

22nd November 2021

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Dear Ms Strong

RE-MODELLING OF NOISE IMPACT ASSESSMENT – RIETKLOOF WIND ENERGY PROJECT

As per our recent correspondence, please find attached the re-modelling report for the Rietkloof Wind Energy Project near Laingsburg in the Western Cape.

This report is to be viewed as an addendum to the main Noise Impact Report that was issued on the 8th of August 2016 (Version 5 – Report Number 26/7588). The methodologies used to conduct the remodelling, identification of noise sensitive areas and the project description is described in the main report and is not repeated here.

The purpose of this report is to determine if the final project layout will comply with the noise emission limits as described in the previous report. The project parameters have changed as the number of turbines has been reduced to 47 turbines as well as other changes. This has necessitated a remodelling of the layout.

1. Noise Sensitive Areas (NSA)

Table 1 below shows the locations of the Noise Sensitive Areas (NSAs) used in the modelling. Figure 1 shows the NSAs location in relation to the Wind Turbine Generators (WTGs).

Table 1: Noise Sensitive Areas

Description	Latitude	Longitude	Within Project Boundary	Type
NSA 1	32°57'10.38"	20°30'17.97"	Yes	Farmhouse
NSA 2	32°59'17.08"	20°32'52.95"	Yes	Farmhouse
NSA 3	32°59'14.38"	20°33'46.34"	Yes	Farmhouse
NSA 4	32°57'02.30"	20°32'50.34"	Yes	Farmhouse
NSA 5	33°04'25.20"	20°35'33.01"	Yes	Farmhouse
NSA 6	32°58'22.40"	20°36'03.35"	No	Farmhouse
NSA 7	33°06'21.24"	20°32'05.40"	Yes	Farmhouse
NSA 8	33°05'39.20"	20°28'42.36"	Yes	Farmhouse
NSA 9	33°10'03.50"	20°23'38.49"	No	Farmhouse
NSA 10	33°08'30.25"	20°21'09.92"	No	Farmhouse
NSA 11	33°04'12.19"	20°23'36.36"	No	Farmhouse
NSA 12	33°04'42.76"	20°25'16.19"	Yes	Farmhouse
NSA 13	33°04'05.63"	20°25'12.35"	Yes	Farmhouse
NSA 14	33°02'14.53"	20°27'42.38"	Yes	Farmhouse
NSA 15	32°54'52.62"	20°33'09.67"	No	Farmhouse
NSA 16	33°07'02.68"	20°22'49.18"	No	Farmhouse
NSA 17	33°05'09.53"	20°23'36.67"	No	Farmhouse
NSA 18	33°03'29.96"	20°29'22.71"	Yes	Farmhouse
NSA 19	33°06'16.52"	20°25'51.24"	Yes	Farmhouse
NSA 20	33°10'20.42"	20°28'51.51"	No	Farmhouse
NSA 21	33°10'25.14"	20°25'54.65"	No	Farmhouse
NSA 22	32°57'21.98"	20°21'25.27"	Yes	Farmhouse
NSA 23	32°58'30.41"	20°22'07.76"	Yes	Farmhouse
NSA 24	32°57'29.92"	20°16'15.80"	No	Farmhouse
NSA 25	32°53'44.68"	20°19'48.45"	No	Farmhouse
NSA 26	32°52'42.16"	20°27'23.34"	Yes	Farmhouse
NSA 27	32°49'35.62"	20°28'03.60"	No	Farmhouse
NSA 28	33°00'14.10"	20°26'46.16"	Yes	Farmhouse
NSA 29	33°00'15.87"	20°19'04.31"	No	Farmhouse

