4th European Rural Geographies Conference

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The Role of *Arbutus unedo* in Early Successional Forestry for Soil Restoration

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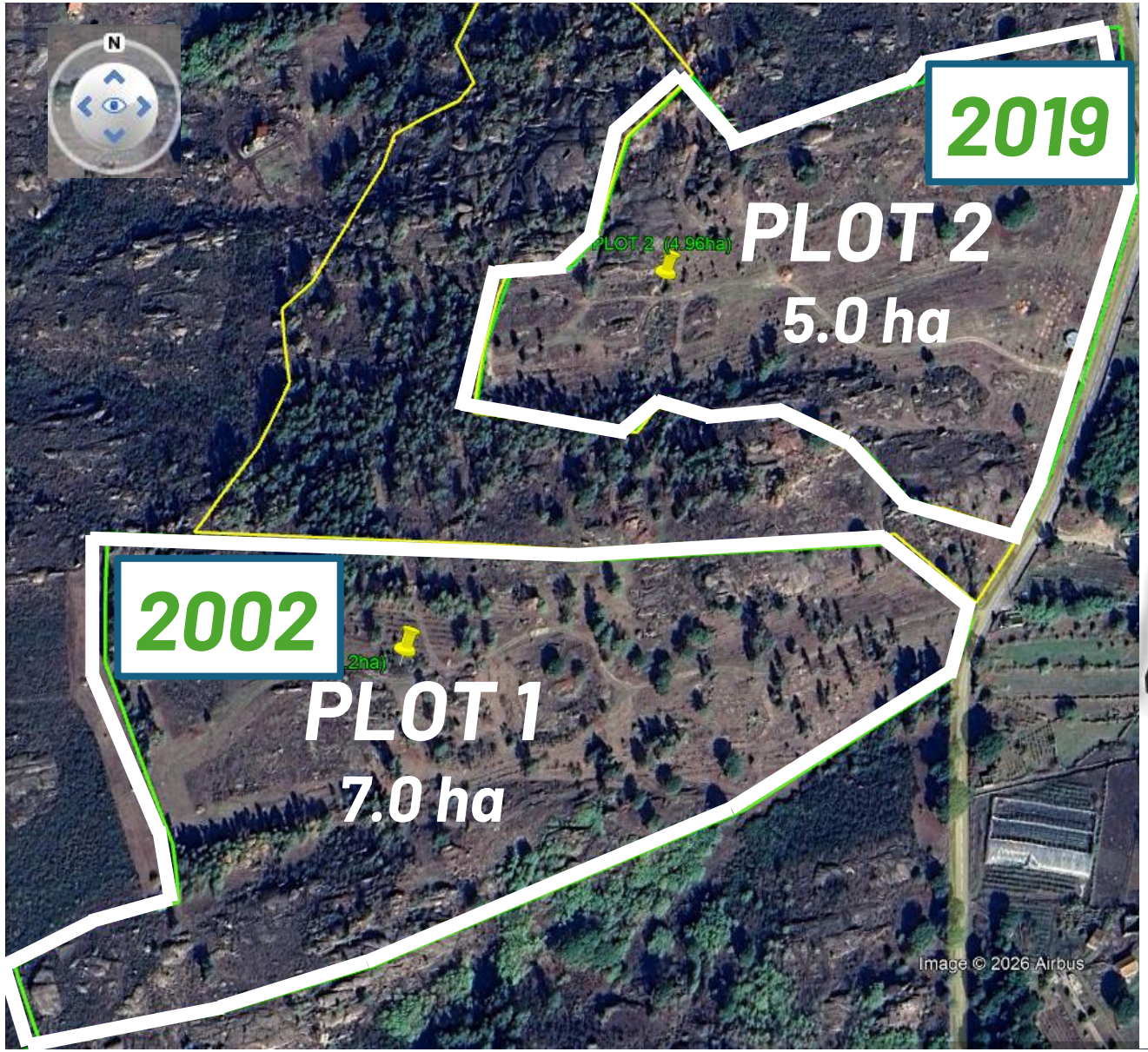
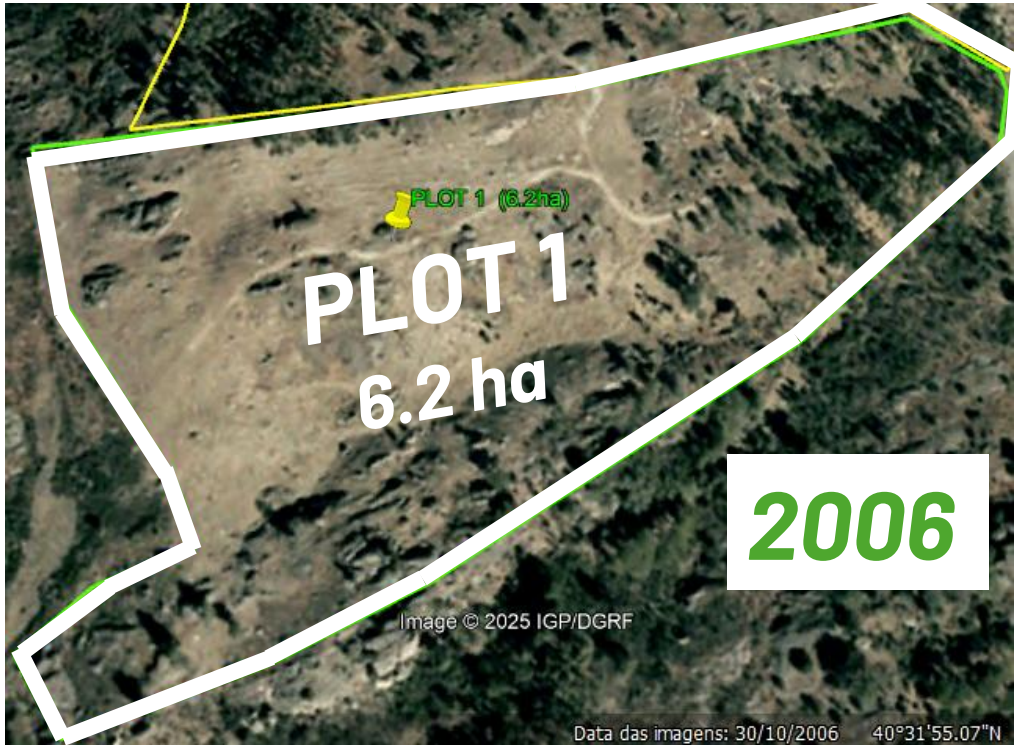
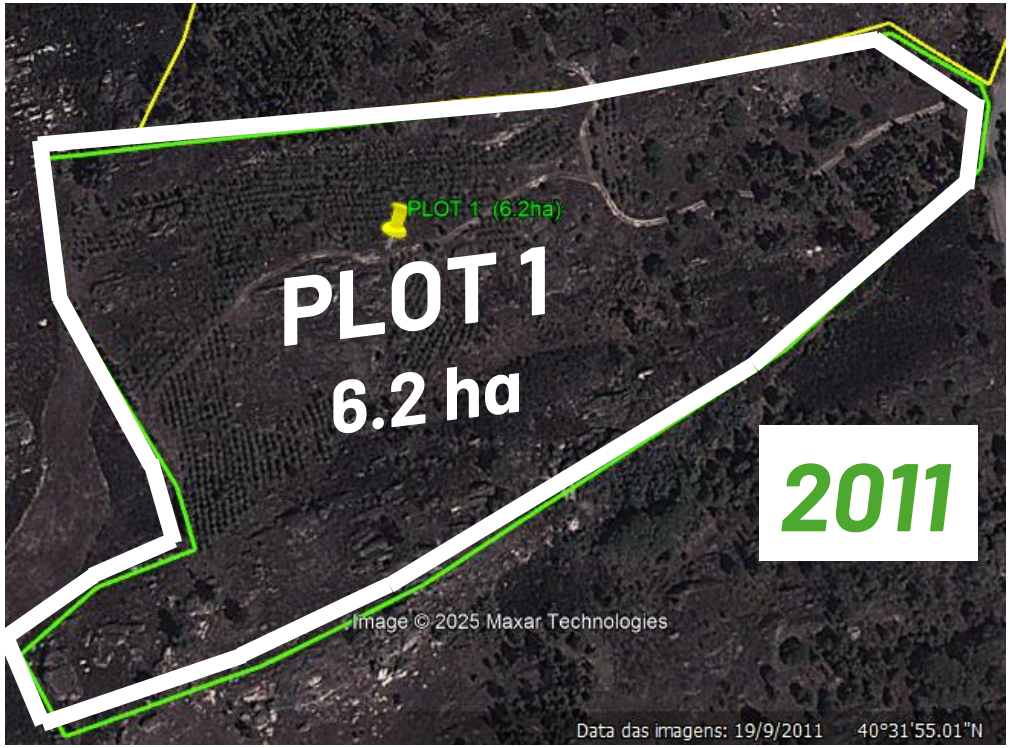
Study area

