

Paardeberg Mountain Wildfire

27 December 2023 – 02 January 2024

M.A.P Scientific Services January 2024 Email: solutions@mapss.co.za | Address: 105A Club Ave, Waterkloof, Pretoria, 0145

www.mapss.co.za

Disclaimer

represent a snapshot at that period of time. All data illustrated should be interpreted with caution and should be backed up The burnt areas displayed in this report are modelled based on significant changes in vegetation and have not been verified on the ground. The data may therefore include areas that were not necessarily affected by fire. Furthermore, the data are generated from satellite imagery that can be affected by atmospheric anomalies and conditions such as cloud cover, smog, or smoke. These factors may result in inaccurate data from time to time. Furthermore, satellite imagery captured over an area with observations on the ground. MAPSS does not take responsibility for any inaccuracies or misrepresentations in the data.



TABLE OF CONTENTS

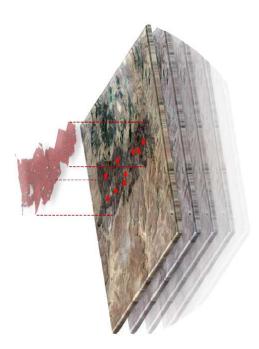
:	m	m	4
	Background	List of Figures	List of Tables
	:	:	:
	•	•	•
:	•	•	•
	•	:	•
	•	•	
		•	:
:		•	:
	•	•	•
		•	:
		•	•
	•	:	:
:	:	:	:
	:	:	:
:	:	:	:
	:	:	:
:	•	•	:
	•	•	:
:	•	•	:
	•	•	:
	•	•	:
:	•	:	:
	:	:	:
:	:	:	:
	:	:	:
	:	:	:
	•	•	:
	•	•	:
	•	•	:
	•	•	•
	:	:	:
	:	:	:
	:	:	:
	:	:	:
	:	:	:
:	:	:	:
	:	•	:
:	:	•	:
	•	•	•
		•	
	:	:	:
:	:	:	:
	:	:	:
نه	:	:	:
.=	:	:	:
5	•	:	:
.≅	•	S	Ś
\geq	ਲੰ	Æ	Ü
_	Ĕ	3	ನ
-=	3	60	ᇹ
T _a		证	Ĥ
_	<u> </u>	ــِب	<u>ب</u>
\Box	₹.	0	0
2	<u> </u>	7	゙
\geq	ā	. <u>≥:</u>	.≌
po	40	_	_
þ			
O			
Ó			
Paardeberg Mountain Wildfire			
а	:	-:	. •
	-	7	က



1. Background

MAPSS Burnt Area Product is produced and owned by M.A.P Scientific Services (Pty) Ltd. The data is generated using high resolution (10m) satellite imagery captured every 5 to 10 days. The data is then modelled by comparing changes in vegetation between two consecutive satellite images represented by a pre-date and post-date image. The result is a burnt area product represented by polygons and associated data.

Specifically, the burn scar is modelled by measuring the spectral/light properties of pixels within a satellite image. The spectral analysis used was normalised burn ratio (NBR) that focuses on the Near infrared and shortwave infrared spectrum.



occurred ~27 December 2023 until ~ 4 January 2024, on the Paardeberg Mountain just north-west of In this document MAPSS reports on the generated burn scar maps of the apparent fire which Wellington, Western Cape. The fire is estimated to be 2 872 ha in size, affecting 61 farm portions. These maps are supported by thermal hotspot data captured by MODIS and VIIRS instruments, as well as a breakdown of the farm portions affected, and area burnt (ha).

2. List of Figures

Figure 6. Map illustraing thermal hotspots captured by MODIS and VIIRS sensors (illustrating the Figure 1. Location of the burn scar of interest that occurred on the 27th of December 2023 on the Figure 2. Satellite image captured before the fire occurred on the 26th of December 2023......6 overall spread of the fire from 27 December 2023 until 2 January 2024).......8 Figure 5. Map illustrating thermal hotspots captured by MODIS and VIIRS sensors (illustrating the potential direction of the spread of the fire on 28 December 2023)10 Figure 7. Map illustrating thermal hotspots captured by MODIS and VIIRS sensors (illustrating the Figure 4. Map illustrating thermal hotspots captured by MODIS and VIIRS sensors (illustrating the potential direction of the spread of the fire on 29 December 2023)11 **Figure 3.** Satellite image captured after the fire occurred on the $05^{ thin}$ of January 2024...... Figure 8. Map illustrating thermal hotspots captured by MODIS and VIIRS sensors (illustrating the Figure 9. Map illustrating thermal hotspots captured by MODIS and VIIRS sensors (illustrating the potential starting point of the fire on 27December 2023 at 11:46 AM) Paardeberg Mountain in the Western Cape potential spread of the fire on 30 and 31 December 2023).....



