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Thermal Survey Report – Solar PV Array
Location: [redacted]
Survey Date: 8th August 2025
Weather & Environmental Conditions:

- **Cloud cover:** Clear to mostly clear skies (<10% cloud cover)
- **Solar irradiance:** ≥600 W/m² (strong, direct sunlight)
- **Panel condition:** Completely dry – no rain, dew, or moisture
- **Wind speed:** Light (≤6 mph)
- **Visibility:** Good – safe access and high imaging quality achieved

1. Objective

The purpose of this thermal survey was to assess the operational condition of the solar PV array and identify any irregularities, such as hot spots, that may indicate contamination, shading, or potential faults in the modules or cells.

2. Methodology

The survey was conducted in accordance with industry best practices and under optimal environmental conditions to ensure accurate thermal imaging results.
Inspection was carried out using a calibrated thermal imaging camera from multiple vantage points, ensuring full coverage of the array.
Both **thermal** and **RGB (visual spectrum)** imaging were collected for correlation and confirmation of findings.

3. Findings

Primary Observations:

- Hot spots observed predominantly along leading edges of numerous panels across the array, most likely linked to accumulation of debris and surface contaminants.
- Sporadic hot spots identified on individual cells throughout the array, not confined to a specific area. The most probable cause is bird guano and other environmental contaminants obstructing sunlight and creating localised heating.
- RGB imaging revealed widespread, excessive bird guano across the entirety of the solar array, supporting the analysis that contamination is a primary factor in the observed thermal anomalies.
- No significant signs of large-scale module failure, delamination, or string-level shading patterns were detected during this inspection. However, contamination could be masking potential underlying cell faults.

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4. Analysis

Debris and contaminants, particularly along leading panel edges, can cause partial shading, resulting in localised heating and reduced module efficiency.

The widespread presence of bird guano, confirmed through RGB imagery, reinforces the likelihood that the hot spots are predominantly contamination-related rather than due to inherent cell or module defects.

While thermal imaging detects temperature differences, it cannot conclusively distinguish contamination-induced hot spots from electrical faults without first removing surface soiling.

5. Recommendations

1. **Comprehensive cleaning** of the entire solar PV array to remove dust, debris, and biological contaminants.

2. **Repeat thermal survey post-cleaning** to verify if the previously observed hot spots persist. Persistent anomalies would indicate potential **cell or module faults** requiring further diagnostic testing.

3. **Implement a routine cleaning and inspection schedule** to maintain optimal performance and prevent debris-related hot spots from developing.

4. Consider **bird deterrent measures** if guano contamination continues to be an ongoing issue.

Conclusion:

The current survey results indicate that most hot spots are likely caused by environmental contamination rather than intrinsic module faults. Cleaning and retesting are essential before definitive conclusions can be made regarding module health.

Please see the below analysis highlighting the noticed defects on the solar PV array