12-ha area of Serra da Estrela, Portugal



Why ecological restoration?

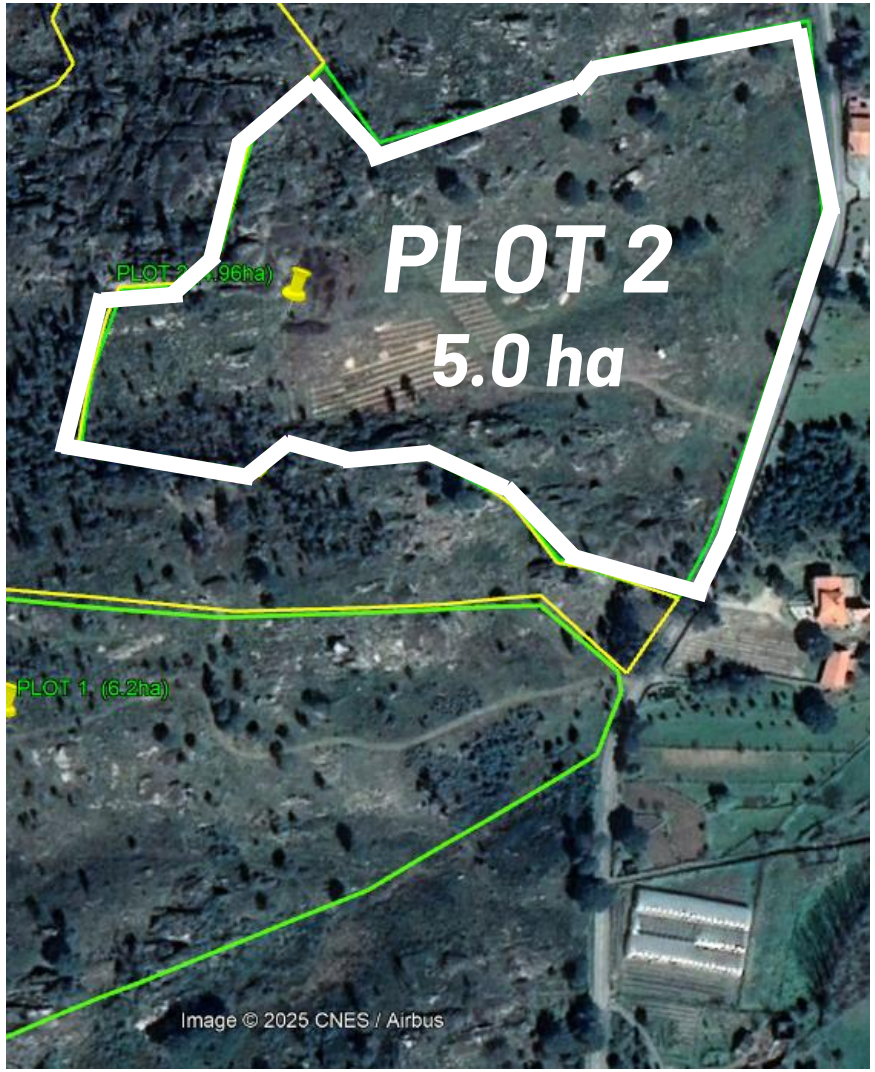




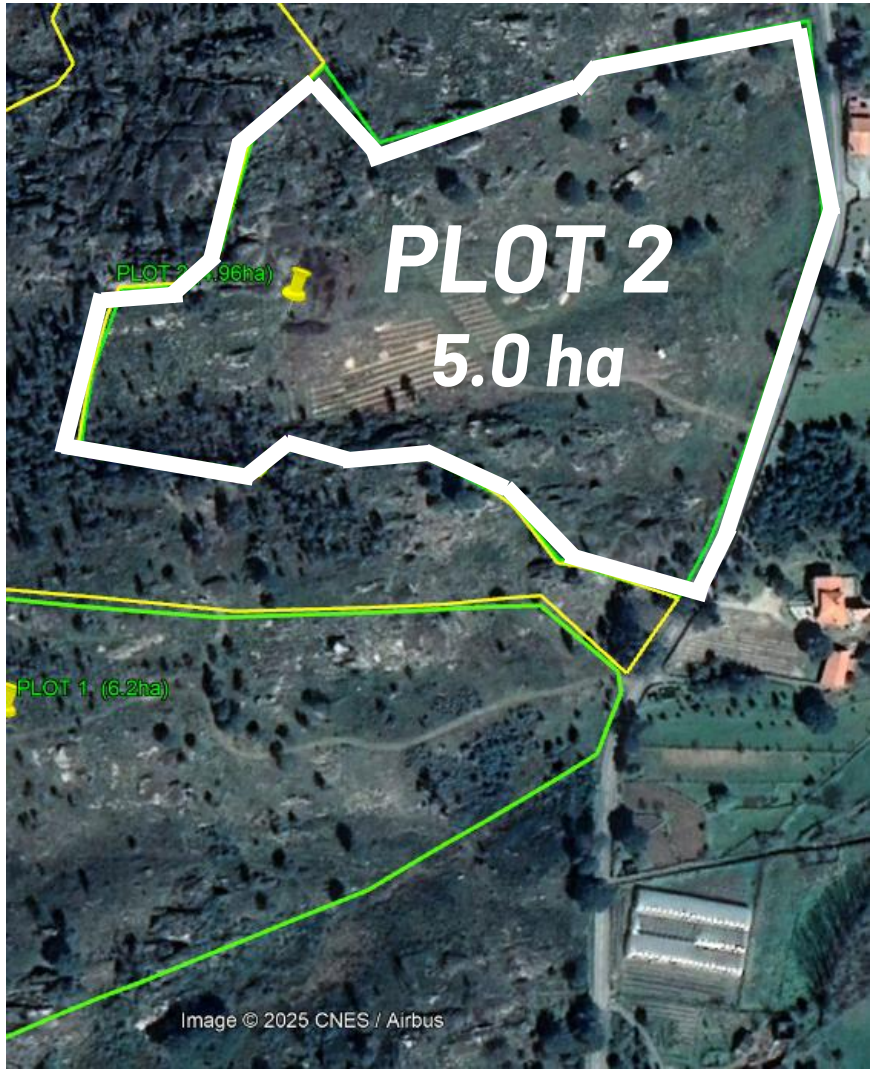
Plot 1 **Pine plantation project → burnt in 2017 in a forest fire**

