




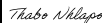



ELECTROMAGNETIC COMPATIBILITY (EMC) CONTROL PLAN FOR LAND MANAGEMENT (SANPARKS)

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ABBREVIATIONS

AGA	Astronomy Geographic Advantage	OOB	Out-of-Band
BSP	Biodiversity Special Projects	RF	Radio Frequency
CP	Construction Planning	RFI	Radio Frequency Interference
dBm	Decibel Milliwatt	SANParks	South African National Parks
DST	Department of Science and Technology	SARAS	South African Radio Astronomy Services
EMC	Electromagnetic Compatibility	SKA	Square Kilometre Array
EMCCP	EMC Control Plan	SOP	Standard Operating Procedures
EUT	Equipment Under Test	VHF	Very High Frequency
GHz	Gigahertz		
HERA	Hydrogen Epoch of Reionization Array		
kHz	Kilohertz		
LNA	Low Noise Amplifier		
MHz	Megahertz		
NRF	National Research Foundation		

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1 INTRODUCTION

Swartfontein farmstead to be renovated to accommodate the SANParks Park Manager. The plan is also to use the outbuildings at Swartfontein to be altered and used as offices.

Visserskloof farmstead to be renovated to accommodate the SANParks Section Ranger.

Skietpoort, Jaskloof and JanseBoom farmstead to be used as a ranger sleep out post while on patrol.

Brakputs farmstead to be used by BSP (Biodiversity Special Projects) contractors while working in that area.

All SANParks activities are to be considered to determine the risk of impact for radio frequency interference (RFI) on MeerKAT, HERA, MeerKAT Extension (MK+) and the SKA1 projects.

1.1 APPLICABLE & REFERENCE DOCUMENTS

1.1.1 Applicable Documents

The following documents are applicable to the extent stated herein. In the event of conflict between the contents of the applicable documents and this document, the applicable documents shall take precedence.

[1] **Regulations on the Protection of the Karoo Central Astronomy Advantage Areas in terms of the Astronomy Geographic Advantage Act, 2007**

Department of Science and Technology (DST), Government Gazette, Republic of South Africa, Vol. 630, No. 41321, Dated 15 December 2017.

[2] **Astronomy Geographic Advantage Act No. 21 of 2007**

Government Gazette, Vol. 516, No. 31157, Cape Town, Republic of South Africa, 17 June 2008.

[3] **SKA EMI/EMC Standards & Procedures**

P. Dewdney, G.-H. Tan, H. Smith, T. Tzioumis and J. Jonas, *SKA EMI/EMC standards SKA EMI/EMC Standards, Related Procedures and Guidelines*, Document Number SKA-TEL-SKO-0000202, Rev 03, 2017-03-13.

[4] **Policy for the Control of RFI on the Karoo Site**

M2900-0000-019 Rev 1

[5] **Guest Instrument Policy**

SSA4100-0000-001 Rev 1

[6] **Definitions of RFI Zones**

SSA-0008N-01A-001 Rev C

[7] **SKA1 System EMI/EMC Control Plan**

Mark Waterson, *SKA1 SYSTEM EMI/EMC CONTROL PLAN*, Document Number SKA-TEL-SKO-0000783, Rev 01, 2017-12-18

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[8] **RFI Risk Analysis: HERA Construction and Operational Activities**

SSA-0008J-088 Rev 0A

[9] **SARAO Radio Frequency Interference Karoo site Procedures**

T.J Nhlapo, SSA-0008B-02464, Rev 1, 15 April 2020

1.1.2 Reference Documents

The following documents are referenced in this document. In the event of conflict between the contents of the referenced documents and this document, this document shall take precedence.

[10] **RFI Risk Analysis: SANPARKS**

SSA-0008J-001 Rev 01

[11] **RFI Zone Definitions**

A. J. Otto and C. van der Merwe, *RFI Zone Definitions for MeerKAT and SKA1*, Report Number SSA-0008N-01A-001, Rev 01, South African Radio Astronomy Observatory (SARAO), Cape Town, South Africa, 22 April 2020.

2 DEFINITIONS

When used in this document, the terms in the list below have the following meaning:

SKA Land Core: Land in the Karoo owned by the National Research Foundation for the purposes of hosting KAT-7, MeerKAT and the SKA, along with other guest instruments.

RFI standard: The RFI protection levels in [3].

Systems: This can be a system, or subsystem, of a radio telescope, supporting infrastructure or other systems used by the general community in close proximity to the Radio Astronomy Site.

RFI Culprit: Any piece of Equipment, Systems or Vehicles that can potentially cause RFI to radio telescopes located at the Astronomy Site.

RFI Protection levels: The RFI levels in the RFI Standard.

RFI Threshold levels: The maximum RFI level at a specific position to ensure compliance with RFI Protection levels at the nearest/most sensitive receiver.

3 DESCRIPTION OF SYSTEM / EQUIPMENT TO BE DEPLOYED

3.1 LIST OF EQUIPMENT TO BE USED

Below possible list of equipment received from SANParks to be used at the different locations:

SANParks Office (Swartfontein)	Workshop	Field	BSP
Laptops	Grinder	GPS	Petrol Chainsaws
Desktop PCs and Monitors	Drill	Radio's	Battery Chainsaw
Multifunctional printer	Compressor	Camera & Video camera	Gas Fridge
Cell phones / VoIP	Welding Machine	Rifle	Camping Fridge Solar
Landline telephones	Pressure Cleaner	Binoculars	Gas Stove
Cameras & Video Cameras		Diesel Generator	Petrol brush cutters
Projectors			Battery Brush cutters
Fridge			
Kettle			
VSAT			

Each of the above mentioned equipment listed should have a proper RFI risk mitigation design in place by using the RFI Risk Analysis document (SSA-0008J-001) as a reference document. A

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detailed planning and understanding on when equipment will be used can assist with the correct mitigation plan to be implemented.

