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DOCUMENT NUMBER	ISSUE	SYSTEM				
WP 8638/22	0.6	De Aar 2 South WEF				
SUBJECT						

RFI Assessment of the Proposed WEF applicable to: De Aar 2 South WEF

KEYWORDS

electrical equipment, electrical infrastructure, EMI, RFI, OHL, WEF

DISTRIBUTION

Mulilo

SUMMARY

The De Aar 2 South WEF project, located on the Eastern plateau (South) near De Aar in the Northern Cape province, requires an RFI statement for the amendment application of the environmental authorisation. The purpose of this document is to report on the possible Radio Frequency Interference (RFI) from the Wind Energy Facilities (WEF) to the surrounding area, to assess whether any mitigation will be required to the facility if it is to be constructed.

For this project, the DFFE Screening Report indicated three high and one medium sensitivity area. The medium sensitivity area will be incorporated in the high sensitivity evaluation. The high sensitivity areas are due to:

- A telecommunications facility located 1km away from the proposed WEF location.
- A weather radar installation located between 18 and 30km away from the proposed WEF location.
- A weather radar installation located between 30 and 60km away from the proposed WEF location.

Literature study revealed that there will be no interference from the WEF to the surrounding high and medium RFI sensitive areas. This statement is only valid when assuming that the WEF electrical/electronic equipment comply to CISPR 11 class A specifications, as a technology partner has not yet been selected to provide actual RFI data.

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Disclaimer

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1. DEFINITIONS AND KEYWORDS

AMA	Astronomy Management Authority
Electrical equipment	Any electrical machinery, electrical systems, appliances, or devices, including any wireless data communication used for the operation of these facilities, used for construction, distribution and transmission power systems, exploration, farming, household, manufacturing, maintenance, or mining purposes
Electrical infrastructure	Any infrastructure or facility, including any wireless data communication used for the operation of the electrical infrastructure, to be used in any way for electricity generation, electricity distribution, electricity transmission, or for a distribution or transmission power system, and electrical facilities and equipment used for these applications
EMI	Electromagnetic Interference
OHL	Over Head Line
RFI	Radio Frequency Interference
WEF	Wind Energy Facility

Table 1: Definitions

2. BACKGROUND

The De Aar 2 South WEF project, located on the Eastern plateau (South) near De Aar in the Northern Cape province, requires an RFI statement for the amendment application of the environmental authorisation. The RFI that a new Wind Energy Facility (WEF) will have on existing electrical/electronic equipment must be evaluated.

RFI from a WEF is generally emitted from the wind turbine hubs located at the top of the mast. The effects of the WEF wind turbine hubs will be the focus of this report. RFI and electromagnetic interference (EMI) can influence sensitive facilities such as airports, RF high sites, railway line control equipment, cell phone towers, Weather Radar Installations, EMI sensitive equipment in the area, etc. If a WEF influences existing infrastructure, EMI mitigation will have to be implemented.

For this project, the DFFE Screening Report indicated three high and one medium sensitivity area. The medium sensitivity area will be incorporated in the high sensitivity evaluation. The high sensitivity areas are due to:

- A telecommunications facility located 1km away from the proposed WEF location.
- A weather radar installation located between 18 and 30km away from the proposed WEF location.
- A weather radar installation located between 30 and 60km away from the proposed WEF location.

Mitigation or sufficient clearance distances, between the radio frequency (RF) source (De Aar 2 South WEF) and any RFI sensitive infrastructure (victim), are required to avoid potential degradation of the Weather Radar installation or the telecommunication facility.

The Weather Radar Installation is approximately 30km away from the proposed WEF. The closest telecommunications facility is 22.3km away from the proposed WEF. A Telecommunications facility closer than 1km could not be identified as stated in the DFFE report. There is a possibility that the proposed WEF will interfere with existing electrical/electronic equipment or electrical/electronic infrastructure, thus the effects of the WEF must be investigated.

Non-correlated noise sources such as PV facility inverters or WEF electrical/electronic equipment in close proximity could increase the level of cumulative unintentional radiated emissions at the source as seen by the victim. Refer to section 9 for further details.

Figure 1 below, contains the RFI sensitivity results according to the DFFE screening report.