potential direction of the spread of the fire on 1 and 2 January 2024)13
Figure 10. Map illustrating thermal hotspots captured by MODIS and VIIRS sensors (illustrating the
potential end point of the fire on 2 January 202414
Figure 11. The location of thermal hotspots for one time-stamp on 28 December 2023 (11:33 PM)
and two time-stamps on 29 December 2023 (12:46 AM and 1:35 AM)
Figure 12. Map showing the extent of the burn scar overlaid with the farm portions affected by the
fire16
Figure 13. Map showing the thermal hotspots captured by MODIS and VIIRS instruments
(illustrating the spread of the fire on three farm portions 14/851, 8/1491 and RE/157 on 28 and 29
December 2023)
Figure 14. Map showing the thermal hotspots captured by MODIS and VIIRS instruments
(illustrating the spread of the fire on two farm portions RE/11/851 and RE/2/1491 on 28 and 29
December 2023. and 2. January 2024).

3. List of Tables

$\stackrel{\leftarrow}{}$	۲.
⊑	Γ.
\preceq	:
7	:
a	:
$\overline{\mathcal{L}}$:
Б	:
Ъ	:
ġ	:
¥	:
Ĕ	:
.⊑	÷
š	:
ŭ	:
$\overline{\Box}$:
ĭ	:
ਰ	:
	:
S	÷
$\underline{\varepsilon}$:
Ö	:
ひ	:
Ō	:
رع	:
~	:
Ž	:
· <u>::</u>	:
~	:
ā	:
Ξ	÷
σ	:
\sqsubseteq	:
⋤	:
Ξ	:
ש	:
4	:
e	:
÷	:
þΩ	:
\subseteq	:
.≡	:
≥	:
\sim	:
$\frac{1}{2}$	÷
in	:
ä	:
;=	:
4	:
ŏ	\Box
ᅙ	0
Ξ	≔
_	\ddot{c}
Ξ	ă
⊑	_
Ę	Ξ.
<u>_</u>	ā
0	تب
ĭ	÷
≟	Ď
4	$\overline{}$
`:	S
H	9
a	Ġ
Table 1. A list of farm properties showing the farm name, size (hectares) and estimated area burnt	(hectares) per farm portion
푿	Ū
"	



Figure 1. Location of the burn scar of interest that occurred on the 27th of December 2023 on the Paardeberg Mountain in the Western Cape.

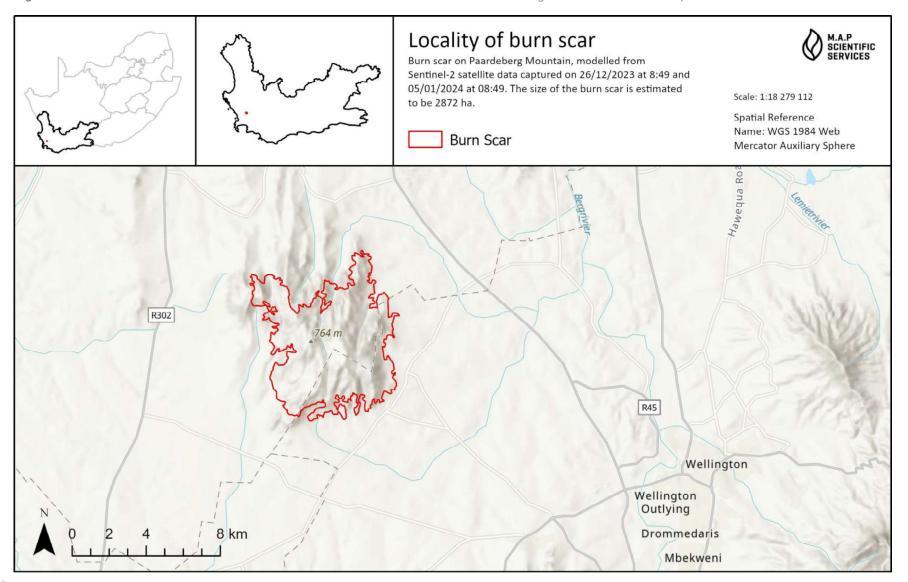


Figure 2. Satellite image captured before the fire occurred on 26th of December 2023.