3.2 VEHICLES ACCESSING THE SKA LAND CORE

Only vehicles that have undergone RFI qualification testing are allowed site access beyond the Losberg on-site facility, subject to any terms and conditions as may be applicable in the relevant RFI Permit in [9].

4 RFI CONTROLS REQUIRED

The project will make use of RFI measurements, routine maintenance, equipment permits, and certifications as the control measures to ensure RFI compliance with the organization's RFI policy. The results and restrictions detailed in the associated permits will be used to establish a compliant work and operational procedure for the various activities of SANParks at the different location.

In addition to the above measures, the SARAO RFI team have deployed RFI monitoring stations at the HERA site, KAT-7 CMC container and soon Losberg mountain high site that will actively monitor RFI across the whole site to ensure RFI compliance.

Restrictions on location as well as time of use will have to be negotiated with the telescope operators.

- All electronic/electrical equipment planned to be used, vehicles to be used or any other potentially frequency emitting equipment (permanent or semi-permanent) shall have its RF emissions tested by SARAO at their agreed testing facility.
- An RFI measurement report in form of a RFI Notice, RFI CoC or RFI Permit shall be issued per item detailing the usage restrictions.
- A serialised list of all equipment/devices/tools shall be kept and maintained by the SANParks manager or supervisor. The list should detail the serial numbers, RF test dates and permit number for each piece as well as summarized usage restrictions. This will be used as both input into planning meetings and a register to ensure RFI compliance on site.
- No modifications to any equipment are to be made that will influence its RFI characteristics.
- Approval to make use of equipment outside of approved engineering hours may be requested (with 24 hours' notice) from the telescope operators or other designated individual.

5 IMPLEMENTATION PLAN FOR SANPARKS

The Implementation plan and risk mitigation measures below will try to identify what SANParks want to install at which location and how to mitigate the risk at each site for every device posing a risk. Please reference the EMC Control Plan below for tracking and identifying the responsible party for delivery of objectives.

5.1 EMC CONTROL PLAN FLOW DIAGRAM

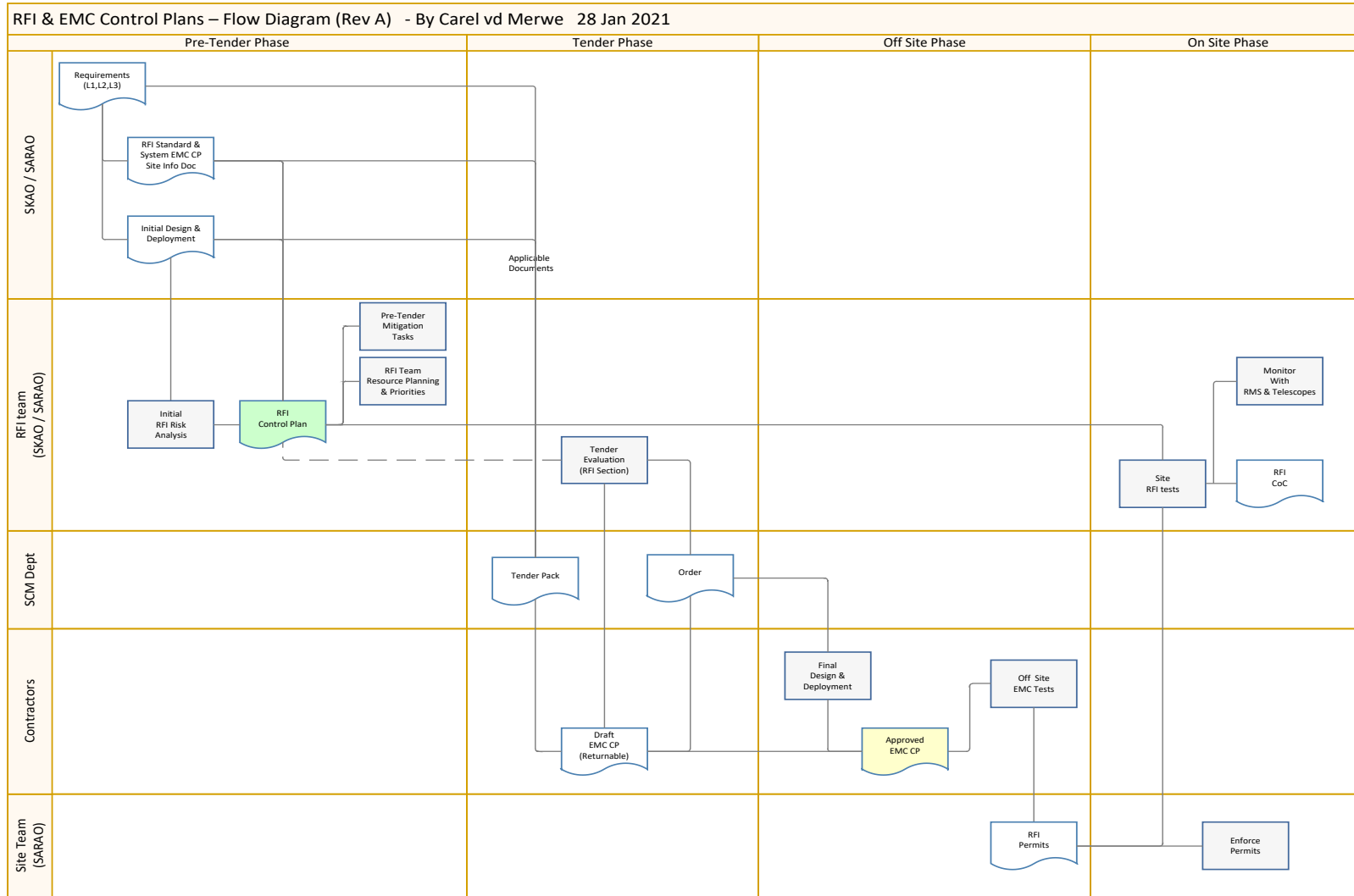


Table 1 EMCCP Flow Diagram

5.2 RFI RISK MITIGATION MEASURES

The following Risk mitigation strategies can be used as an example to determine the risk mitigation design to be implemented for each device used at a pre-determined location and time.