MAP OF RELATIVE RFI (WIND) THEME SENSITIVITY

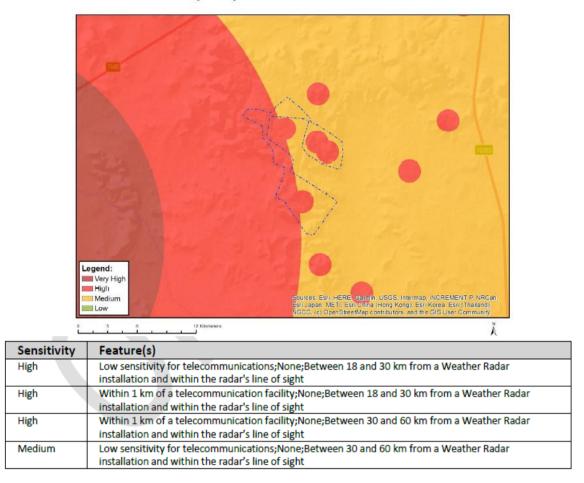


Figure 1 - DFFE Screening Report RFI Results

3. AIM

The aim of this document is to provide a statement with motivation regarding the RFI from the WEF Wind Turbines in the RFI sensitive areas identified by the DFFE screening report. An approximate sphere of RFI from the WEF will be noted and discussed.

As the project is still in early planning stage, no Technology partner has been selected yet. It is therefore assumed that the inverters and switching station equipment to be used will comply to CISPR 11 Class A [7]. Receiver sensitivities, inside the indicated sensitivity areas, are assumed, and listed in Table 3.

4. LOCATION

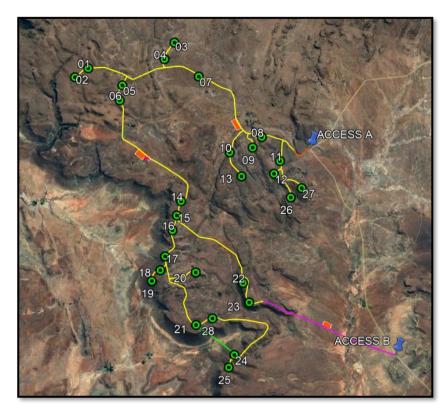


Figure 2 - Entire Proposed WEF site

Figure 3 above represents the entire proposed WEF facility site. There are 28 visible wind turbine locations, of which only 26 will be constructed.



Figure 3 – Proposed WEF with relative distance to a Weather Radar and the Telecommunications Facility

5. TECHNOLOGY DESCRIPTION

A typical wind turbine system has the following building blocks elements:

- Rotor (Blades, hub, and pitch system).
- Nacelle housing the generator, gearbox if not direct drive, yaw system, monitoring/ control systems, power convertor, transformer.
- Tower (concrete or steel).

Some manufacturers choose to remove the power convertors and transformers from the nacelle and place it in the tower or separate facility next to the tower.

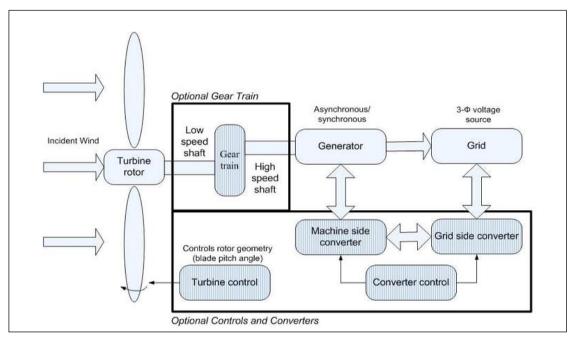


Figure 4 - Generic Wind Turbine Block Diagram

6. RISK IDENTIFICATION

6.1 TECHNOLOGY RISKS

The following building blocks are viewed as potential interference sources:

- Control/ monitoring systems specially nacelle mounted systems.
- Power conversion equipment (rectifier/ invertor systems).
- Control and operations centre (computer equipment).

6.1.1 Control/ monitoring systems

- Environmental sensors.
- Warning lights.
- Cabinets housing PLC equipment.
- Variable speed drives (yaw and pitch control system).

6.1.2 Control and operations centre

Equipment installed in the control and operations centre should comply with CISPR 32 Class B. No mitigation requirement for equipment installed in the control and operations centre.

6.1.3 Power Convertor

- Thyristor/ IGBT switching rectification and invertor circuits
- UPS for control circuits

7. GOOD PRACTISE RFI MITIGATION METHODS

There are some steps that can be considered when designing a new WEF to minimise the amount of RFI or EMI that can be emitted:

- Properly ground the WEF Turbines to reduce common mode impedance.
- Avoid pigtail connections when installing the grid connections.
- Shield the DC cabling to ensure a good connection to ground.
- Only use electrical/electronic equipment with CE approval.
- Ensure all grid related connections are according to specification. (no gaps between connections)
- Use approved grid cable connectors to avoid unwanted corona and/or sparking.
- Avoid sharp edges at the end of cable connections.