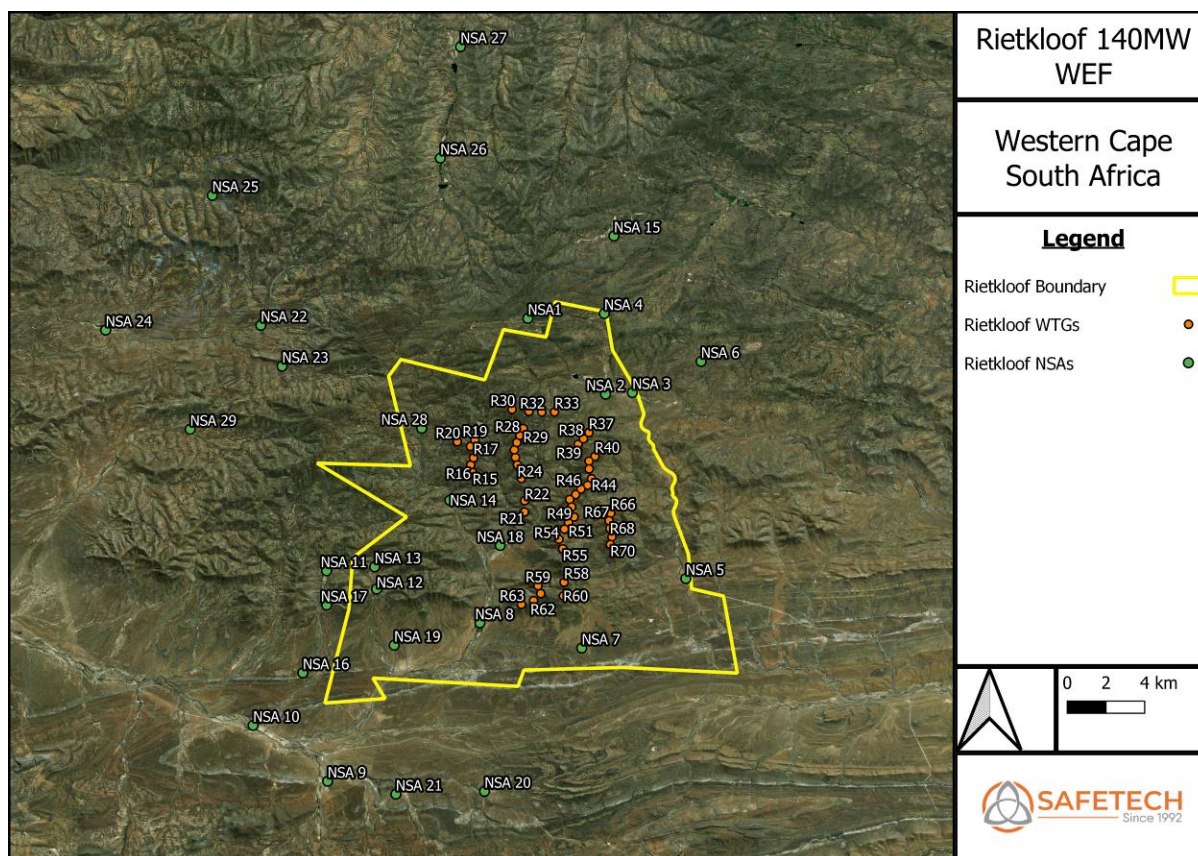


Figure 1: Proposed Development Layout

2. Wind Turbine Generators (WTG)

The wind turbine generators that were modelled are described in Table 2 below. The final turbine specifications have not been confirmed. The worst-case scenario has therefore been assessed.

Table 2: Proposed Turbine Specifications

Parameter	New Specifications for Rietkloof WEFS	Previously Approved for Rietkloof WEF
Turbine Generation Capacity	7 MW	Not specified (Up to 183 MW – with 60 turbines)
Hub Height	125m	9 turbines – up to 120m 51 turbines – up to 125m
Rotor Diameter	180m	9 turbines – up to 140m 51 turbines – up to 160m
Blade Length	90m	9 turbines – up to 70m 51 turbines – up to 80m
Max upper tip height	215m	Not specified

The details of the turbines used for modelling purposes are shown in Table 3 below.