Risk Mitigation Strategy	Comment	RFI Control
Do not deploy this equipment to site / remove from site	When Risk level is High (e.g. Saturation) No other feasible strategy	RFI Notice
Limit the time when equipment can be used / get permission from operators before use	Relatively low risk Mitigation will be expensive	RFI Permit
Modify the equipment to reduce radiated RFI (screened enclosure, filters, etc.) or change technology	Requires development efforts Consider “standard” type solutions to reduce costs	RFI CoC
Provide screened area where non-compliant equipment can be used	Screened room in house / container Flexible solution but expensive	RFI CoC / Permit

Table 2 – Risk Mitigation Strategies

5.3 PROPOSED RISK MITIGATION STRATEGIES FOR SANPARKS OFFICE - SWARTFONTEIN

Risk Item	What	How	Who
Cooking & Fridges	M1: Use gas stove and fridges	Agreement with SANParks	SARAO install, SANParks maintain
Hot Water	M2: Low pressure solar heaters (non PV)	Agreement with SANParks	SARAO install, SANParks maintain
Small Solar PV Plant used for lights, charging devices etc.	M3: Screened enclosure for charge controller, inverter/electrical devices	Generic solution to be developed for small PV installations	RFI team – RFP/tender for design and prototype, Issue RFI CoC/Permit Project team – Production acquisition (Commercialization opportunity)
Office (Swartfontein)	M4: Screened room Laptops, Desktop PC & Monitors, Printers, VoIP phones, VSAT, Network Switches, Kettle TV, DSTV Air conditioners	Short term: KAT-7 shielded container Long term: RFI shielding in 3x allocated outbuilding offices Investigate options (Screened room, mesh room, EMC tent, conductive cement) Screened enclosures Inside shielded container/chiller plant	Desktop Study by MESA (RFI team contract), RFI team issue RFI CoC/Permit Conductive cement prototype (walls) – RFP (can be local builders) Openings (Doors & windows) – RFP (EMC specialist companies) Testing by RFI team RFI team issue RFI CoC/Permit Issue RFI CoC/Permit on all device prior to installation RFI team issue RFI CoC/Permit
Communications	M5: VHF Radio System	KAT-7 shielded container, Use VHF-Mid until VHF Low is rolled out, Limit use to critical / emergency only	SARAO provide radios Site team verify usage policy RFI issue CoC/Permits

Table 3 – Swartfontein Office Risk Mitigations

5.4 PROPOSED RISK MITIGATION STRATEGIES FOR SANPARKS – SWARTFONTEIN WORKSHOP

Risk Item	What	How	Who
Workshop (Swartfontein)	M6: Compressor, Drill, Welding machine, Grinder, Pressure cleaner	Agreement with SANParks Drill/Grinder – pneumatic/brushless	Use of Klerefontein SARAO workshops RFI team issue RFI CoC/Permit (When welding is required on equipment, consult with operators and get permission)
Communications	M5: Radio Base Station	Inside KAT-7 shielded container	SARAO provide radio Site team verify usage policy

Table 4 – Swartfontein Workshop Risk Mitigations

5.5 PROPOSED RISK MITIGATION STRATEGIES FOR SANPARKS – OUTPOSTS & FENCING TEAM

Risk Item	What	How	Who
Jaskloof, Janseboom, Schietpoort 64/2, Pofadderfontein, Visserskloof 69/1, Bottersleegte, De Hoek, Blaauwheuwel	M3: Screened enclosure for charge controller, inverter/electrical devices	Generic solution to be developed for small 3KVA PV installations	RFI team – RFP/tender for design and prototype, Project team – Production acquisition (Commercialization opportunity) Issue RFI CoC/Permit
Cooking & Fridges	M1: Use gas stove and fridges	Agreement with SANParks	SARAO install, SANParks maintain
Hot Water	M2: Low pressure solar heaters (non PV)	Agreement with SANParks	SARAO install, SANParks maintain
Small Solar PV Plant used for lights, charging devices etc.	M3: Screened enclosure for charge controller, inverter/electrical devices	Generic solution to be developed for small PV installations	RFI team – RFP/tender for design and prototype, Issue RFI CoC/Permit Project team – Production acquisition

Risk Item	What	How	Who
Communications	M5: Radio Base Station	Used inside vehicles only, Limit use to critical / emergency only	SARAO provide radio Site team verify usage policy

Table 5 – Outposts & Fencing Team Risk Mitigations

5.6 PROPOSED RISK MITIGATION STRATEGIES FOR SANPARKS – PROSOPIS ERADICATION TEAMS

Risk Item	What	How	Who
Brakputs	M3: Screened enclosure for charge controller, inverter/electrical devices	Generic solution to be developed for small PV installations	RFI team – RFP/tender for design and prototype, Project team – Production acquisition Issue RFI CoC/Permit
Battery chainsaw, Battery Brush cutters	M7: Electrical/Petrol/Pneumatic/Brushless	Investigate best technology / emission reduction modifications Handsaws at Losberg & Meysdam	Desktop Study by MESA (RFI team contract), RFI team Permit (M2901-0000-166) with kmz file for each device to be used SAROA SOP Consult with operators on pre-approved time of use.
Cooking & Fridges	M1: Use gas stove and fridges	Agreement with SANParks	SARAO install, SANParks maintain
Hot Water	M2: Low pressure solar heaters (non PV)	Agreement with SANParks	SARAO install, SANParks maintain