The purpose of electrical bonding is to provide structural homogeneity with respect to the flow of electrical currents, including high frequency currents for proper operation of filters and fault current paths. Bonding also prevents or safely discharges static charges and ensures a good ground connection that will prevent unintentional emissions to occur.

8. CLEARANCE ZONE

The clearance zone around a WEF is the separation distance needed, between the edge of the WEF (source) to a specific EMI sensitive location or infrastructure (victim), for the WEF facility to have no RFI on existing electrical infrastructure. The exact wind turbine equipment that will be used is unknown as no technology partner has been selected yet, thus it is assumed that the inverters and equipment comply to CISPR11 Class A specification [7]. (57 dB μ V/m @ 3m which relates to an EIRP of -38.16dBm). The recommended clearance zones are listed in Table 2.

It is stated in the Electronic Communications Act [8] that no product used or manufactured in South Africa may cause unwanted RFI or EMI due to intentional or unintentional transmissions on existing electrical equipment. Thus, to prevent the WEFs unintentional RFI to cause unwanted interference on existing electrical equipment a clearance zone is used.

EMI sensitive location	Distance Between the Edge of a WEF and an EMI sensitive location in meter
Existing Radar equipment ex. Weather radar	400 m
Navigational and communication equipment	300 m
Equipment sensitive to EMI	300 m
Airfield/Airport Radar system	400 m

Table 2 - Clearance Zone Distances calculated using [5]

8.1 COVERAGE MAP, TYPICAL RECEIVER SENSITIVITIES AND SITE TRANSMIT POWER

Coverage maps generated using Radio Mobile RF software [5] is shown below in Figures 5 to 13. In figures 11, 12 and 13 a 1km radius exclusion zone been chosen to account for an unidentified telecommunications tower stated to be 1km away from the proposed WEF. Figures 5 to 10 represent the pathloss and received power level (PathLoss, Rx level) from three different wind turbines to the identified Weather Radar Installation and the Telecommunications facility located near De Aar.

The receive power level at the Weather Radar Installation as well as the Telecommunications facility is less than the receiver sensitivities listed in Table 3. The received power level 1km away from the three chosen wind turbines is less than the GSM/LTE/GPRS receiver sensitivities listed in Table 3.

Signal (dBm) < -200 -192 -184 -176 -168 -160 -152 -144 -136 -128 -1	👖 🕅 Radio Link						×
	Edit View Swap						
255 A 10 20 20 -	Azimuth=245,88* PathLoss=124,3dB	Elev. angle=-0,945° E field=-29,3dBµV/m	Clearance at 2, Rx level=-164,5			nce=27,44km elative=-14,5dB	
							V
and the second second	Transmitter			Receiver			
	WEF 2		■ S0 ▼	Weather Radar de AAR		SI	
	A Role	Command		Role	Command		<u> </u>
Weather Radar de AAR	Tx system name	UHF	•	Rx system name	UHF		•
A CONTRACT OF	Tx power			Required E Field	-14,86 dBµV/m		
	Line loss	1 dB 0 dBi -2.2		Antenna gain Line loss	0 dBi 1 dB	-2,2 dBd	+
	Antenna gain Radiated power			Line loss Rx sensitivity	⊺αs 0,0071μV	-149,97 dBm	
	Antenna height (m)	120 • +		Antenna height (m)	10 .	+ Unde	
	Net Mulilo De Aar 2 South			Frequency (MHz) Minimum 700	Maximu	im 700	

Figure 5 - Signal Strength Coverage Map between WEF2 and the De Aar Weather Radar Installation

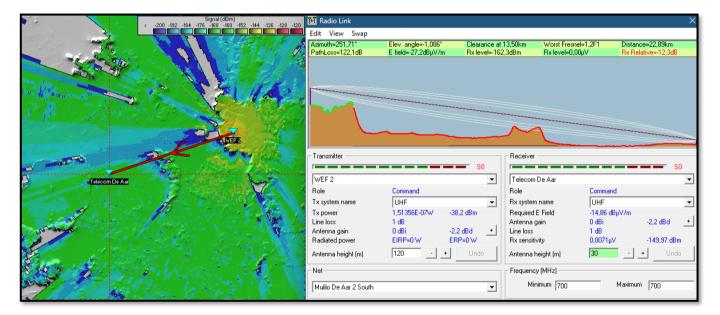


Figure 6 - Signal Strength Coverage Map between WEF2 and the nearest Telecommunications facility

*note – WEFx referes to an allocated wind turbine in the Mulilo De Aar 2 South WEF project.