Table 3: Turbine Specifications used for the Assessment

Manufacturer	ENERCON
Type / Version	E-126
Rated Power	7.5MW
Rotor Diameter	180m
Tower	Tubular
Grid Connection	50 Hz
Maximum Sound Power Level	108.5dB
Hub Height	125m

*Sound Power Level dB(A) reference to 1pW from WindPro 3.2 Catalogue

The sound power levels at lower and higher wind speeds as stated above were interpolated from the published data. The actual sound power levels may be less than those stated above when type certification of the selected turbine is completed. The levels used in the re-modelling are thus a worst-case scenario.

The turbine positions are as follows:

Table 4: WTG Positions

Turbine Number	Latitude	Longitude
R15	33° 01' 27.87" S	20° 28' 27.69" E
R16	33° 01' 15.41" S	20° 28' 23.87" E
R17	33° 01' 03.43" S	20° 28' 29.56" E
R18	33° 00' 44.45" S	20° 28' 23.59" E
R19	33° 00' 33.87" S	20° 28' 32.37" E
R20	33° 00' 36.61" S	20° 27' 57.13" E
R21	33° 02' 33.93" S	20° 30' 11.12" E
R22	33° 02' 15.18" S	20° 30' 11.55" E
R23	33° 01' 37.92" S	20° 30' 04.93" E
R24	33° 01' 15.31" S	20° 29' 57.11" E
R25	33° 01' 02.85" S	20° 29' 53.16" E
R26	33° 00' 50.14" S	20° 29' 50.85" E
R27	33° 00' 38.01" S	20° 29' 55.96" E
R28	33° 00' 26.06" S	20° 30' 01.90" E
R29	33° 00' 14.47" S	20° 30' 08.67" E
R30	32° 59' 42.50" S	20° 29' 46.42" E
R31	32° 59' 45.74" S	20° 30' 20.05" E
R32	32° 59' 46.96" S	20° 30' 45.54" E

Turbine Number	Latitude	Longitude
R33	32° 59' 46.78" S	20° 31' 11.17" E
R37	33° 00' 21.34" S	20° 32' 19.71" E
R38	33° 00' 31.64" S	20° 32' 08.80" E
R39	33° 00' 40.82" S	20° 31' 58.04" E
R40	33° 01' 00.94" S	20° 32' 31.70" E
R41	33° 01' 09.04" S	20° 32' 19.89" E
R42	33° 01' 21.93" S	20° 32' 20.25" E
R44	33° 01' 38.35" S	20° 32' 25.04" E
R45	33° 01' 49.29" S	20° 32' 17.01" E
R46	33° 01' 55.63" S	20° 32' 03.69" E
R47	33° 02' 04.92" S	20° 31' 53.11" E
R48	33° 02' 13.09" S	20° 31' 41.30" E
R49	33° 02' 25.61" S	20° 31' 45.26" E
R50	33° 02' 42.32" S	20° 31' 50.01" E
R51	33° 02' 51.75" S	20° 31' 38.96" E
R52	33° 03' 02.66" S	20° 31' 30.89" E
R54	33° 03' 19.58" S	20° 31' 19.81" E
R55	33° 03' 35.45" S	20° 31' 27.44" E
R58	33° 04' 31.40" S	20° 31' 30.18" E
R59	33° 04' 37.12" S	20° 30' 38.05" E
R60	33° 04' 54.33" S	20° 31' 28.66" E
R61	33° 04' 50.26" S	20° 30' 43.63" E
R62	33° 05' 02.11" S	20° 30' 29.30" E
R63	33° 05' 08.34" S	20° 30' 05.00" E
R66	33° 02' 35.91" S	20° 33' 03.31" E
R67	33° 02' 48.58" S	20° 32' 59.85" E
R68	33° 03' 01.44" S	20° 33' 01.43" E
R69	33° 03' 15.58" S	20° 33' 05.57" E
R70	33° 03' 28.29" S	20° 33' 02.44" E

3. Modelling Results

The masking effect of the wind noise will mitigate the impact. The results are based on NO wind noise masking, which in reality rarely occurs. The maximum noise rating limit as per SANS 10103:2008 is 35dB(A) at night and 45 dB(A) for day/night i.e., 24 hours. The cumulative effect of developing both the Brandvalley and Rietkloof Wind Energy Projects was modelled using the ENERCON E-126 7500.