Risk Item	What	How	Who
Communications	M5: Radio Base Station	Used inside vehicles only, Limit use to critical / emergency only	SARAO provide radio Site team verify usage policy
Diesel Generator	M8: Only Diesel generators	Investigate best technology / emission reduction modifications if needed	RFI team issue RFI CoC/Permit
GPS	M9: Use of pre-approved GPS devices	Investigate SANParks GPS devices used	RFI team issue Permit
Cameras and Video Cameras	M10: Use of pre-approved devices	Investigate best RFI approved devices.	RFI team provide list of approved devices RFI team issue Permit (Used during non-observation times to be agreed with operators)

Table 6 - Prosopis Eradication Teams

5.7 PROPOSED RISK MITIGATION STRATEGIES FOR SANPARKS – GENERAL ITEMS NOT LISTED ABOVE

Risk Item	What	How	Who
Vehicles	M11: Diesel Only vehicles – No Bluetooth/Wi-Fi	Agreement with SANParks. To be deactivated by SARAO (cut-out switches)	RFI team perform RFI testing with consultation. Vehicle modifications – Client/SARAO Verification – RFI Control Officer RFI team issue permit
Wi-Fi /Bluetooth	Not Allowed	Agreement with SANParks	RFI team perform RFI testing with consultation. RFI team issue permit
Drones	M12: Not allowed	Agreement with SANParks	RFI team issue permit No flight during observations. SOP as per SARAO. Consult with operators to approve.
Helicopter/Airplanes	M13: Not Allowed	Agreement with SANParks	SOP as per SARAO. Consult with operators to approve.

Table 7 - General Items not Listed

6 RFI RISK IDENTIFICATION AND QUALIFICATION TEST PLAN

The complete RFI Risk Analysis for SANPARKS can be found in [10], below a summary of the important findings from the analysis. The attenuation deficit value in dB on each table is defined as the additional attenuation required by a mitigation solution. For example, if the attenuation deficit shows a value of 30dB, it means the specific device requires an additional screening of 30dB in order not to exceed the protection levels at the telescope.

The various RFI Zones defined in [11] are overlaid in the Figure 1 below. All the locations fall within “RFI Zone 2: Outer Core” which is defined in [11] as a 25 km radius around the SKA Virtual Core defined in [11].

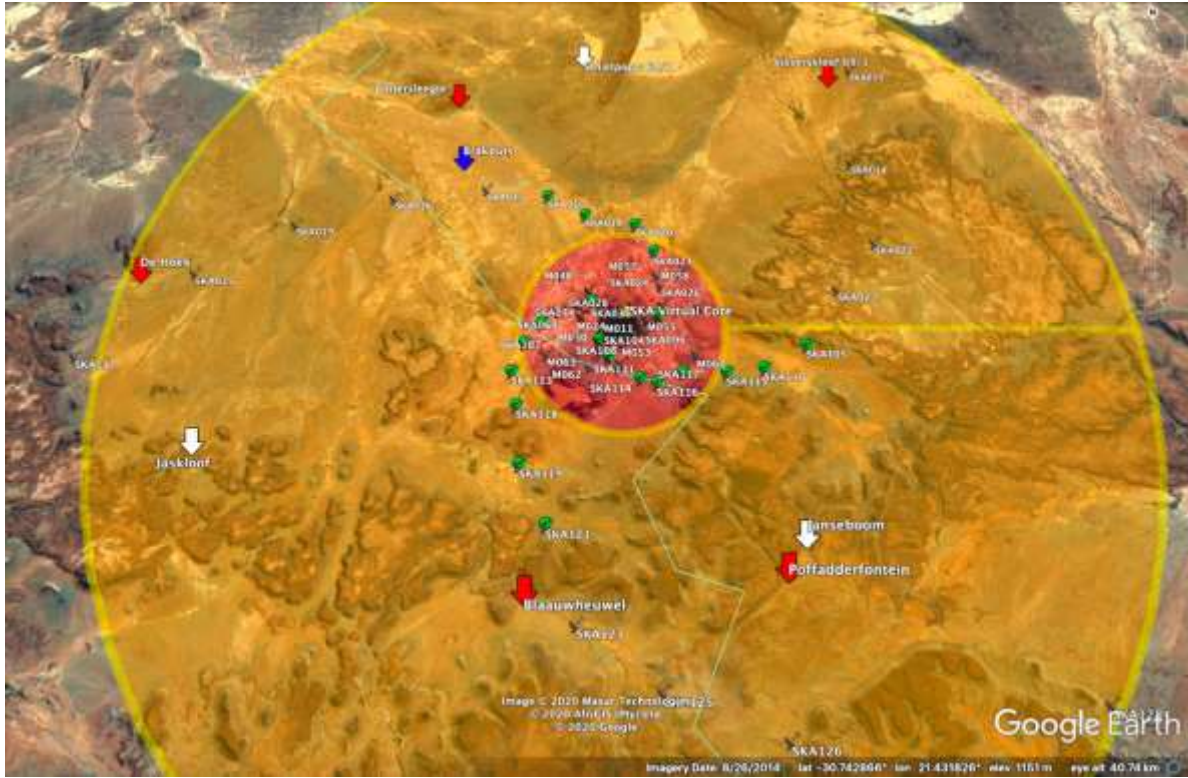


Figure 1 – RFI Zones overlaid on culprit locations and MeerKAT, MK+ and SKA1-Mid positions.