Restoration strategy

Removal of a spot of acacia trees



Restoration strategy

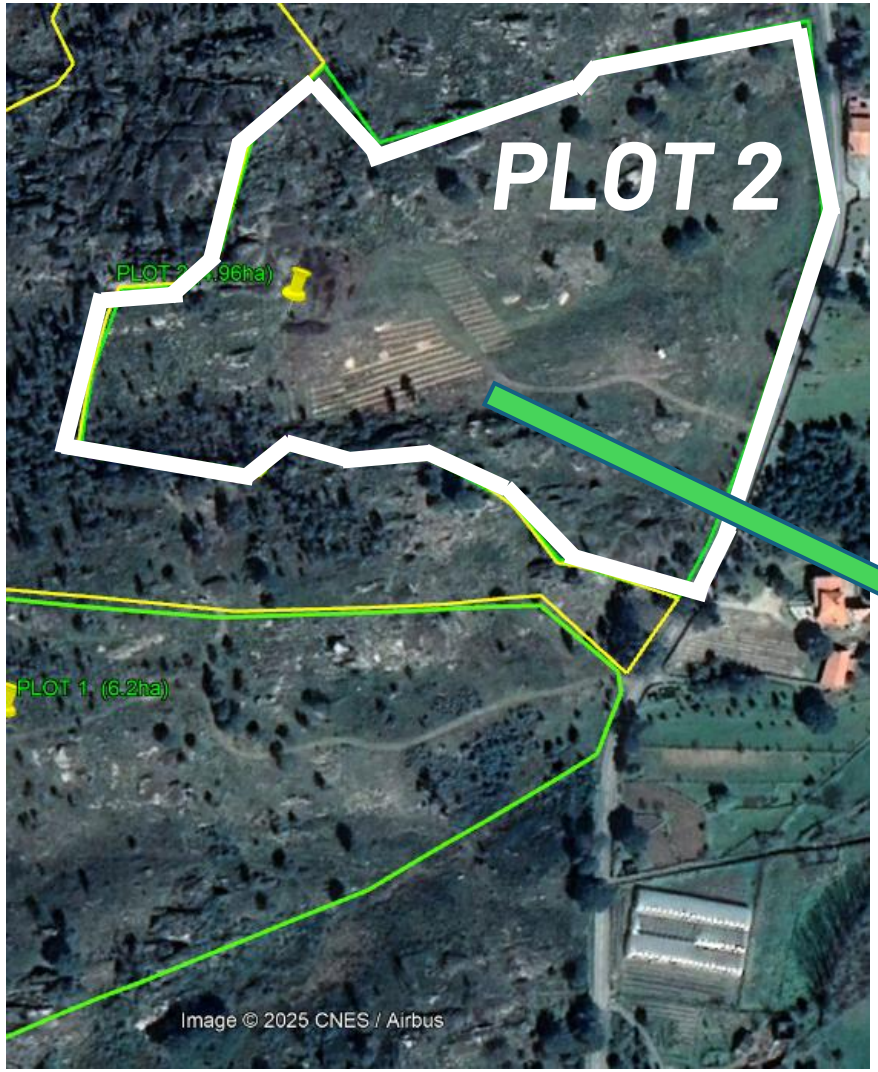


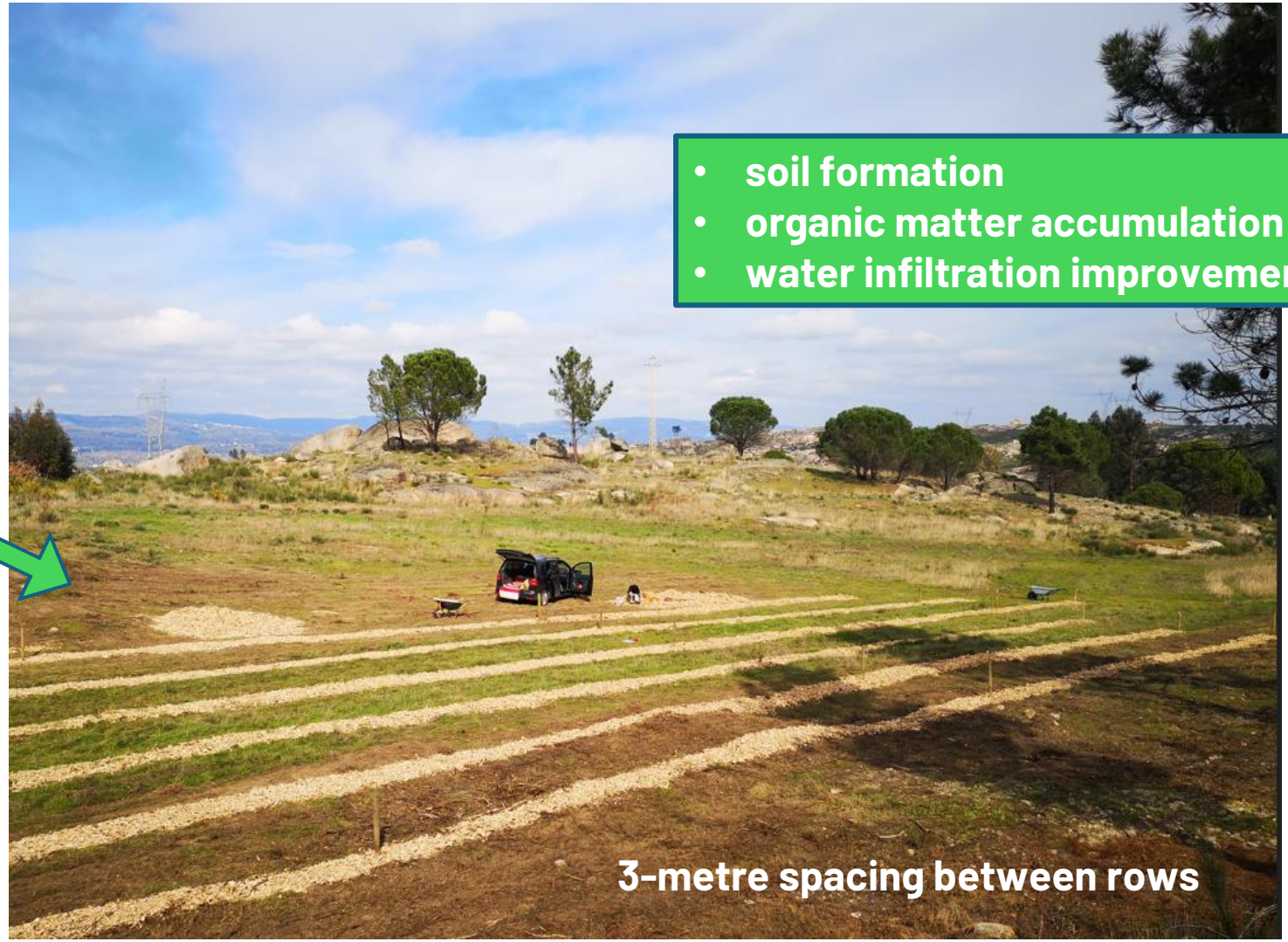
Removal of a spot of acacia trees

Acacia height, Human figure for scale