The new turbine layout was modelled in WindPro 3.2 using the above data. The results area as follows:

Table 5: Modelling Results

Receiver	Wind Speed m/s	Rietkloof WEF Only (dB(A))	Brandvalley and Rietkloof Cumulative Impact	
NSA1	3	17,2	33,7	
	4	17,7	34,2	
	5	18,2	34,7	
	6	18,7	35,2	
	7	19,2	35,7	
	8	20,7	37,2	
	9	21,7	38,2	
	10	22,7	39,2	
	11	23,7	40,2	
	12	24,7	41,2	
	NSA 2	3	27,4	28,8
		4	27,9	29,3
5		28,4	29,8	
6		28,9	30,3	
7		29,4	30,8	
8		30,9	32,3	
9		31,9	33,3	
10		32,9	34,3	
11		33,9	35,3	
12		34,9	36,3	
NSA 3		3	23,2	24,7
		4	23,7	25,2
	5	24,2	25,7	
	6	24,7	26,2	
	7	25,2	26,7	
	8	26,7	28,2	
	9	27,7	29,2	
	10	28,7	30,2	
	11	29,7	31,2	
	12	30,7	32,2	
	NSA 4	3	14,0	29,1
		4	14,5	29,6
5		15,0	30,1	
6		15,5	30,6	
7		16,0	31,1	
8		17,5	32,6	
9		18,5	33,6	
10		19,5	34,6	
11		20,5	35,6	
12		21,5	36,6	
NSA 5		3	18,6	18,6
		4	19,1	19,1

Receiver	Wind Speed m/s	Rietkloof WEF Only (dB(A))	Brandvalley and Rietkloof Cumulative Impact
	5	19,6	19,6
	6	20,1	20,1
	7	20,6	20,6
	8	22,1	22,1
	9	23,1	23,1
	10	24,1	24,1
	11	25,1	25,1
	12	26,1	26,1
NSA 6	3	11,0	13,1
	4	11,5	13,6
	5	12,0	14,1
	6	12,5	14,6
	7	13,0	15,1
	8	14,5	16,6
	9	15,5	17,6
	10	16,5	18,6
	11	17,5	19,6
	12	18,5	20,6
NSA 7	3	23,7	23,7
	4	24,2	24,2
	5	24,7	24,7
	6	25,2	25,2
	7	25,7	25,7
	8	27,2	27,2
	9	28,2	28,2
	10	29,2	29,2
	11	30,2	30,2
	12	31,2	31,2
NSA 8	3	24,1	24,1
	4	24,6	24,6
	5	25,1	25,1
	6	25,6	25,6
	7	26,1	26,1
	8	27,6	27,6
	9	28,6	28,6
	10	29,6	29,6
	11	30,6	30,6
	12	31,6	31,6
NSA 9	3	0,0	0,0
	4	0,0	0,0
	5	0,0	0,0
	6	0,0	0,0
	7	0,0	0,0
	8	0,0	0,0
	9	0,0	0,0
	10	0,0	0,0
	11	0,0	0,0