The parameters considered in the risk analysis are:

1. Level of interference
 - a. Damage, Saturation, Continuum and Spectral Line Protection Levels
2. Time occupancy (TO) based on ITU-R RA.769
 - a. Class A :: TO < 2%
 - b. Class B :: 2% < TO < 5%
 - c. Class C :: TO > 5%
3. Receiver channel occupancy
(Telescope receiver bands affected)

The risk impact of the culprit source (SANParks Office, Workshop, Outposts & Fencing Team, Prosopis Eradication teams) has to be calculated. This risk is calculated based on this culprit source toward the most sensitive MeerKAT or SKA1 telescope receivers. In other words, what is the risk that the culprit source causes towards the most sensitive MeerKAT or SKA1 telescope receivers. This is also done in accordance with the SARAS protection levels.

6.1 RISK ANALYSIS FOR TECHNOLOGY SPECIFIC DEVICES AT SANPARKS OFFICE (SWARTFONTEIN)

Frequency [GHz]	EUT Description	Attenuation Deficit [dB]					Recommendation
		L1	L2	L3	L4	L5	
Measured Emission Profiles for Technology Specific Equipment							
0.08 to 2 GHz	Laptop	30	-	-	-	-	Address in EMCCP
0.08 to 2.5 GHz	Desktop PCs and Monitors	55	-	-	-	-	Address in EMCCP
0.2 to 0.5 GHz	Fridge	35	-	-	-	-	Address in EMCCP
0.08 to 0.5 GHz	VoIP phones	30	-	-	-	-	Address in EMCCP
0.4 to 0.8 GHz	Cameras and Video Cameras	20	-	-	-	-	Address in EMCCP
0.3 to 2.2 GHz	VSAT	50	-	-	-	-	Address in EMCCP
1.89 GHz	DECT phones	80	-	-	-	-	Not permitted
2.3 to 2.5 GHz	Microwave Oven	90	-	-	-	-	Not permitted
<i>L1: Swartfontein</i>							
General Emission Profiles based on Commercial EMC Standards							
0.03 to 6 GHz	CISPR 11/22 Class A (Pk)	70	-	-	-	-	Address in EMCCP
<i>L1: Swartfontein</i>							

Table 8 – Risk Analysis for technology specific devices at SANParks Office

Below table supplies the measured results for previously measured emissions from equipment proposed to be used at Swartfontein farmstead.

Frequency [MHz]	EIRP [dBm]	EUT Description	**Time Occupancy	Wideband Start Freq.	Wideband Stop Freq.	RBW [kHz]
100 MHz	-68 dBm	Laptop	C	80 MHz	2 GHz	100 kHz
100 MHz	-45 dBm	Desktop PCs and Monitors	C	80 MHz	2.5 GHz	100 kHz
250 MHz	-59 dBm	Fridge	C	200 MHz	500 MHz	100 kHz
327 MHz	-61 dBm	VoIP phones	C	80 MHz	500 MHz	100 kHz
700 MHz	-70 dBm	Cameras and Video Cameras	A	400 MHz	800 MHz	100 kHz
1300 MHz	-45 dBm	VSAT	C	300 MHz	2.2 GHz	25 kHz

1890 MHz	-7.8 dBm	DECT phones	B	-	-	100 kHz
2430 MHz	+1.2 dBm	Microwave Oven	B	2.3 GHz	2.5 GHz	120 kHz

Table 9 – Previously measured RFI culprits for SANParks Office

** *Time occupancy* is defined as an approximation of percentage time use per day:

A: TO < 2% **B:** 2% < TO < 5% **C:** TO > 5%

Below table refers to the risk analysis for the SANParks Office location. Utilised receiver bands have been shown, together with the effective received power spectral density from identified RFI culprits and a view on the risk of each of the culprits, taking into account the utilisation (or % time of use) of the relevant culprit.

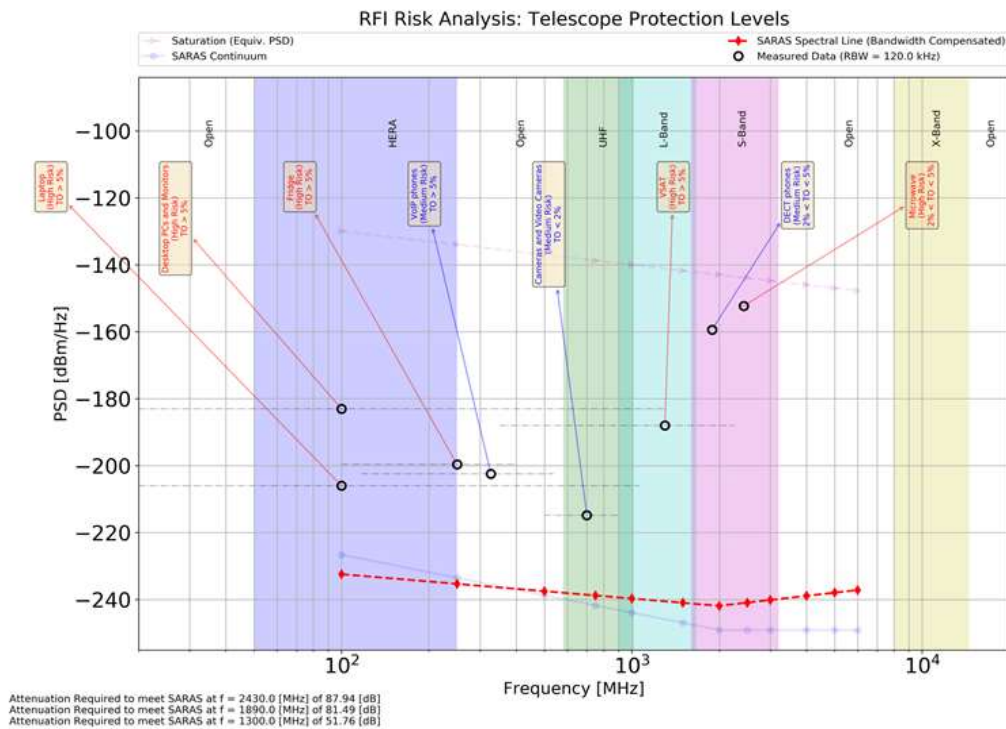


Figure 2 - Risk analysis for single source SANParks Office (Swartfontein) toward the most sensitive MeerKAT or SKA1 telescope receivers.

