2018 8:00	4.76	51.04
23/03/2018 8:10	4.112	51.32
23/03/2018 8:20	4.375	68.18
23/03/2018 8:30	4.579	55.66
23/03/2018 8:40	3.896	55.15
23/03/2018 8:50	3.427	53.87
23/03/2018 9:00	5.247	60
23/03/2018 9:10	6.485	55.33
23/03/2018 9:20	6.557	59.36
23/03/2018 9:30	6.446	53.92
23/03/2018 9:40	5.159	55.25
23/03/2018 9:50	5.396	45.47
23/03/2018 10:00	6.613	37.45
23/03/2018 10:10	6.49	36.89
23/03/2018 10:20	6.031	53.96
23/03/2018 10:30	6.381	47.74
23/03/2018 10:40	6.664	43.45
23/03/2018 10:50	5.004	50.17
23/03/2018 11:00	4.521	47.17
23/03/2018 11:10	5.249	37.28
23/03/2018 11:20	5.08	39.95
23/03/2018 11:30	5.504	46.56
23/03/2018 11:40	5.225	38.61
23/03/2018 11:50	5.968	49.22
23/03/2018 12:00	5.535	41.56

Date & time	Wind speed (m/s)	Wind Direction (°)
23/03/2018 12:10	5.602	60.99
23/03/2018 12:20	6.379	51.25
23/03/2018 12:30	5.348	53.06
23/03/2018 12:40	5.307	66.07
23/03/2018 12:50	4.866	53.61
23/03/2018 13:00	6.227	44.73
23/03/2018 13:10	6.037	48.91
23/03/2018 13:20	4.781	35.51
23/03/2018 13:30	5.111	39.9
23/03/2018 13:40	5.066	43.57
23/03/2018 13:50	5.734	27.44
23/03/2018 14:00	5.447	17.57
23/03/2018 14:10	4.567	22.72
23/03/2018 14:20	5.018	31.97
23/03/2018 14:30	5.309	30.73
23/03/2018 14:40	4.505	47.17
23/03/2018 14:50	5.609	25.55
23/03/2018 15:00	5.241	21.8
23/03/2018 15:10	5.589	48.67
23/03/2018 15:20	5.14	42.78
23/03/2018 15:30	4.811	35.95
23/03/2018 15:40	5.14	56.39
23/03/2018 15:50	5.407	36.07
23/03/2018 16:00	6.003	21.81
23/03/2018 16:10	4.491	25.84
23/03/2018 16:20	5.705	43.94
23/03/2018 16:30	5.593	53.39
23/03/2018 16:40	6.13	46.86
23/03/2018 16:50	6.017	60
23/03/2018 17:00	5.396	58
23/03/2018 17:10	5.261	66.32
23/03/2018 17:20	5.615	60.24
23/03/2018 17:30	5.484	55.2
23/03/2018 17:40	5.156	46.89
23/03/2018 17:50	5.017	46.37
23/03/2018 18:00	3.967	46.33
23/03/2018 18:10	4.247	51.4
23/03/2018 18:20	3.644	55.6
23/03/2018 18:30	3.682	51.25
23/03/2018 18:40	3.588	53.7
23/03/2018 18:50	3.655	59.91
23/03/2018 19:00	3.564	63.58
23/03/2018 19:10	3.45	53.56
23/03/2018 19:20	3.829	54.46
23/03/2018 19:30	3.762	57.57
23/03/2018 19:40	3.76	64.76
23/03/2018 19:50	4.216	70.95
23/03/2018 20:00	5.169	76.42
23/03/2018 20:10	6.367	69.97
23/03/2018 20:20	5.649	63.87
23/03/2018 20:30	5.668	59.23
23/03/2018 20:40	5.668	57.49
23/03/2018 20:50	5.603	58.51
23/03/2018 21:00	6.102	57.13
23/03/2018 21:10	6.178	57.55
23/03/2018 21:20	5.623	54.55
23/03/2018 21:30	6.118	52.09
23/03/2018 21:40	6.381	51.31
23/03/2018 21:50	6.004	49.95
23/03/2018 22:00	5.712	47.13
23/03/2018 22:10	6.286	42.98
23/03/2018 22:20	5.909	43.95
23/03/2018 22:30	6.307	43.21
23/03/2018 22:40	5.766	41.94
23/03/2018 22:50	4.914	41.19
23/03/2018 23:00	4.345	37.53
23/03/2018 23:10	4.138	33.52
23/03/2018 23:20	4.184	28.75
23/03/2018 23:30	5.702	29.46
23/03/2018 23:40	5.717	37.04
23/03/2018 23:50	5.852	39.42

-End of report-