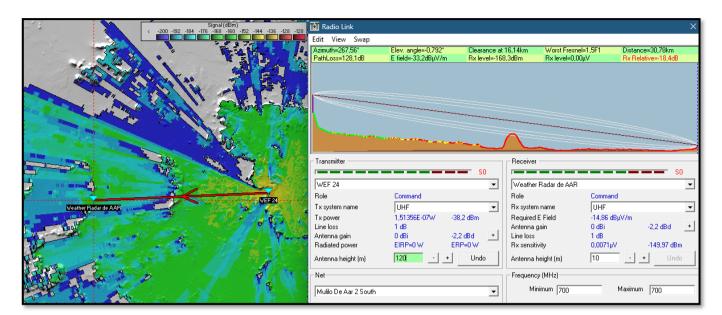


Figure 7 - Signal Strength Coverage Map between WEF24 and the De Aar Weather Radar Installation

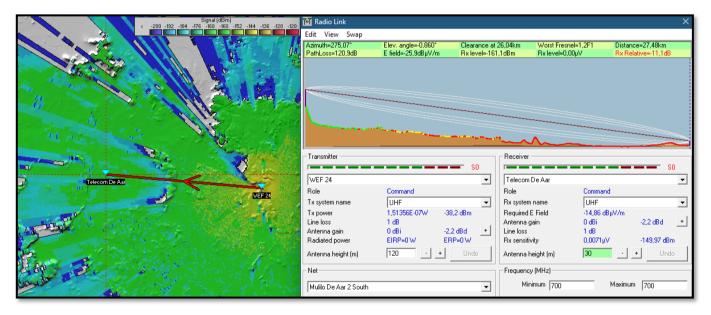


Figure 8 - Signal Strength Coverage Map between WEF24 and the Nearest Telecommunications Facility

- 1 % ,	Signal (dBm) < -200 -192 -184 -176 -168 -160 -152 -144 -136 -128 -120	🕅 Radio Link				>	\times
2		Edit View Swap					
50,84	A MALE AND A	Azimuth=257,61* PathLoss=126,0dB	Elev. angle=-0,752° E field=-31,1dBµV/m	Clearance at 4 Rx level=-166,			
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AN AREA PROVIDED							2
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	The Constant of the second sec			• SO		SO	
		WEF 27		•	Weather Radar de AAR	•	-
	P . CAR	Role	Command		Role	Command	_
Weather Radar de AAR		Tx system name	UHF	-	Rx system name	UHF	4
		Tx power		2 dBm	Required E Field	-14,86 dBµV/m	
		Line loss	1 dB		Antenna gain	0 dBi -2,2 dBd _+	1
	and the state of the	Antenna gain	0 dBi -2,2 EIRP=0 W ERP	dBd _+_ ⊨0W	Line loss	1 dB 0.0071µV -149.97 dBm	
and the second s		Radiated power			Rx sensitivity	0,0071µV -149,97 dBm	
		Antenna height (m)	120 • +	Undo	Antenna height (m)	10 · + Undo	
Con the for the	\$	Net			Frequency (MHz)		-
and the second second		Mulilo De Aar 2 South		•	Minimum 700	Maximum 700	1

Figure 9 - Signal Strength Coverage Map between WEF27 and the De Aar Weather Radar Installation

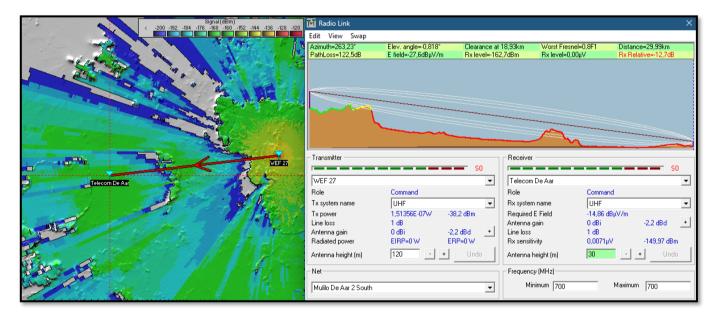


Figure 10 - Signal Strength Coverage Map between WEF27 and the Nearest Telecommunications Facility