Receiver	Wind Speed m/s	Rietkloof WEF Only (dB(A))	Brandvalley and Rietkloof Cumulative Impact
	12	0,0	0,0
NSA 10	3	0,0	0,0
	4	0,0	0,0
	5	0,0	0,0
	6	0,0	0,0
	7	0,0	0,0
	8	0,0	0,0
	9	0,0	0,0
	10	0,0	0,0
	11	0,0	0,0
	12	0,0	0,0
NSA 11	3	4,7	13,0
	4	5,2	13,5
	5	5,7	14,0
	6	6,2	14,5
	7	6,7	15,0
	8	8,2	16,5
	9	9,2	17,5
	10	10,2	18,5
	11	11,2	19,5
	12	12,2	20,5
NSA 12	3	9,6	12,2
	4	10,1	12,7
	5	10,6	13,2
	6	11,1	13,7
	7	11,6	14,2
	8	13,1	15,7
	9	14,1	16,7
	10	15,1	17,7
	11	16,1	18,7
	12	17,1	19,7
NSA 13	3	10,8	14,6
	4	11,3	15,1
	5	11,8	15,6
	6	12,3	16,1
	7	12,8	16,6
	8	14,3	18,1
	9	15,3	19,1
	10	16,3	20,1
	11	17,3	21,1
	12	18,3	22,1
NSA 14	3	28,3	28,5
	4	28,8	29,0
	5	29,3	29,5
	6	29,8	30,0
	7	30,3	30,5
	8	31,8	32,0

Receiver	Wind Speed m/s	Rietkloof WEF Only (dB(A))	Brandvalley and Rietkloof Cumulative Impact
	9	32,8	33,0
	10	33,8	34,0
	11	34,8	35,0
	12	35,8	36,0
NSA 15	3	2,9	12,8
	4	3,4	13,3
	5	3,9	13,8
	6	4,4	14,3
	7	4,9	14,8
	8	6,4	16,3
	9	7,4	17,3
	10	8,4	18,3
	11	9,4	19,3
	12	10,4	20,3
NSA 16	3	0,0	0,0
	4	0,0	0,2
	5	0,0	0,7
	6	0,0	1,2
	7	0,0	1,7
	8	0,0	3,2
	9	0,5	4,2
	10	1,5	5,2
	11	2,5	6,2
	12	3,5	7,2
NSA 17	3	2,7	8,3
	4	3,2	8,8
	5	3,7	9,3
	6	4,2	9,8
	7	4,7	10,3
	8	6,2	11,8
	9	7,2	12,8
	10	8,2	13,8
	11	9,2	14,8
	12	10,2	15,8
NSA 18	3	29,0	29,0
	4	29,5	29,5
	5	30,0	30,0
	6	30,5	30,5
	7	31,0	31,0
	8	32,5	32,5
	9	33,5	33,5
	10	34,5	34,5
	11	35,5	35,5
	12	36,5	36,5
NSA 19	3	8,6	9,2
	4	9,1	9,7
	5	9,6	10,2

Receiver	Wind Speed m/s	Rietkloof WEF Only (dB(A))	Brandvalley and Rietkloof Cumulative Impact
	6	10,1	10,7
	7	10,6	11,2
	8	12,1	12,7
	9	13,1	13,7
	10	14,1	14,7
	11	15,1	15,7
	12	16,1	16,7
NSA 20	3	0,2	0,2
	4	0,7	0,7
	5	1,2	1,2
	6	1,7	1,7
	7	2,2	2,2
	8	3,7	3,7
	9	4,7	4,7
	10	5,7	5,7
	11	6,7	6,7
	12	7,7	7,7
NSA 21	3	0,0	0,0
	4	0,0	0,0
	5	0,0	0,0
	6	0,0	0,0
	7	0,0	0,0
	8	0,0	0,0
	9	0,0	0,0
	10	0,0	0,0
	11	0,7	1,0
	12	1,7	2,0
NSA 22	3	0,0	17,7
	4	0,0	18,2
	5	0,0	18,7
	6	0,0	19,2
	7	0,0	19,7
	8	0,0	21,2
	9	0,0	22,2
	10	0,7	23,2
	11	1,7	24,2
	12	2,7	25,2
NSA 23	3	0,2	23,2
	4	0,7	23,7
	5	1,2	24,2
	6	1,7	24,7
	7	2,2	25,2
	8	3,7	26,7
	9	4,7	27,7
	10	5,7	28,7
	11	6,7	29,7
	12	7,7	30,7