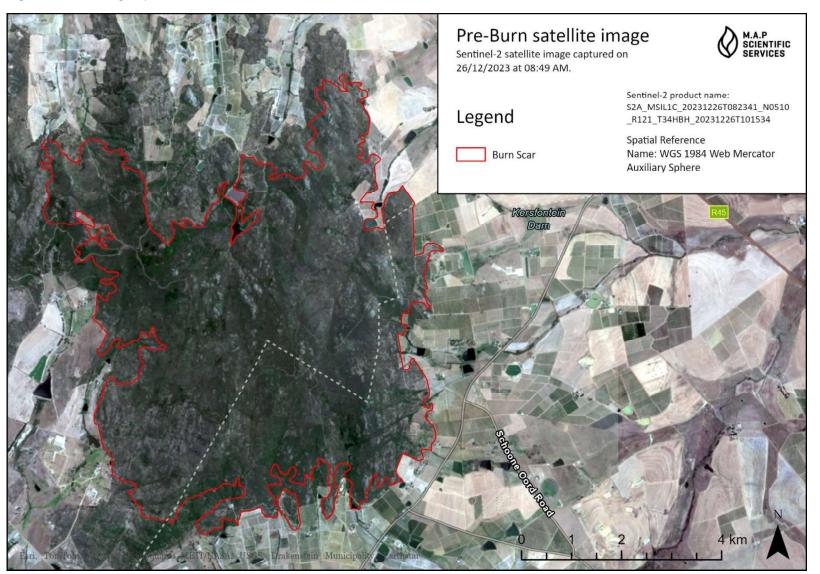




Figure 3. Satellite image captured after the fire occurred on the 5th of January 2024.

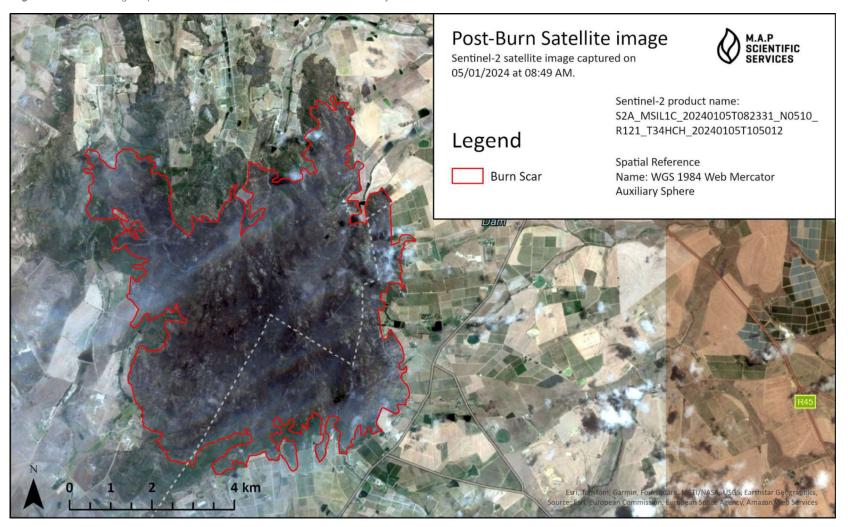




Figure 4. Map illustrating thermal hotspots captured by MODIS and VIIRS sensors (illustrating the overall spread of the fire from 27 December 2023 until 2 January 2024).

Near Real-Time Thermal Hotspots Zoomed in Sentinel-2 image of the Paardeberg mountain captured on 05/01/2024 at 08:49 AM. Thermal hotspot time series data captured by MODIS and VIIRS instruments from 27 December 2023 to 2 January 2024. Sentinel-2 product name: R121_T34HBH_20240105T105012 Spatial Reference Name: WGS 1984 Web Mercator Auxiliary Sphere 29/12/2023 2:33:00 PM Thermal Hotspots 29/12/2023 2:48:00 PM Timestamp 29/12/2023 3:37:00 PM 27/12/2023 1:46:00 PM 9/12/2023 10:38:00 PM 27/12/2023 2:36:00 PM O 30/12/2023 1:16:00 AM 27/12/2023 2:50:00 PM O 30/12/2023 2:07:00 AM 27/12/2023 3:27:00 PM O 30/12/2023 9:37:00 AM 28/12/2023 1:54:00 AM 31/12/2023 1:48:00 AM 28/12/2023 2:45:00 AM 31/12/2023 2:10:00 PM 28/12/2023 1:25:00 PM O1/01/2024 1:53:00 PM 28/12/2023 2:16:00 PM O2/01/2024 1:09:00 AM 28/12/2023 2:18:00 PM O2/01/2024 2:02:00 AM 28/12/2023 3:31:00 PM O2/01/2024 2:52:00 AM 28/12/2023 11:33:00 PM O2/01/2024 10:00:00 AM 29/12/2023 12:46:00 AM O 02/01/2024 1:34:00 PM 29/12/2023 1:35:00 AM O2/01/2024 2:25:00 PM 29/12/2023 2:26:00 AM 29/12/2023 2:32:00 AM M.A.P SCIENTIFIC SERVICES 29/12/2023 1:57:00 PM



Figure 5. Map illustrating thermal hotspots captured by MODIS and VIIRS sensors (illustrating the potential starting point of the fire on 27 December 2023).