6.2 RISK ANALYSIS FOR TECHNOLOGY SPECIFIC DEVICES AT SANPARKS WORKSHOP

Frequency [GHz]	EUT Description	Attenuation Deficit [dB]					Recommendation
		L1	L2	L3	L4	L5	
Measured Emission Profiles for Technology Specific Equipment							
0.05 to 0.2 GHz	Compressor	20	-	-	-	-	Address in EMCCP
0.08 to 4 GHz	Radio Base Station	30	-	-	-	-	Address in EMCCP
0.32 to 0.45 GHz	Drill	45	-	-	-	-	Address in EMCCP
0.1 to 1 GHz	Welding Machine	75	-	-	-	-	Address in EMCCP

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0.5 to 0.75 GHz	Grinder	60	-	-	-	-	Address in EMCCP
<i>L1: Swartfontein</i>							
General Emission Profiles based on Commercial EMC Standards							
0.03 to 6 GHz	CISPR 11/22 Class A (Pk)	70	-	-	-	-	Address in EMCCP
<i>L1: Swartfontein</i>							

Table 10 - Risk analysis for technology specific devices at SANParks Workshop

Below table supplies the measured results for previously measured emissions from equipment proposed to be used at this location.

Frequency [MHz]	EIRP [dBm]	EUT Description	**Time Occupancy	Wideband Start Freq.	Wideband Stop Freq.	RBW [kHz]
50 MHz	-80 dBm	Compressor	B	50 MHz	200 MHz	100 kHz
107 MHz	-59 dBm	Radio Base Station	B	80 MHz	4 GHz	120 kHz
430 MHz	-51 dBm	Drill	A	320 MHz	450 MHz	100 kHz
450 MHz	-24 dBm	Welding Machine	A	100 MHz	1 GHz	25 kHz
700 MHz	-35 dBm	Grinder	A	500 MHz	750 MHz	100 kHz

Table 11 - Previously measured RFI culprits for SANParks Workshop

** *Time occupancy* is defined as an approximation of percentage time use per day:

A: TO < 2% **B:** 2% < TO < 5% **C:** TO > 5%

Below table refers to the risk analysis for the SANParks Workshop location.

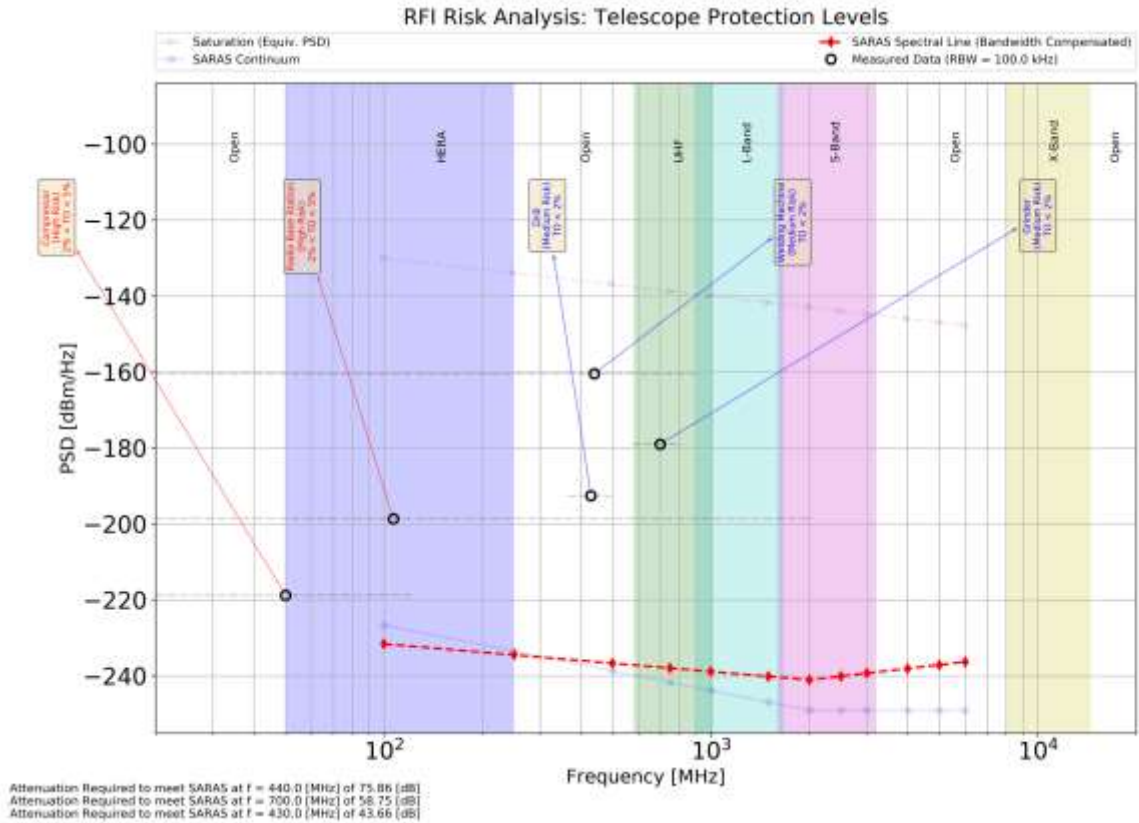


Figure 3 - Risk analysis for single source SANParks Workshop (Swartfontein) toward the most sensitive MeerKAT or SKA1 telescope receivers.