Receiver	Wind Speed m/s	Rietkloof WEF Only (dB(A))	Brandvalley and Rietkloof Cumulative Impact	
NSA 24	3	0.0	0.0	
	4	0.0	0.0	
	5	0.0	0.0	
	6	0.0	0.0	
	7	0.0	0.0	
	8	0.0	0.0	
	9	0.0	0,8	
	10	0.0	1,8	
	11	0.0	2,8	
	12	0.0	3,8	
	NSA 25	3	0.0	0,0
		4	0.0	0,5
5		0.0	1,0	
6		0.0	1,5	
7		0.0	2,0	
8		0.0	3,5	
9		0.0	4,5	
10		0.0	5,5	
11		0.0	6,5	
12		0.0	7,5	
NSA 26		3	0.0	4,6
		4	0.0	5,1
	5	0.0	5,6	
	6	0.0	6,1	
	7	0.0	6,6	
	8	0.0	8,1	
	9	0.0	9,1	
	10	0.0	10,1	
	11	0.0	11,1	
	12	0,1	12,1	
	NSA 27	3	0.0	0.0
		4	0.0	0.0
5		0.0	0.0	
6		0.0	0.0	
7		0.0	0.0	
8		0.0	0.0	
9		0.0	0.0	
10		0.0	0.0	
11		0.0	0.0	
12		0.0	0.0	
NSA 28		3	26,8	30,0
		4	27,3	30,5
	5	27,8	31,0	
	6	28,3	31,5	
	7	28,8	32,0	
	8	30,3	33,5	
	9	31,3	34,5	

Receiver	Wind Speed m/s	Rietkloof WEF Only (dB(A))	Brandvalley and Rietkloof Cumulative Impact
	10	32,3	35,5
	11	33,3	36,5
	12	34,3	37,5
NSA 29	3	0.0	9,4
	4	0.0	9,9
	5	0.0	10,4
	6	0.0	10,9
	7	0.0	11,4
	8	0.0	12,9
	9	0.0	13,9
	10	0.0	14,9
	11	0.0	15,9
	12	0.0	16,9

*Night Limit = 35dB(A) Day/Night Limit = 45dB(A).

4. Discussion

The results above indicate that the 24-hour 45 dB(A) limit for day/night operations will not be exceeded at any of the noise sensitive areas.

The results above indicate that the 35 dB(A) limit for night operations will be slightly exceeded at NSA 14 and NSA 18 due to the operation of the Rietkloof Wind Energy Farm. The limit will be exceeded at high wind speeds where wind noise masking is likely to occur, therefore no community response in terms of noise complaints is expected.

The 35 dB(A) night guideline limit will be exceeded at six noise sensitive areas (NSA 1, NSA 2, NSA 4, NSA 14, NSA 18, and NSA 28) if both the Brandvalley and Rietkloof Wind Energy Farms are developed. It is highly likely that, at the high wind speeds when the limits will be exceeded, the wind noise will provide a masking effect and no community response is expected. The impact at NSA 1 is from the Brandvalley turbines and not the Rietkloof turbines.

The modelling results present the worst case scenario as no wind noise masking is considered. It is recommended that the current ambient noise levels at the affected NSA's be measured on a long-term basis before operations commence to determine the actual ambient sound under different weather conditions. This information can then be used to determine the masking effect that any wind noise may have and if any operational mitigation measures should be considered.

5. Impact Statement

The overall environmental impact of the changes made to the project scope is rated as low as reflected in Table 6 below. The impact rating methodology was supplied by the client.

Table 6: Operational Impact Significance Statement

Nature of impact	Temporal Scale	Spatial Scale	Severity of Impact	Risk or Likelihood	Overall Significance
WITHOUT MITIGATION					
Impact of the operational noise on the surrounding environment (Including the cumulative impacts)	Short Term (1)	Local (1)	Slight (1)	Unlikely (1)	Low (4)
WITH MITIGATION					
Impact of the operational noise on the surrounding environment	Short Term (1)	Local (1)	Slight (1)	Probable (1)	Low (4)

Please feel free to contact us should you have any further requirements. Assuring you of our best attention at all times.

Yours sincerely



Dr BRETT WILLIAMS