Zoomed in Sentinel-2 image of the Paardeberg mountain captured on 05/01/2024 at 08:49 AM. Thermal hotspot time series data captured by MODIS and VIIRS instruments on 27 December 2023.

Sentinel-2 product name: S2A_MSIL1C_20240105T082331_N0510_ R121_T34HBH_20240105T105012

Spatial Reference Scale: 1:109 193

Name: WGS 1984 Web Mercator Auxiliary Sphere

Timestamp

- 27/12/2023 1:46:00 PM
- 27/12/2023 2:36:00 PM
- 27/12/2023 2:50:00 PM
- O 27/12/2023 3:27:00 PM



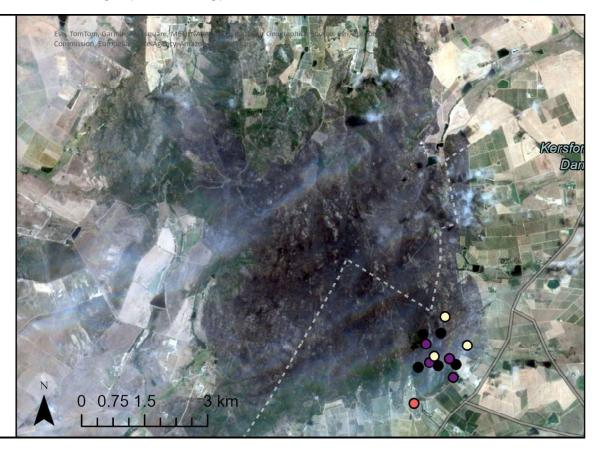




Figure 6. Map illustrating thermal hotspots captured by MODIS and VIIRS sensors (illustrating the potential direction of the spread of the fire on 28 December 2023).

Sentinel-2 image captured on 05/01/2024 at 08:49 AM. Thermal hotspot time series data captured by MODIS and VIIRS instruments on 28 December 2023.

Sentinel-2 product name: \$2A_MSIL1C_20240105T082331_N0510_ R121_T34HBH_20240105T105012

Spatial Reference

Name: WGS 1984 Web Mercator Auxiliary

Sphere

Scale: 1:95 435

Thermal Hotspots

28/12/2023 2:16:00 PM

Timestamp

- O 28/12/2023 2:18:00 PM
- 28/12/2023 1:54:00 AM
- O 28/12/2023 3:31:00 PM
- **28/12/2023 2:45:00 AM**
- O 28/12/2023 11:33:00 PM
- **28/12/2023 1:25:00 PM**



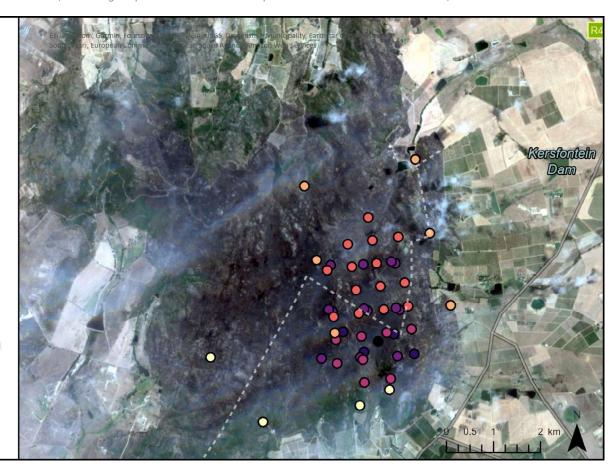




Figure 7. Map illustrating thermal hotspots captured by MODIS and VIIRS sensors (illustrating the potential direction of the spread of the fire on 29 December 2023).

Sentinel-2 image captured on 05/01/2024 at 08:49 AM. Thermal hotspot time series data captured by MODIS and VIIRS instruments on 29 December 2023.