Restoration strategy

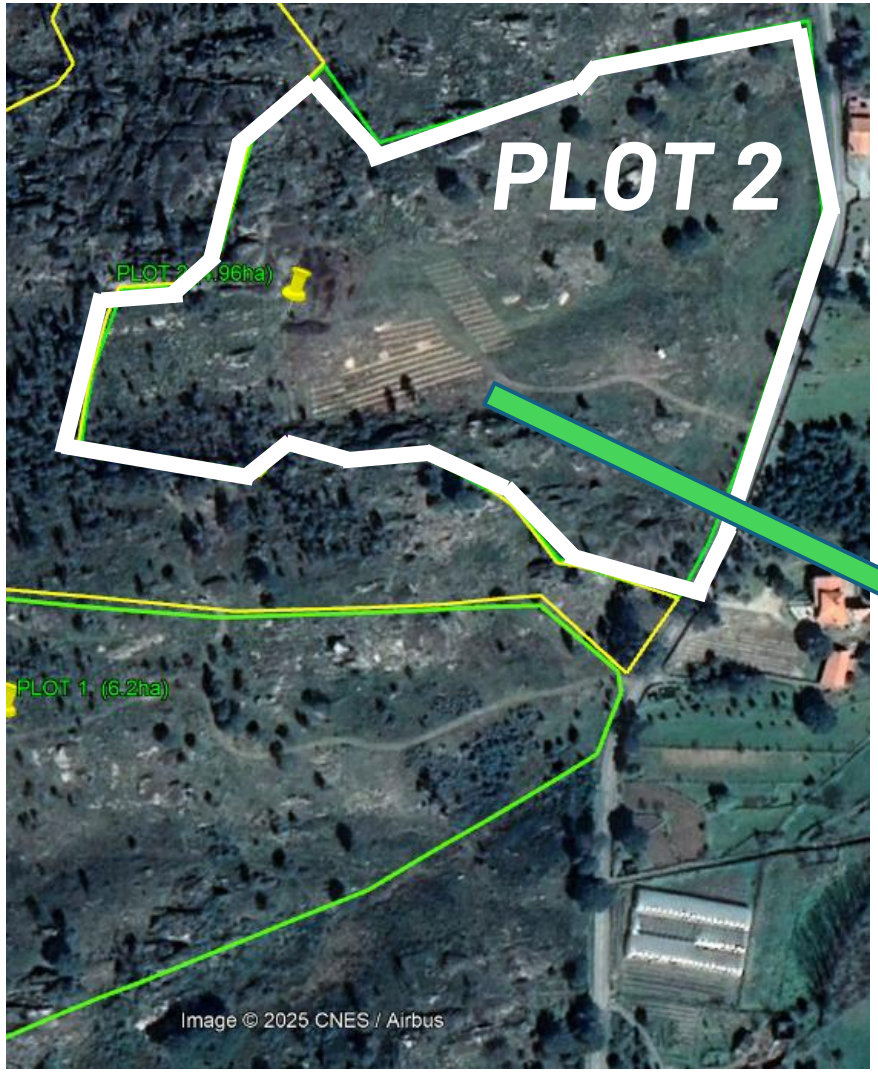
Marking rows with eucalyptus wood chips

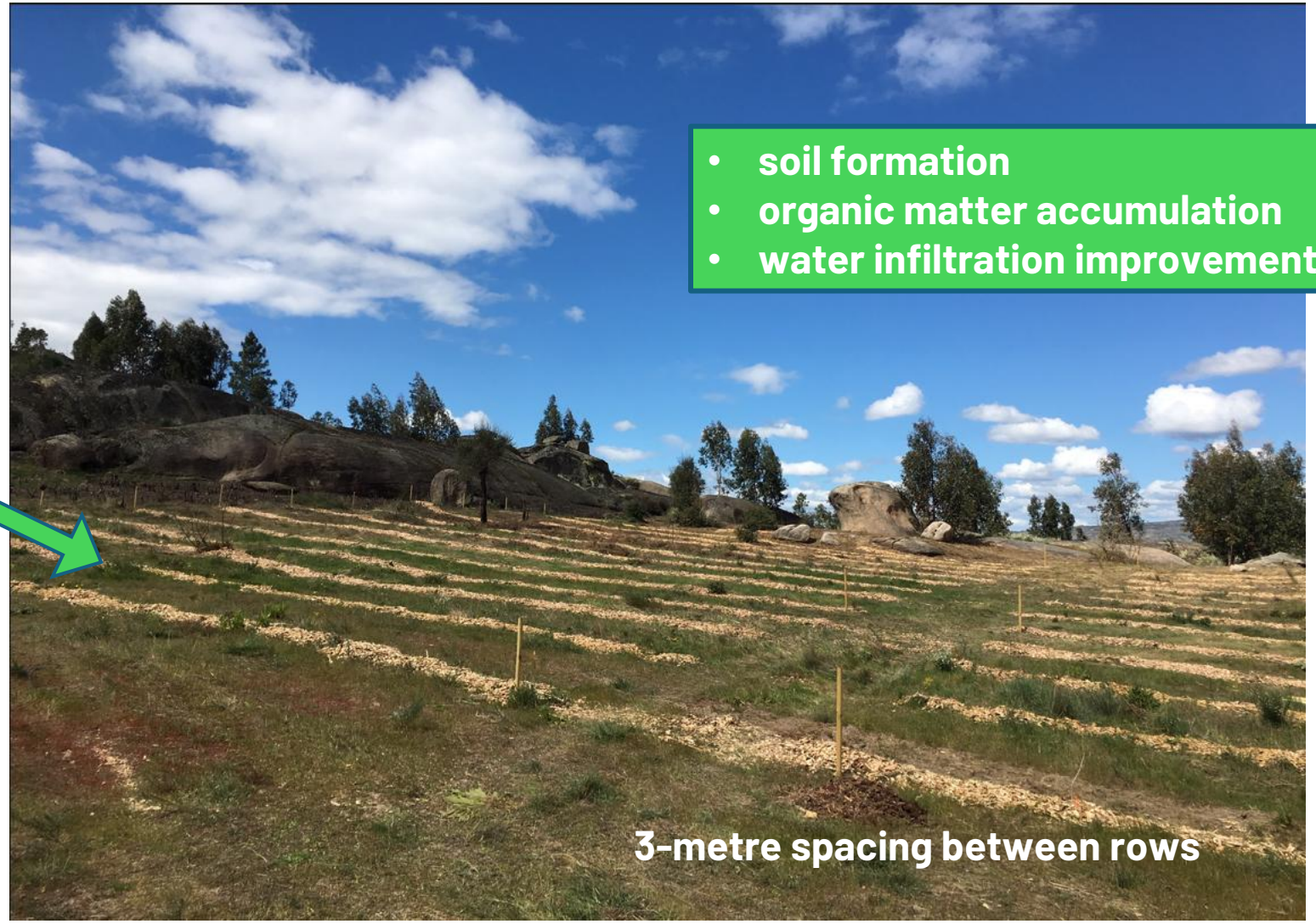




Restoration strategy

Marking rows with eucalyptus wood chips





Restoration strategy

Watering system in Plot 1

1. 240m deep borehole
2. Water tank 98 m^3
3. Support building for agriculture tools and an electropump system
4. Total installed length of underground irrigation pipeline: 1,469 m (HDPE PN8 D63)