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Severity overview

Severity 1	Severity 2	Severity 3	Severity 4	Severity 5
0	0	176	0	0

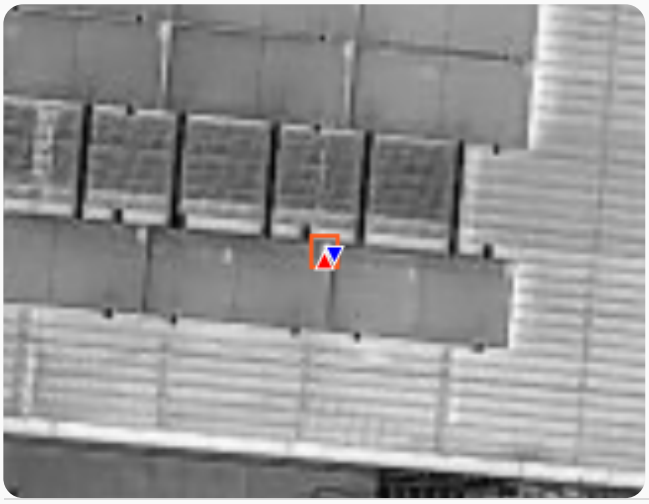
#	Severity	Components	Issues	Comments	Page
1	3	Cell	Hot Spot		9
2	3	Cell	Hot Spot		9
3	3	Cell	Hot Spot		10
4	3	Cell	Hot Spot		11
5	3	Cell	Hot Spot		12
6	3	Cell	Hot Spot		12
7	3	Cell	Hot Spot		13
8	3	Cell	Hot Spot		14
9	3	Cell	Hot Spot		15
10	3	Cell	Hot Spot		15
11	3	Cell	Hot Spot		16
12	3	Cell	Hot Spot		17
13	3	Cell	Hot Spot		17
14	3	Cell	Hot Spot		18
15	3	Cell	Hot Spot		18
16	3	Cell	Hot Spot		18
17	3	Cell	Hot Spot		19
18	3	Cell	Hot Spot		19
19	3	Cell	Hot Spot		19
20	3	Cell	Hot Spot		20
21	3	Cell	Hot Spot		21
22	3	Cell	Hot Spot		21
23	3	Cell	Hot Spot		22
24	3	Cell	Hot Spot		22
25	3	Cell	Hot Spot		22
26	3	Cell	Hot Spot		23
27	3	Cell	Hot Spot		23
28	3	Cell	Hot Spot		23
29	3	Cell	Hot Spot		24
30	3	Cell	Hot Spot		25
31	3	Cell	Hot Spot		26

DJI_20250808164435_0026_T.JPG
2025:08:08 16:44:35

152.7m above sea level
↑ North (4.3°)

1

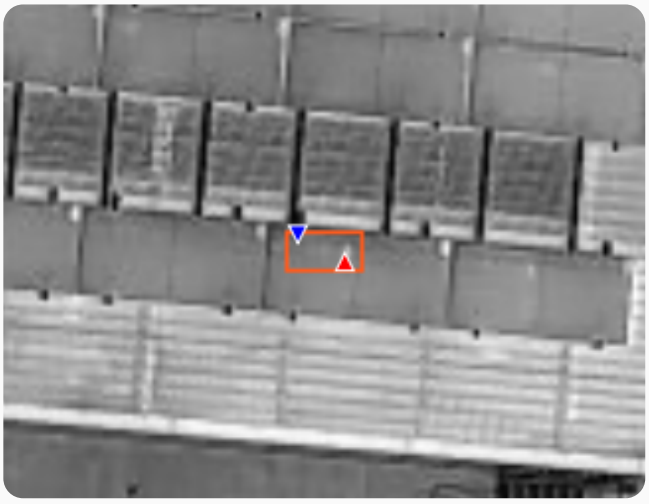
Severity 3 | Hot Spot | Cell



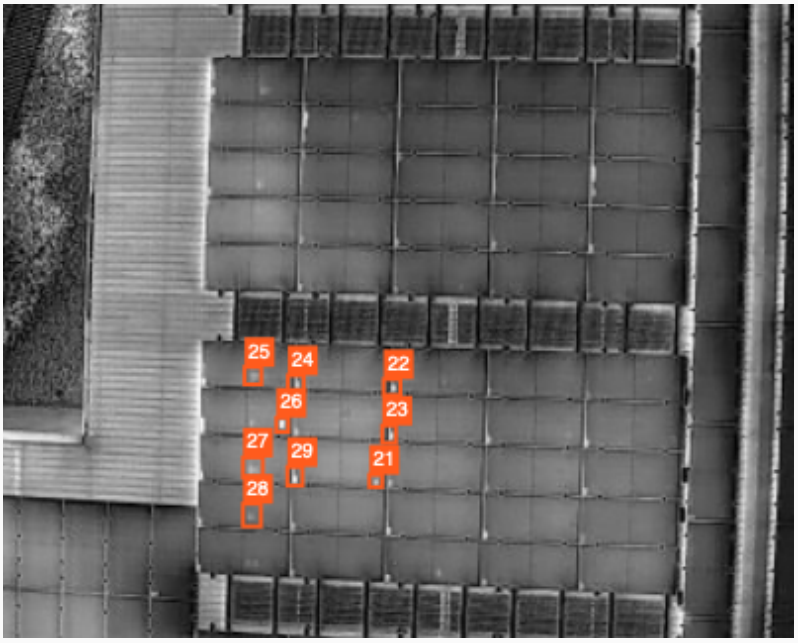
Thermal Readings:
~Avg : 30.136° Δ : 8.5°
▲ : 34.5° ▼ : 26°