Sentinel-2 product name: S2A_MSIL1C_20240105T082331_N0510_ R121_T34HBH_20240105T105012

Spatial Reference

Name: WGS 1984 Web Mercator Auxiliary

Sphere

Scale: 1:95 435

Thermal Hotspots

Timestamp

9/12/2023 12:46:00 AM

29/12/2023 1:35:00 AM

9/12/2023 2:26:00 AM

9/12/2023 2:32:00 AM

29/12/2023 1:57:00 PM

9/12/2023 2:33:00 PM

O 29/12/2023 2:48:00 PM

29/12/2023 3:37:00 PM

O 29/12/2023 10:38:00 PM



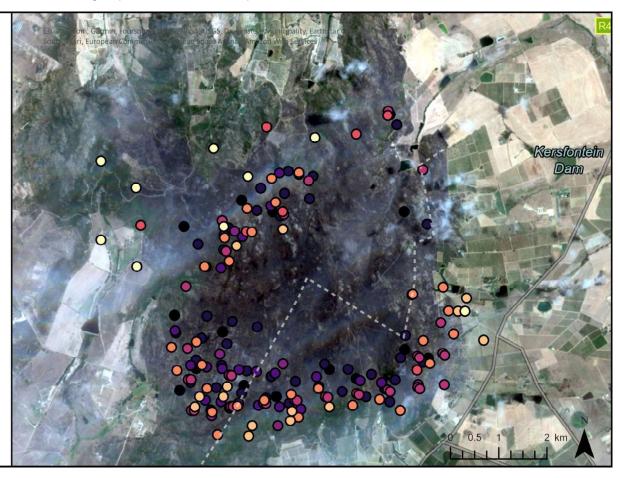




Figure 8. Map illustrating thermal hotspots captured by MODIS and VIIRS sensors (illustrating the potential direction of the spread of the fire on 30 and 31 December 2023).

Sentinel-2 image captured on 05/01/2024 at 08:49 AM. Thermal hotspot time series data captured by MODIS and VIIRS instruments on 30 and 31 December 2023.

Sentinel-2 product name: S2A_MSIL1C_20240105T082331_N0510_ R121_T34HBH_20240105T105012

Spatial Reference

Name: WGS 1984 Web Mercator Auxiliary

Sphere

Scale: 1:95 435

Thermal Hotspots

Timestamp

- 30/12/2023 1:16:00 AM
- **3**0/12/2023 2:07:00 AM
- **3**0/12/2023 9:37:00 AM
- 31/12/2023 1:48:00 AM
- O 31/12/2023 2:10:00 PM



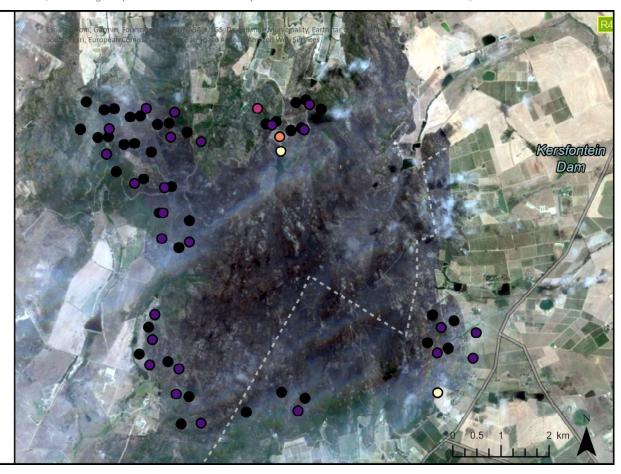




Figure 9. Map illustrating thermal hotspots captured by MODIS and VIIRS sensors (illustrating the potential direction of the spread of the fire on 1 and 2 January 2024).

Sentinel-2 image captured on 05/01/2024 at 08:49 AM. Thermal hotspot time series data captured by MODIS and VIIRS instruments on 1 and 2 January 2024.

Sentinel-2 product name: S2A_MSIL1C_20240105T082331_N0510_ R121_T34HBH_20240105T105012

Spatial Reference

Name: WGS 1984 Web Mercator Auxiliary

Scale: 1:95 435

Sphere

Thermal Hotspots

Timestamp

- O1/01/2024 1:53:00 PM
- 02/01/2024 1:09:00 AM
- O2/01/2024 2:02:00 AM

02/01/2024 2:52:00 AM

- 02/01/2024 10:00:00 AM
- 02/01/2024 1:34:00 PM
- O2/01/2024 2:25:00 PM



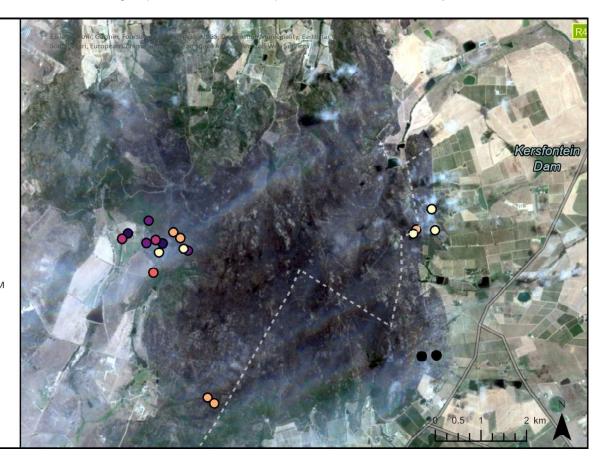




Figure 10. Map illustrating thermal hotspots captured by MODIS and VIIRS sensors (illustrating the potential end point of the fire on 2 January 2024).