6.3 RISK ANALYSIS FOR TECHNOLOGY SPECIFIC DEVICES AT SANPARKS OUTPOSTS & FENCING TEAM

Frequency [GHz]	EUT Description	Attenuation Deficit [dB]					Recommendation
		L1	L2	L3	L4	L5	
Measured Emission Profiles for Technology Specific Equipment							
0.05 to 0.7 GHz	Charge Controller	25	30	20	-	-	Address in EMCCP
0.08 to 4 GHz	Radio Base Station	10	15	5	-	-	Address in EMCCP
0.3 to 2 GHz	Inverter	30	25	20	-	-	Address in EMCCP
<i>L1: Jaskloof; L2: Janseboom; L3: Schietpoort 64/2</i>							
0.05 to 0.7 GHz	Charge Controller	30	45	25	40	45	Address in EMCCP
0.08 to 4 GHz	Radio Base Station	20	30	10	25	30	Address in EMCCP
0.3 to 2 GHz	Inverter	35	50	30	45	50	Address in EMCCP
<i>L1: Poffadderfontein; L2: Visserskloof 69/1; L3: Bottersleepte; L4: De Hoek; L5: Blaauwheuwel</i>							
General Emission Profiles based on Commercial EMC Standards							
0.03 to 6 GHz	CISPR 11/22 Class A (Pk)	50	30	30	-	-	Address in EMCCP
<i>L1: Jaskloof; L2: Janseboom; L3: Schietpoort 64/2</i>							

0.03 to 6 GHz	CISPR 11/22 Class A (Pk)	40	70	60	70	70	Address in EMCCP
L1: Poffadderfontein; L2: Visserskloof 69/1; L3: Biddersleegte; L4: De Hoek; L5: Blaauwheuwel							
Emission Profiles of "Difficult-to-Shield" Equipment based on SARAO RFI Database							
2.430 GHz	WiFi / Bluetooth	Carrier in Telescope Rx (S-Band)					Not Permitted
2.480 GHz	Bluetooth (Vehicles)	Carrier in Telescope Rx (S-Band)					Not Permitted
2.400 GHz	Microwave Oven	Carrier in Telescope Rx (S-Band)					Not Permitted

Table 12 - Risk analysis for technology specific devices at SANParks Outposts and Fencing Teams

Measurement results for previously measured emissions from equipment proposed by SANParks for use at their Outposts and Fencing Team accommodations are shown below.

Frequency [MHz]	EIRP [dBm]	EUT Description	**Time Occupancy	Wideband Start Freq.	Wideband Stop Freq.	RBW [kHz]
50 MHz	-43 dBm	Charge Controller (MPPT)	C	50 MHz	700 MHz	100 kHz
107 MHz	-59 dBm	Radio Base Station	B	80 MHz	4 GHz	120 kHz
280 MHz	-42 dBm	Inverter	C	300 MHz	2 GHz	100 kHz

Table 13 - Previously measured RFI culprits for SANParks Outpost and Fencing Teams Accommodations

** Time occupancy is defined as an approximation of percentage time use per day:

A: TO < 2% **B:** 2% < TO < 5% **C:** TO > 5%

Below table refers to the risk analysis for the SANParks Jaskloof Outpost and Fencing team location.

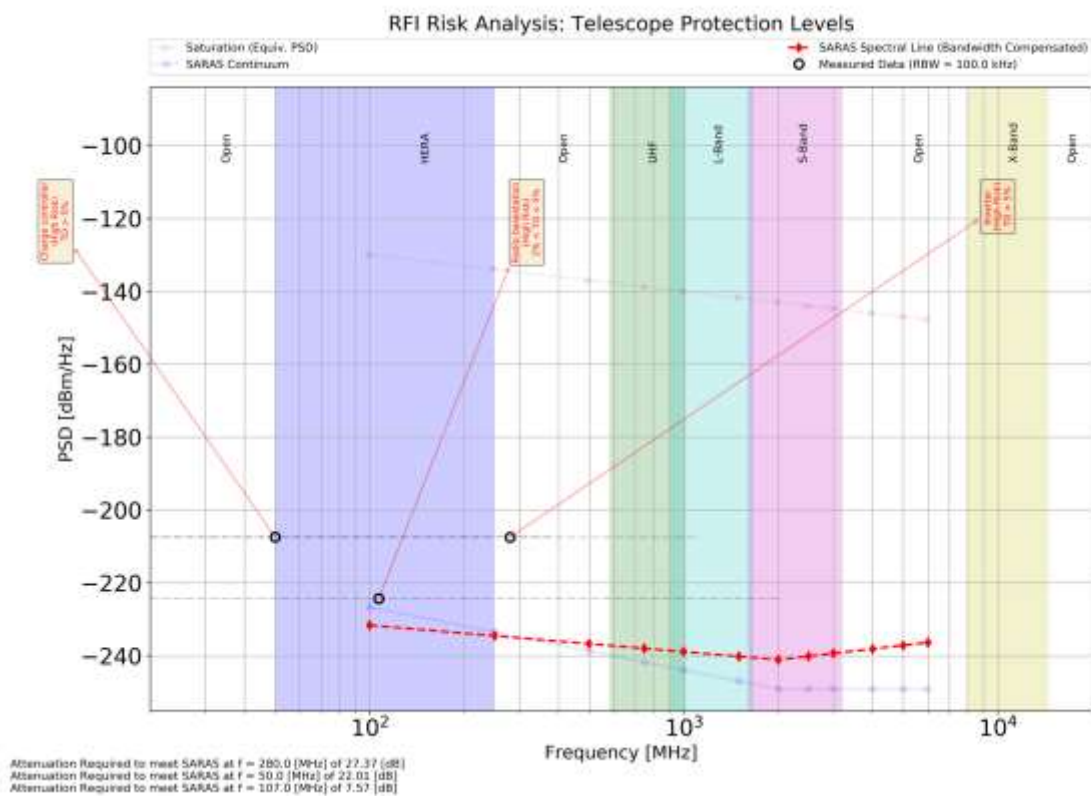


Figure 4 - Risk analysis for single source SANParks Outposts (Jaskloof) toward the most sensitive MeerKAT or SKA1 telescope receivers.