2

Severity 3 | Hot Spot | Cell



Thermal Readings:
~Avg : 27.603° Δ : 9.3°
▲ : 30.3° ▼ : 21°

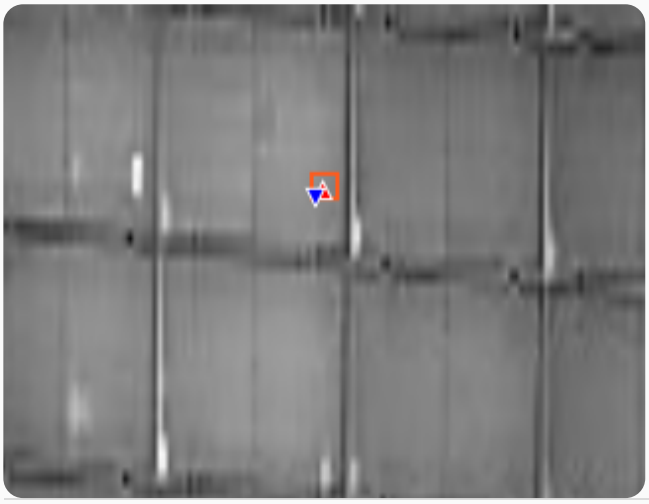


DJI_20250808164536_0042_T.JPG
2025:08:08 16:45:36

151.3m above sea level
↓ South (185°)

21

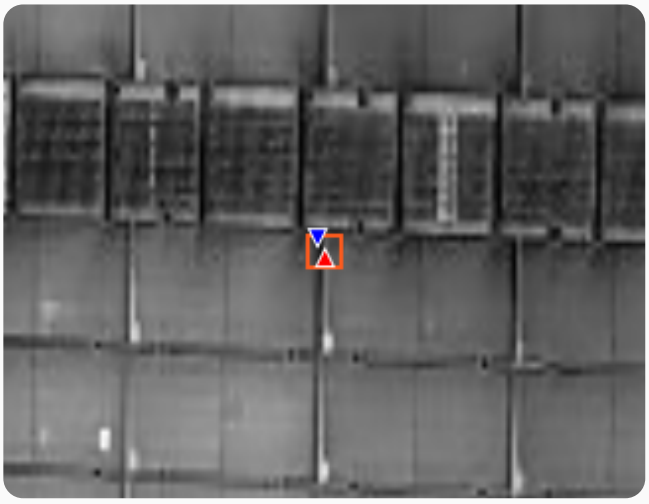
Severity 3 | Hot Spot | Cell



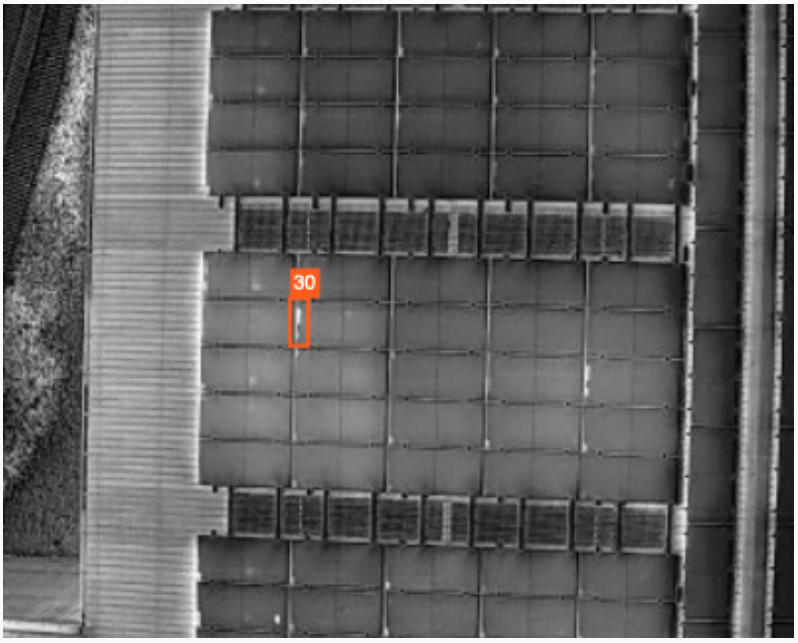
Thermal Readings:
~Avg : 31.977° Δ : 3.2°
▲ : 33.7° ▼ : 30.5°