Sentinel-2 image captured on 05/01/2024 at 08:49 AM. Thermal hotspot time series data captured by MODIS and VIIRS instruments on 2 January 2024.

Sentinel-2 product name: \$2A_MSIL1C_20240105T082331_N0510_ R121_T34HBH_20240105T105012

Spatial Reference

Name: WGS 1984 Web Mercator Auxiliary

Sphere

Scale: 1:114 522

Thermal Hotspots

Timestamp

0

02/01/2024 2:25:00 PM



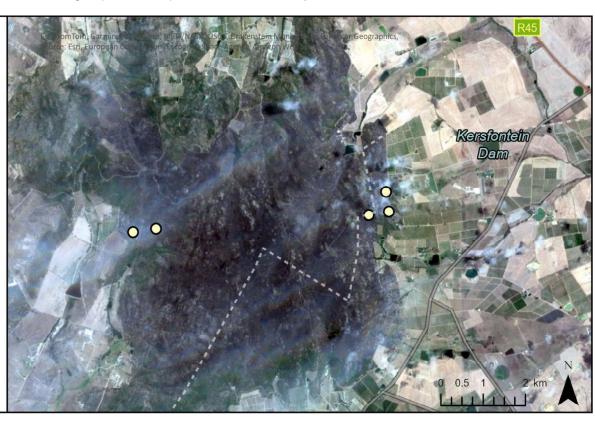




Figure 11. The location of thermal hotspots for one time-stamp on 28 December 2023 (11:33 PM) and two time-stamps on 29 December 2023 (12:46 AM and 1:35 AM).

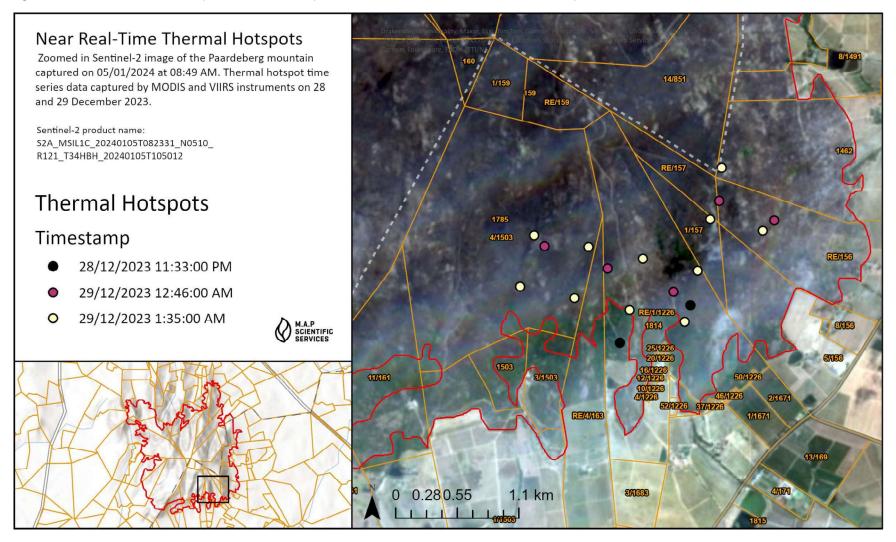




Figure 12. Map showing the extent of the burn scar overlaid with the farm portions affected by the fire.