1

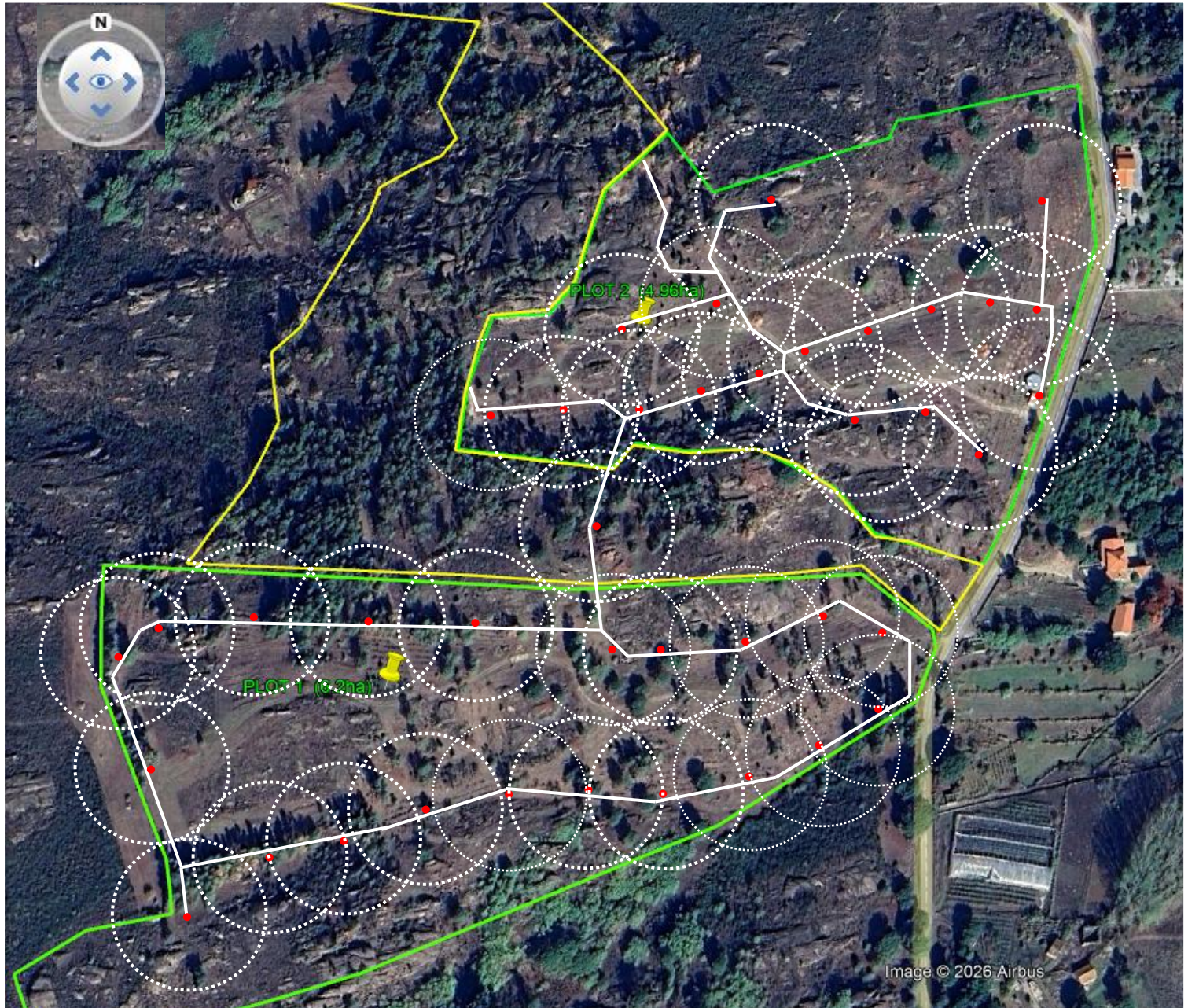
2

3

4

Restoration strategy

Underground irrigation pipeline network



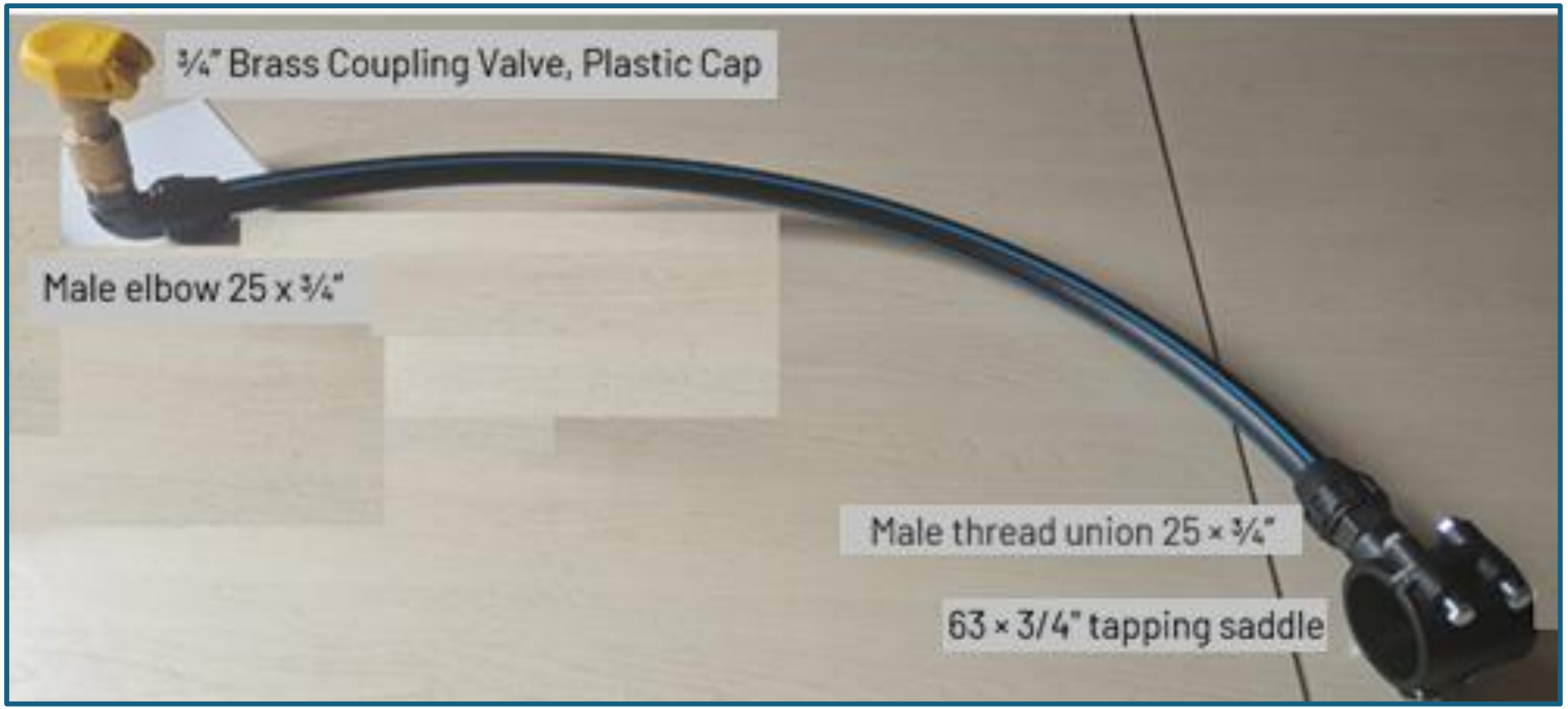
Site plan showing the pipe network and irrigation outlet locations **(red dots)**