Signal (dBm) < -200 -132 -184 -176 -188 -180 -152 -144 -136 -128 -120	🕅 Radio Link						×
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	Azimuth=90,34*		earance at 0			nce=1,01km	
/TREAMER HIM (* K MEEL/SZE/14)	PathLoss=96,3dB	E field=-1,4dBµV/m Rx	x level=-136,	5dBm Rx level=0,0	3μV <mark>Rx R</mark>	elative=13,5dB	
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N. ZUKNERUSIKER							
	Transmitter			Receiver			
WEF3 WEF3 WEF3-1km			S5			S!	5
	WEF 3		-	WEF 3 - 1km			-
	Role	Command	<u> </u>	Role	Command		<u> </u>
	Tx system name			Rx system name	UHF		
21		UHF 1,51356E-07W -38,2 dBi	_	-	-14,86 dBµV/m		-
	Tx power Line loss	1,51356E-07W -38,2 dbi 1 dB		Required E Field Antenna gain	-14,86 dBµV/m 0 dBi	-2,2 dBd	+
	Antenna gain	0 dBi -2,2 dBd	+	Line loss	1 dB	2,2 000	_
	Radiated power	EIRP=0W ERP=0V		Rx sensitivity	0,0071µV	-149,97 dBm	0
	Antenna height (m)	120 · + U	Indo	Antenna height (m)	10 .	+ Unde	. 1
	randon a noight (m)			randon no riosgine (m)			
	Net			Frequency (MHz)			
	Mulilo De Aar 2 South		_	Minimum 700	Maxim	.m 700	_
	In allo De Adi 2 South			1.00		,	

Figure 11 - Signal Strength Coverage Map 1km away from WEF3

< 200.152 .184 .176 .68 .160 .152 .144 .136 .129 .120	📔 Radio Link					>
	Edit View Swap					
	Azimuth=351,24*	Elev. angle=-6,561*	Clearance at 0		Vorst Fresnel=2,7F1	Distance=1,15km
	PathLoss=96,3dB	E field=-1,4dBµV/m	Rx level=-136,	5dBm R	lx level=0,03μV	Rx Relative=13,4dB
WEF 3-1km						
	Transmitter			Receiver		
VEF 9	Transmitter		- 55	neceiver		S5
						50
	WEF 9			WEF 9 - 1km		<u>•</u>
	Role	Command		Role	Comma	nd
	Tx system name	UHF	•	Rx system nar	J	-
	Tx power		2 dBm	Required E Fie		dBμV/m
	Line loss	1 dB		Antenna gain		-2,2 dBd 🔶 🛨
	Antenna gain Radiated power	0 dBi -2,2 (EIRP=0 W ERP	dBd _+ ≥0W	Line loss Rx sensitivity	1 dB 0,0071	.V -149.97 dBm
				-		
	Antenna height (m)	120 • +	Undo	Antenna heigh	nt (m) 10	· + Undo
	- Net			-Frequency (M	Hzì	
	Mulilo De Aar 2 South		-	Minimu	m 700	Maximum 700

Figure 12 - Signal Strength Coverage Map 1km away from WEF9

Signal (dBm) < -200 -132 -134 -176 -168 -160 -152 -144 -136 -128 -120	🕅 Radio Link						×
	Edit View Swap						
	Azimuth=284,74*	Elev. angle=-12,302*	Clearance at 1		t Fresnel=4,4F1	Distance=1,06km	
	PathLoss=95,0dB	E field=-0,1dBµV/m	Rx level=-135	2dBm Rx lev	vel=0,04μV	Rx Relative=14,8dB	
WEF 25 - 1km							
	Transmitter			Receiver			_
WEF 25			- S6	J		 SI	6
	WEF 25		-	WEF 25 · 1km			-
	Role	Command		Role	Command		_
	Tx system name	UHF	•	Rx system name	UHF		•
	Tx power		2 dBm	Required E Field	-14,86 dBi	Alles	<u> </u>
	Line loss	1 dB	ubiii	Antenna gain	0 dBi	-2,2 dBd	+
Contraction of the second s	Antenna gain	0 dBi -2,2 (dBd +	Line loss	1 dB	2,2 000	
	Radiated power		=0 W	Rx sensitivity	0,0071µV	-149,97 dBn	0
	Antenna height (m)	120 • +	Undo	Antenna height (m)		· + Unde	
	Net			Frequency (MHz)-			
	Mulilo De Aar 2 South		•	Minimum 7	700	Maximum 700	

Figure 13 - Signal Strength Coverage Map 1km away from WEF25

Table 3 - List of typical sensitivities from EMI sensitive equipment
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Receiver	Typical Sensitivities
LoRa 2.4GHz	-130 dBm
Pulse Radar 1-12GHz	-94 dBm
Wifi (common 802.11g) 2.4/5 GHz	-85 dBm
GSM/LTE/GPRS 0.85-2.1GHz	-102 dBm
UHF 300MHz	-100 dBm
Bluetooth 2.4GHz	-82 dBm

9. CUMULATIVE EFFECT

Non-correlated noise sources such as PV facility inverters or Wind Turbine electric/electronic equipment in close proximity could increase the clearance zone required around a specific renewable energy plant site, as the cumulative level of unintentional radiated emissions will be higher. A standard factor of 10 log_{10} N, where N = amount of renewable energy plants in the direct vicinity, is used to account for the increased radiated emission levels [9]. For the De Aar 2 South WEF there are 11 renewable resource locations in a 30km radius.