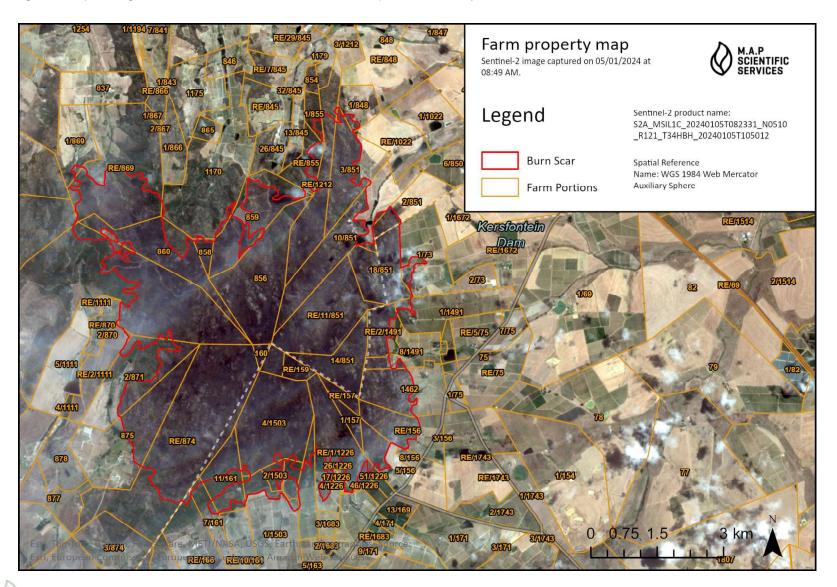


 Table 1. A list of farm portions, showing the farm name, size (hectares) and estimated area burnt (hectares) per farm portion.

2,5	20:4:00		Daront Farm name	200	
Portion	Tag Value	בס מופור כסמה	י מובוור ו מוווו וומווופ	area (ha)	area burnt (ha)
1	1503	W023C055000000001503000000	SLENT 1503	422.26	258.12
2	1/159	W023C055000000001785000000	1785	18.03	18.03
3	RE/159	W023C055000000000159000000	ANNEX SLENT 159	19.38	19.38
4	RE/855	W015C046000000000855000000	WATERVAL 855	52.95	14.03
5	858	W015C046000000000858000000	ANNEX WATERVAL 858	15.18	13.67
9	859	W015C046000000000859000000	MALMESBURY	153.12	102.60
			RESERVOIR AREA 859		
7	860	W015C046000000000860000000	ANNEX BROUWERS	147.40	122.41
c	1/000	Wo157000000000000000000000000000000000000	KLOOF 860	Co	07.10
∞ .	1/869	W015C046000000000869000000	WELIEVREDEN 869	83.80	81.70
ത	870	W015C046000000000870000000	BROUWERSKLOOF 870	41.01	0.23
10	2/871	W015C046000000000871000000	BRAUWERSKLOOF 871	169.38	64.21
11	1/157	W023C055000000000157000000	ANNEX WELTEVREDEN	19.66	19.66
			157		
12	160	W023C055000000001785000000	1785	8.83	8.83
13	RE/2/1226	W023C05500000001814000000	KLOKBERG 1814	4.40	0.25
14	4/1226	W023C055000000001814000000	KLOKBERG 1814	0.07	0.02
15	5/1226	W023C05500000001814000000	KLOKBERG 1814	0.05	0.01
16	6/1226	W023C055000000001814000000	KLOKBERG 1814	90.0	0.04
17	7/1226	W023C055000000001814000000	KLOKBERG 1814	90.0	0.29
18	1462	W023C055000000001462000000	1462	141.38	71.99
19	RE/157	W023C055000000000157000000	ANNEX WELTEVREDEN 157	17.96	17.96
20	RE/156	W023C05500000000015600000	SCHOON OORT 156	101.36	56.29
21	14/851	W015C046000000000851000000	BOTER KLOOF 851	89.34	89.34
22	159	W023C055000000000159000000	ANNEX SLENT 159	37.41	37.41
23	RE/11/851	W015C046000000000851000000	BOTER KLOOF 851	182.32	182.32
24	10/851	W015C046000000000851000000	BOTER KLOOF 851	194.67	121.31
25	2/851	W015C046000000000851000000	BOTER KLOOF 851	68.36	15.82
26	1/73	W023C055000000000073000000	KEERSFONTEIN 73	132.10	10.22
27	RE/1111	W015C046000000000111000000	JAKOB 111	682.04	268.32
28	856	W015C046000000000856000000	ANNEX BOTERKLOOF	214.53	214.53
			856		
29	RE/869	W015C046000000000869000000	WELTEVREDEN 869	316.29	132.70
30	875	W015C046000000000875000000	LEMOEN KLOOF 875	221.48	99.24
31	1170	W015C046000000001170000000	1170	281.37	6.38
32	1/1111	W015C046000000000111000000	JAKOB 111	206.24	1.45
					1