22

Severity 3 | Hot Spot | Cell



Thermal Readings:
~Avg : 30.845° Δ : 6.5°
▲ : 35° ▼ : 28.5°

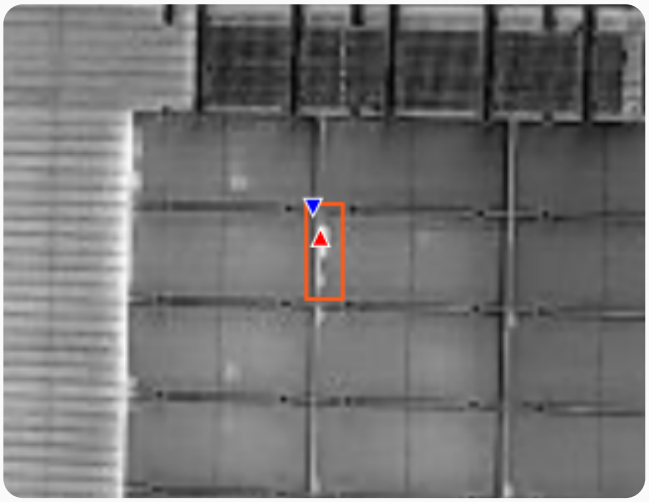


DJI_20250808164540_0043_T.JPG
2025:08:08 16:45:40

151.3m above sea level
↓ South (185.1°)

30

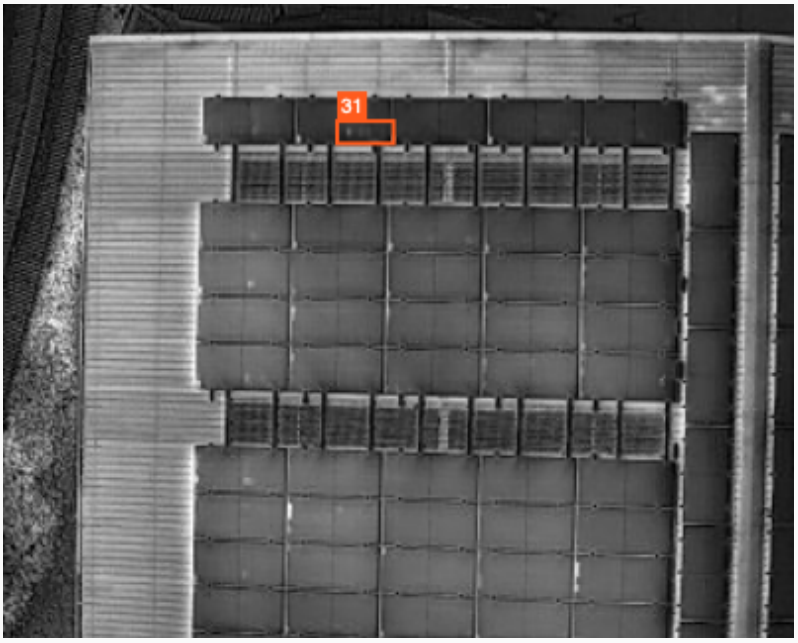
Severity 3 | Hot Spot | Cell



Thermal Readings:

~Avg : 31.656° Δ : 9°

▲ : 37.6° ▼ : 28.6°



DJI_20250808164544_0044_T.JPG
2025:08:08 16:45:44

151.4m above sea level
South (185.7°)

31

Severity 3 | Hot Spot | Cell

Thermal Readings:

~Avg : 25.822° Δ : 6.4°

▲ : 29.2° ▼ : 22.8°