For this theoretical worst-case scenario, the possible increase in the cumulative radiated emission levels will be 10.4 dB, increasing the transmit power level to -27.8dBm.

The received power levels represented in Figures 14 to 22 are less than the receiver sensitivities at the Weather Radar Installation as well as the Telecommunications facility listed in Table 3. The cumulative effect increases the received power, but not enough to cause any unwanted RFI or EMI to surrounding electrical equipment.

	Signal (dBm) < -200 -192 -184 -176 -168 -160 -152 -144 -136 -128 -120	🖬 Radio Link						\times
		Edit View Swap						
		Azimuth=246,49* PathLoss=123,4dB	Elev. angle=-0,940* E field=-18,0dBµV/m	Clearance at 1 Rx level=-153,2			e=27,38km itive=-3,2dB	
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a a the	A AND	Transmitter		- so	Receiver		S0	,
		WEF 2		-	Weather Radar de AAR			•
E De As		Role	Command		Role	Command		_
Weather Radar de AAR	No. of the second second second	Tx system name	UHF	•	Rx system name	UHF		-
		Tx power	1,659587E-06W -27,8	dBm	Required E Field	-14,86 dBµV/m		_
A BOARD		Line loss	1 dB		Antenna gain	0 dBi	-2,2 dBd	+
		Antenna gain Radiated power	0 dBi -2,2 d EIRP=0 W ERP=		Line loss	1 dB	140.07.40	
					Rx sensitivity	0,0071µV	-149,97 dBm	
	NYTY SET FRANK	Antenna height (m)	120 • +	Undo	Antenna height (m)	10 • •	• Undo	
800 8 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Net			Frequency (MHz)			
and the second s	水、、 了完 定、 「我们」。					Maximum		_
		Mulilo De Aar 2 South		<u> </u>	Minimum 700	Maximum	700	-

Figure 14 - Signal Strength Coverage Map between WEF2 and the De Aar Weather Radar Installation with the cumulative effects considered

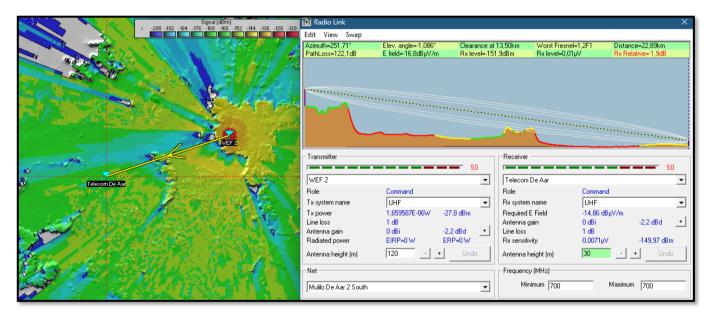


Figure 15 - Signal Strength Coverage Map between WEF2 and the nearest Telecommunications facility with the cumulative effects considered

	Signal (dBm) < -200 -192 -184 -176 -168 -160 -152 -144 -136 -128 -120	附 Radio Link					×
		Edit View Swap					
		Azimuth=267,56* PathLoss=128,1dB	Elev. angle=-0,792* E field=-22,8dBµV/m	Clearance at 16 Rx level=-157,9			=30,78km ve=-8,0dB
	And the second second	Transmitter			Receiver		
				- SO			S0
		WEF 24		-	Weather Radar de AAR		•
	WEF 24	Role	Command		Role	Command	
Weather Radar de AAR		Tx system name	UHF		Rx system name	UHF	•
	Service and the service of the service	Tx power			Required E Field	-14,86 dBµV/m	
		Line loss	1 dB		Antenna gain		-2,2 dBd +
a a a a a a a a a a a a a a a a a a a	State of the second	Antenna gain	0 dBi -2,2 (Line loss	1 dB	140.07.40
	and the second of the second freedow	Radiated power			Rx sensitivity	0,0071µV	-149,97 dBm
	and the set of the set of the set	Antenna height (m)	120 · +	Undo	Antenna height (m)	10 • +	Undo
Reading and the		Net			Frequency (MHz)		
in the		Mulilo De Aar 2 South		•	Minimum 700	Maximum	700