Approximate	area burnt (ha)	30.72	107.18	94.31	4.69	104.14	352.27	1.81	2.95	52.89	22.82	40.99	5.82	12.74	4.46	9.63	206.74	9.64	12.49	1.45	74.37	4.82	1.57	113.77	115.11	1.90		115.11	1.45	1.45	0.27	
Farm	area (ha)	118.71	107.18	128.50	50.98	133.10	479.79	167.52	47.38	80.22	172.70	55.93	135.71	99.99	23.66	56.68	211.58	17.03	20.95	79.19	238.44	319.77	4.07	179.16	166.98	137.50		172.06	72.97	79.19	38.73	
Parent Farm name		SCHOON OORT 156	BOTER KLOOF 851	BOTER KLOOF 851	LA RHINE 848	1212	WOODLANDS 874	166	SLENT 161	SLENT 161	SLENT 1503	1491	1491	1491	WATERVAL 855	SLENT 163	1785	SLENT 1503	SLENT 1503	1261	1785	LA RHINE 848	WELTEVREDE 1815	KLOKBERG 1814	KLOKBERG 1814	STAART VAN	PAARDEBERG 171	KLOKBERG 1814	1261	1261	BROUWERSKLOOF	870
26 Digit Code		W023C055000000000156000000	W015C046000000000851000000	W015C046000000000851000000	W015C046000000000848000000	W015C046000000001212000000	W015C046000000000874000000	W023C055000000000166000000	W023C055000000000161000000	W023C055000000000161000000	W023C055000000001503000000	W023C055000000001491000000	W023C055000000001491000000	W023C055000000001491000000	W015C046000000000855000000	W023C055000000000163000000	W023C055000000001785000000	W023C055000000001503000000	W023C055000000001503000000	W015C046000000001261000000	W023C055000000001785000000	W015C046000000000848000000	W023C055000000001815000000	W023C055000000001814000000	W023C055000000001814000000	W023C055000000000171000000		W023C055000000001814000000	W015C046000000001261000000	W015C046000000001261000000	W015C0460000000000870000000	
Portion	Tag Value	5/156	18/851	3/851	1/848	RE/1212	RE/874	RE/166	7/161	11/161	1/1503	RE/2/1491	1/1491	8/1491	1/855	RE/4/163	4/1503	2/1503	3/1503	2/1111	1785	848	57/1226	1814	RE/1/1226	1815		RE/1/1226	1261	RE/2/1111	RE/870	
Farm	Portion	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57		58	59	09	61	

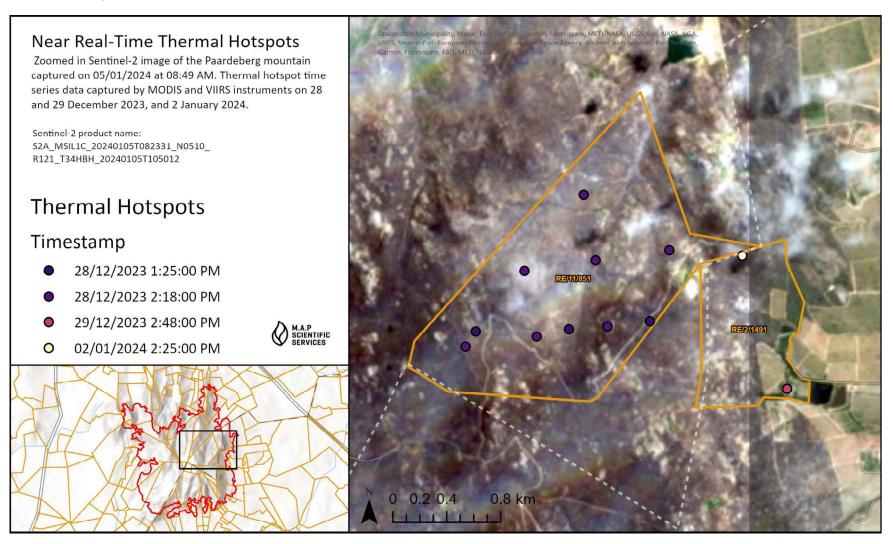


Figure 13. Map showing the thermal hotspots captured by MODIS and VIIRS instruments (illustrating the spread of the fire on three farm portions 14/851, 8/1491 and RE/157 on 28 and 29 December 2023).

Near Real-Time Thermal Hotspots Zoomed in Sentinel-2 image of the Paardeberg mountain captured on 05/01/2024 at 08:49 AM. Thermal hotspot time series data captured by MODIS and VIIRS instruments on 28 and 29 December 2023. Sentinel-2 product name: S2A_MSIL1C_20240105T082331_N0510_ R121_T34HBH_20240105T105012 **28/12/2023 2:18:00 PM Thermal Hotspots** 29/12/2023 1:57:00 PM **Timestamp** O 29/12/2023 2:48:00 PM 28/12/2023 2:45:00 AM O 29/12/2023 3:37:00 PM 28/12/2023 1:25:00 PM 28/12/2023 2:16:00 PM M.A.P SCIENTIFIC SERVICES 0.8 km



Figure 14. Map showing the thermal hotspots captured by MODIS and VIIRS instruments (illustrating the spread of the fire on two farm portions RE/11/851 and RE/2/1491 on 28 and 29 December 2023, and 2 January 2024).





END OF DOCUMENT.