Below table refers to the risk analysis for the SANParks Janseboom Outpost and Fencing team location.

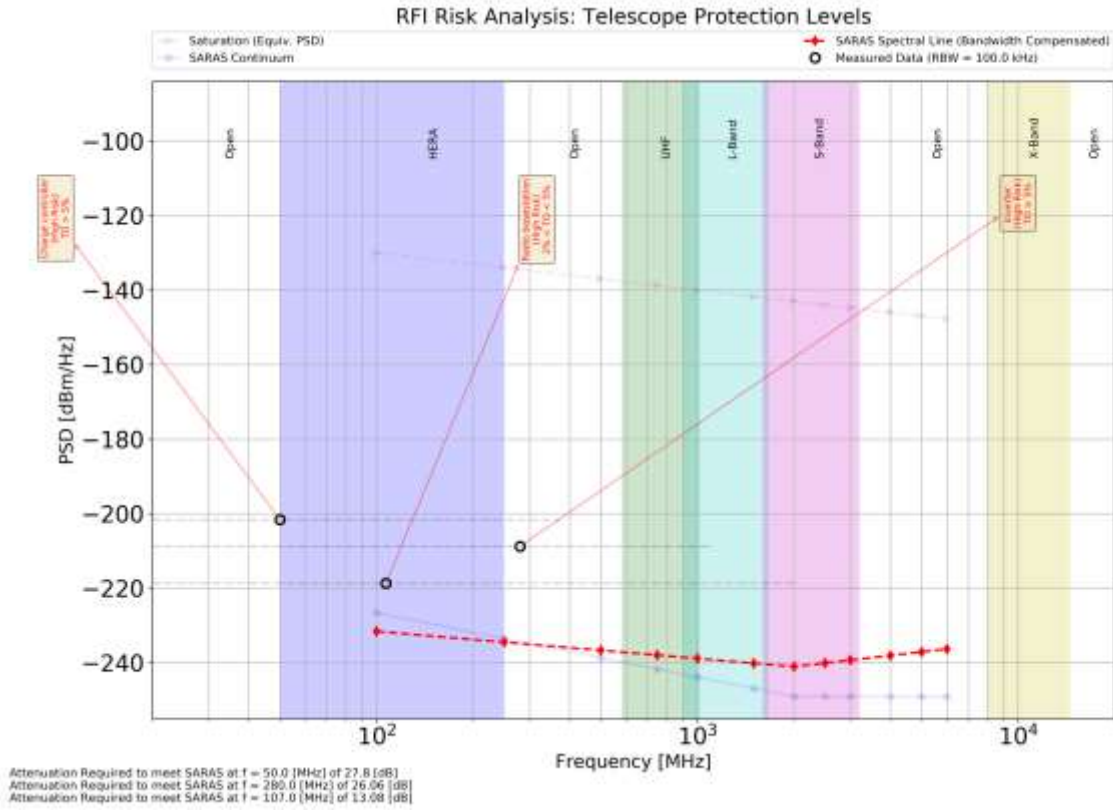


Figure 5 - Risk analysis for single source SANParks Outposts (Janseboom) toward the most sensitive MeerKAT or SKA1 telescope receivers.

Below table refers to the risk analysis for the SANParks Schietpoort64/2 Outpost and Fencing team location.

Measurement results for previously measured emissions from equipment proposed by SANParks for use at their Prosopis Eradication Teams are shown below.

Frequency [MHz]	EIRP [dBm]	EUT Description	**Time Occupancy	Wideband Start Freq.	Wideband Stop Freq.	RBW [kHz]
84.8 MHz	-67 dBm	Battery Chainsaw	A	80 MHz	1 GHz	100 kHz
106 MHz	-64 dBm	Battery Brush Cutters	A	100 MHz	400 MHz	100 kHz
155.68 MHz	+14 dBm	Radios	C	120 MHz	170 MHz	120 kHz
200 MHz	-27 dBm	Diesel Generator	C	30 MHz	300 MHz	120 kHz
700 MHz	-79 dBm	GPS	A	400 MHz	2.5 GHz	100 kHz
701 MHz	-70 dBm	Cameras and Videos	A	400 MHz	800 MHz	100 kHz
1100 MHz	-75 dBm	GPS	A	400 MHz	2.5 GHz	100 kHz
2200 MHz	-79 dBm	GPS	A	400 MHz	2.5 GHz	100 kHz

Table 15 - Previously measured RFI culprits for SANParks Prosopis Eradication Teams

** *Time occupancy* is defined as an approximation of percentage time use per day:

A: TO < 2% **B:** 2% < TO < 5% **C:** TO > 5%

7 ROLES AND RESPONSIBILITIES

Task	Responsible Person(s)
Desktop Study by MESA	RFI Team / MESA
Tender/RFP for Design, Test & Verification of PV Plant	RFI Team
Production acquisition of PV Plant	Project Team
RFI testing of listed electrical/electronic devices and tools, vehicles etc.	RFI Team test and issue RFI Notice/Permit/CoC
Agreement with SANParks – use of gas stoves/ solar heaters	Project Team
Production and Implementation contracts	Project Team

Table 16 – Roles and Responsibilities












SSA-0008C-014 EMCCP SANPARKS Rev01

Final Audit Report

2021-05-02


Created:	2021-04-29
By:	Steve Bila (sbila@ska.ac.za)
Status:	Signed
Transaction ID:	CBJCHBCAABAACVKark_CJyV4MAbpE-_PWozYvXHEUjhu

"SSA-0008C-014 EMCCP SANPARKS Rev01" History

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 Agreement completed.

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