Figure 16 - Signal Strength Coverage Map between WEF24 and the De Aar Weather Radar Installation with the cumulative effects considered

	Signal (dBm) < -200 -192 -184 -176 -168 -160 -152 -144 -136 -128 -120	🕅 Radio Link						×
		Edit View Swap						
		Azimuth=275,07* PathLoss=120,9dB		Clearance at 2 Rx level=-150,		Worst Fresnel=1,2F1 Rx level=0,01µV	Distance=27,4 Rx Relative=-0	
		Transmitter			-Receiver -			
				= S1				• S1
Telecom De Aar		WEF 24		-	Telecom D	e Aar		•
	WEF 24	Role	Command		Role	Com	nand	
		Tix system name	UHF	•	Rx system r			•
	and the second states of the	Tx power	1,659587E-06W -27,8 d	dBm	Required E		6 dBµV/m	
A CALL IN MALLING		Line loss	1 dB	Bd 🗐	Antenna ga Line loss		-2,2 (dBd 🛨
		Antenna gain Radiated power	0 dBi -2,2 dE EIRP=0 W ERP=0		Rx sensitivi	1 dB ty 0,00	149 July	.97 dBm
A		Antenna height (m)		Undo	Antenna he			Undo
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	MARCAS DAY CO. A PUTTE	Net			Frequency	(MHz)		
and the second s		Mulilo De Aar 2 South		•	Minir	mum 700	Maximum 700]

Figure 17 - Signal Strength Coverage Map between WEF24 and the nearest Telecommunications facility with the cumulative effects considered

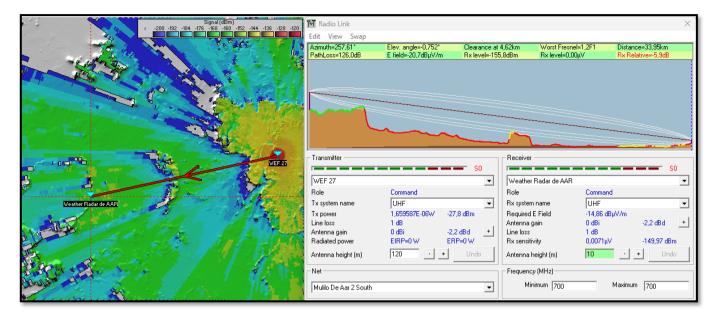


Figure 18 - Signal Strength Coverage Map between WEF27 and the De Aar Weather Radar Installation with the cumulative effects considered

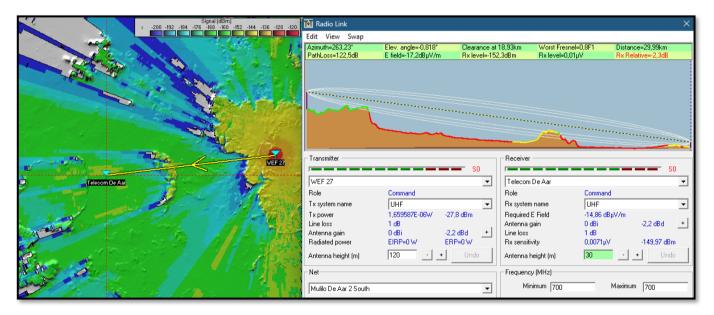


Figure 19 - Signal Strength Coverage Map between WEF27 and the nearest Telecommunications facility with the cumulative effects considered

Signal (dBm) < -150 -145 -140 -135 -130 -125 -120 -115 -110 -105 -100	🕅 Radio Link						\times
	Edit View Swap						
L. THERE AND STRUCTURE AND	Azimuth=90,34*	Elev. angle=-6,973°	Clearance at			ance=1,01km	
	PathLoss=96,3dB	E field=9,0dBµV/m	Rx level=-126	6,1dBm Rx level=0),11μV <mark>Βχ Ε</mark>	Relative=23,9dB	
							~~
	Transmitter			Receiver			_
WEF 3 WEF 3			— 59			S9	
	WEF 3		-	WEF 3 - 1km			-
	Role	Command		Role	Command		
	Tx system name	UHF	-	Rx system name	UHF		-
	Tx power		7,8 dBm	Required E Field	-14,86 dBµV/m		
Constants to Long the second of the new test	Line loss	1 dB		Antenna gain	0 dBi	-2,2 dBd	+
	Antenna gain Radiated power		,2 dBd _+	Line loss Rx sensitivity	1 dB 0,0071μV	-149,97 dBm	
	Antenna height (m)	120 • +	Undo	Antenna height (m)	10 •	+ Undo	
to at a fine of the	Net			Frequency (MHz)			
and the second of the second second second					Mauin	um 700	
	Mulilo De Aar 2 South		_	Minimum 700	Maxin	um 700	-1

Figure 20 - Signal Strength Coverage Map 1km away from WEF3 with the cumulative effects considered

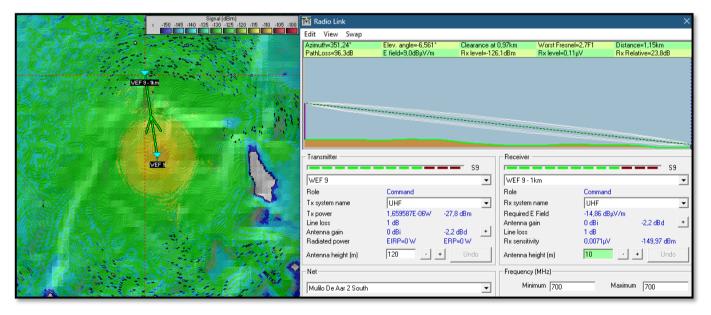


Figure 21 - Signal Strength Coverage Map 1km away from WEF9 with the cumulative effects considered

Signal (dBm) < 150 145 140 125 120 125 120 115 110 105 100	🕅 Radio Link				X
	Edit View Swap				
	Azimuth=284,74*	Elev. angle=-12,302*	Clearance at 1		
	PathLoss=95,0dB	E field=10,3dBµV/m	Rx level=-124,	8dBm Rx level=0,1	3µV Rx Relative=25,2dB
	Transmitter			Receiver	
(1) (1) (1) (1) (1) (1) (1) (1) (1) (1)	Tarisinidei		- S9	neceivei	S9
WEF 25	WEF 25	-		WEF 25 - 1km	•
· 制造工作学家 化化学的存在于关键的第三人称单数 化化学化学	Role	Command		Role	Command
14、5世上的方法的法律法律学校的学生。2011年1月1日,1月1日,1月1日,1月1日,1月1日,1月1日,1月1日,1月	Tix system name	UHF		Rx system name	UHF
	Tx power	1,659587E-06W -27,8	dBm	Required E Field	-14,86 dBµV/m
A THE LAND STRATE AND A	Line loss	1 dB		Antenna gain	0 dBi -2,2 dBd +
	Antenna gain	0 dBi -2,2 c		Line loss	1 dB
	Radiated power	EIRP=0W ERP=	•0 w	Rx sensitivity	0,0071µV -149,97 dBm
No. 12" ANY LOC LOG	Antenna height (m)	120 • +	Undo	Antenna height (m)	10 · + Undo
	Net			Frequency (MHz)	
	Mulilo De Aar 2 South		•	Minimum 700	Maximum 700

Figure 22 - Signal Strength Coverage Map 1km away from WEF25 with the cumulative effects considered

10. CONCLUSION

The exact location of the telecommunications facility within 1km from the proposed facility was not identified, thus a 1km radius point around three different wind turbine locations was used to determine the received power at that distance with and without the cumulative effect considered. In both cases, the received power level at 1km is lower than the GSM/LTE/GPRS receiver sensitivities.

According to the Radio Mobile data, the proposed WEF will have no RFI on the Weather Radar Installation nor the telecommunications facility, assuming that the sites emit less RFI than the CISPR 11 class A levels. If the exclusion zones, listed in Table 2, are adhered to when the WEF facility is constructed, the proposed facility will have no RFI influence on existing electrical/electronic equipment. This statement applies to the entire proposed region seen in Figure 3.

Table 3 contains possible EMI sensitive receivers with their respective sensitivities that can be used in the area. According to the worst-case cumulative coverage data generated in Radio Mobile seen in figures 14 to 22, the receivers at the Weather Radar Installation, the Telecommunications facility and the surrounding area will not be affected by the proposed WEF. There might be slight interference to LoRa applications within 1km from the WEF turbines, thus avoid using LoRa within this area.

A further detailed assessment will not be required based on the findings from the Radio Mobile data as no RFI risk was identified to classify the site as a High sensitivity site. The site can be classified as a Low sensitivity site.

11. REFERENCED AND APPLICABLE DOCUMENTS

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