The circles shown by dashed white lines indicate the sprinkler coverage area

Irrigation outlets

Restoration strategy

Irrigation outlet connection



¾" brass hose coupling

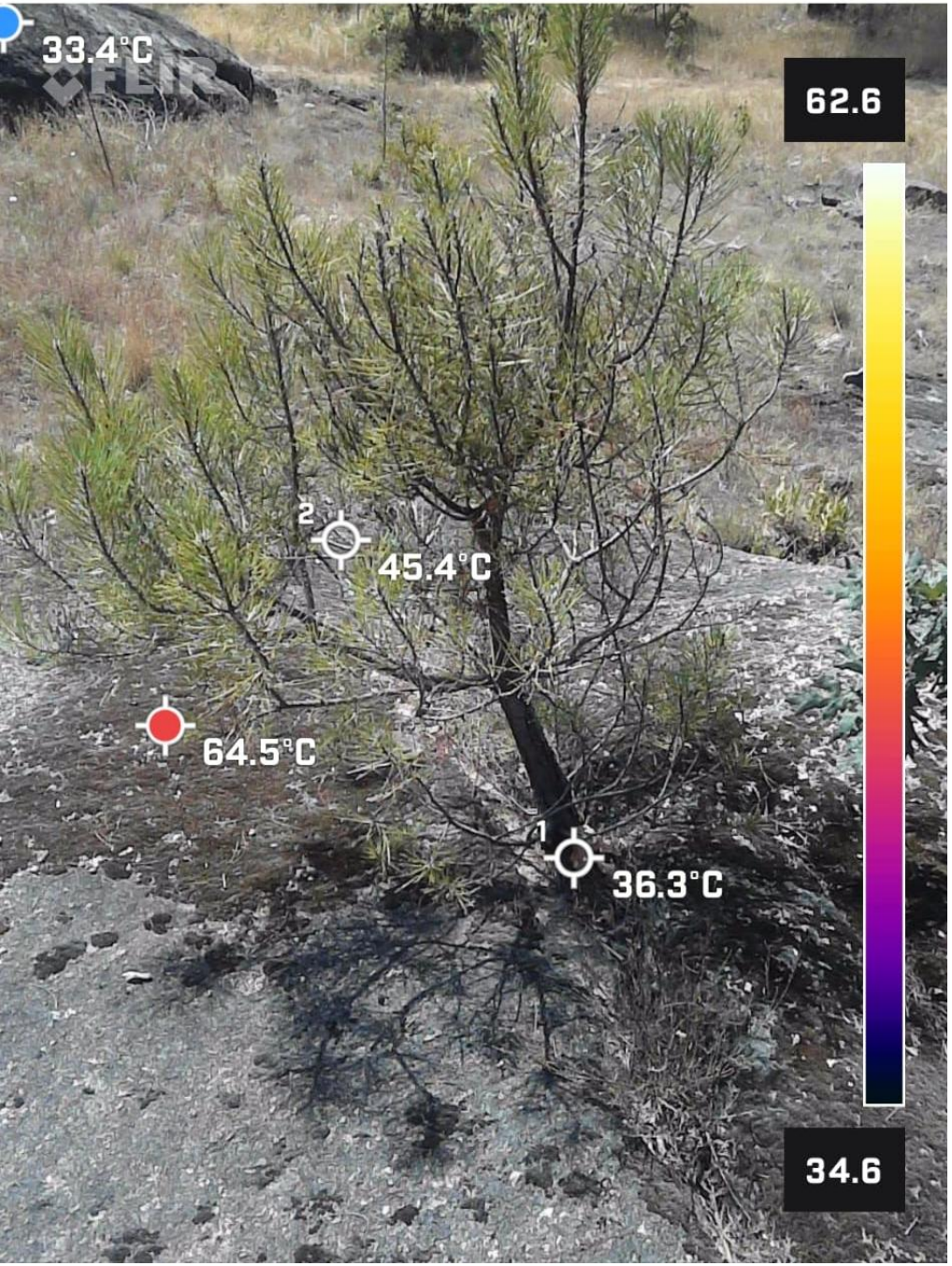
¾" brass female coupling

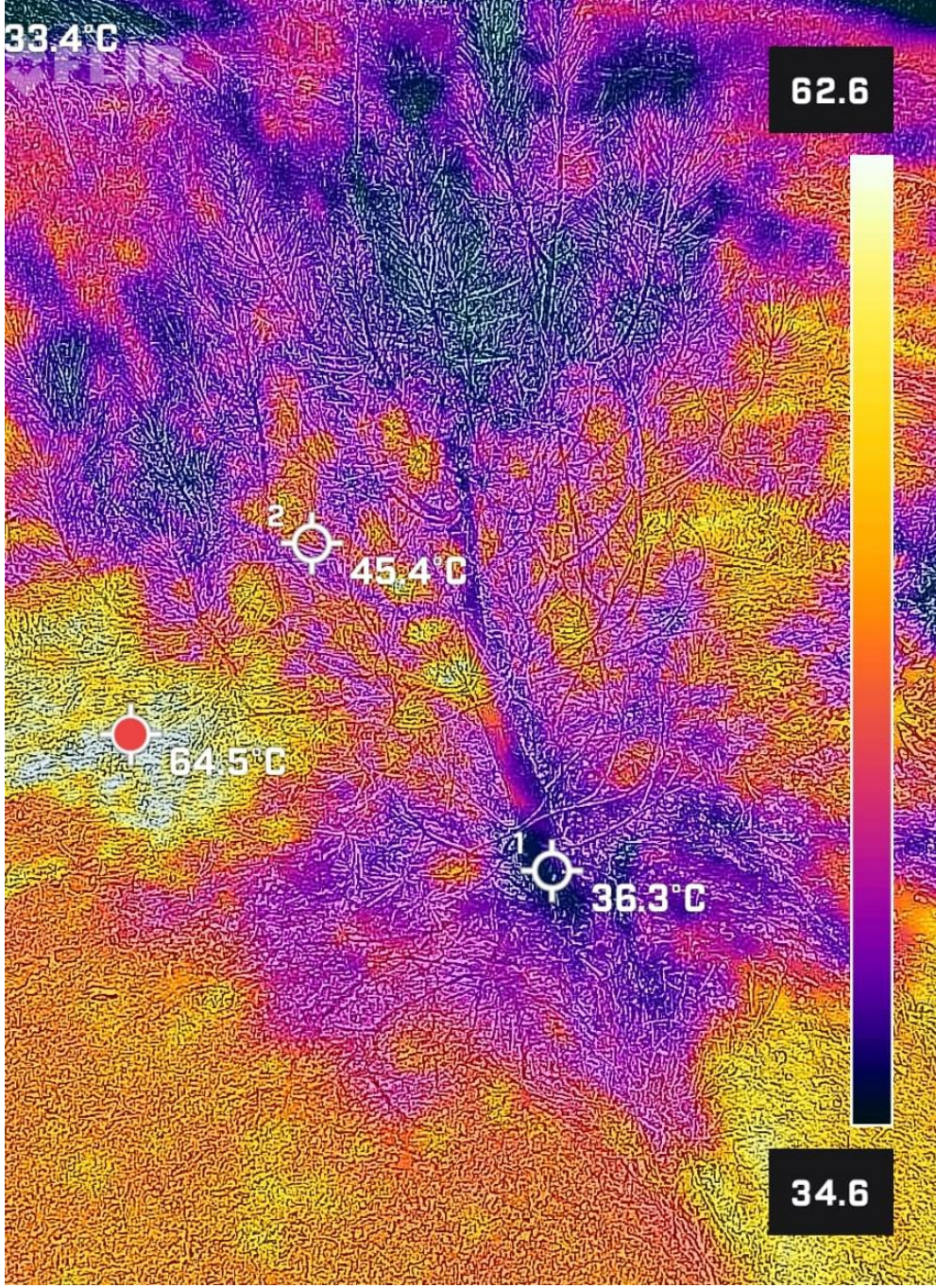
¾" brass swivel elbow

¾" brass valve key

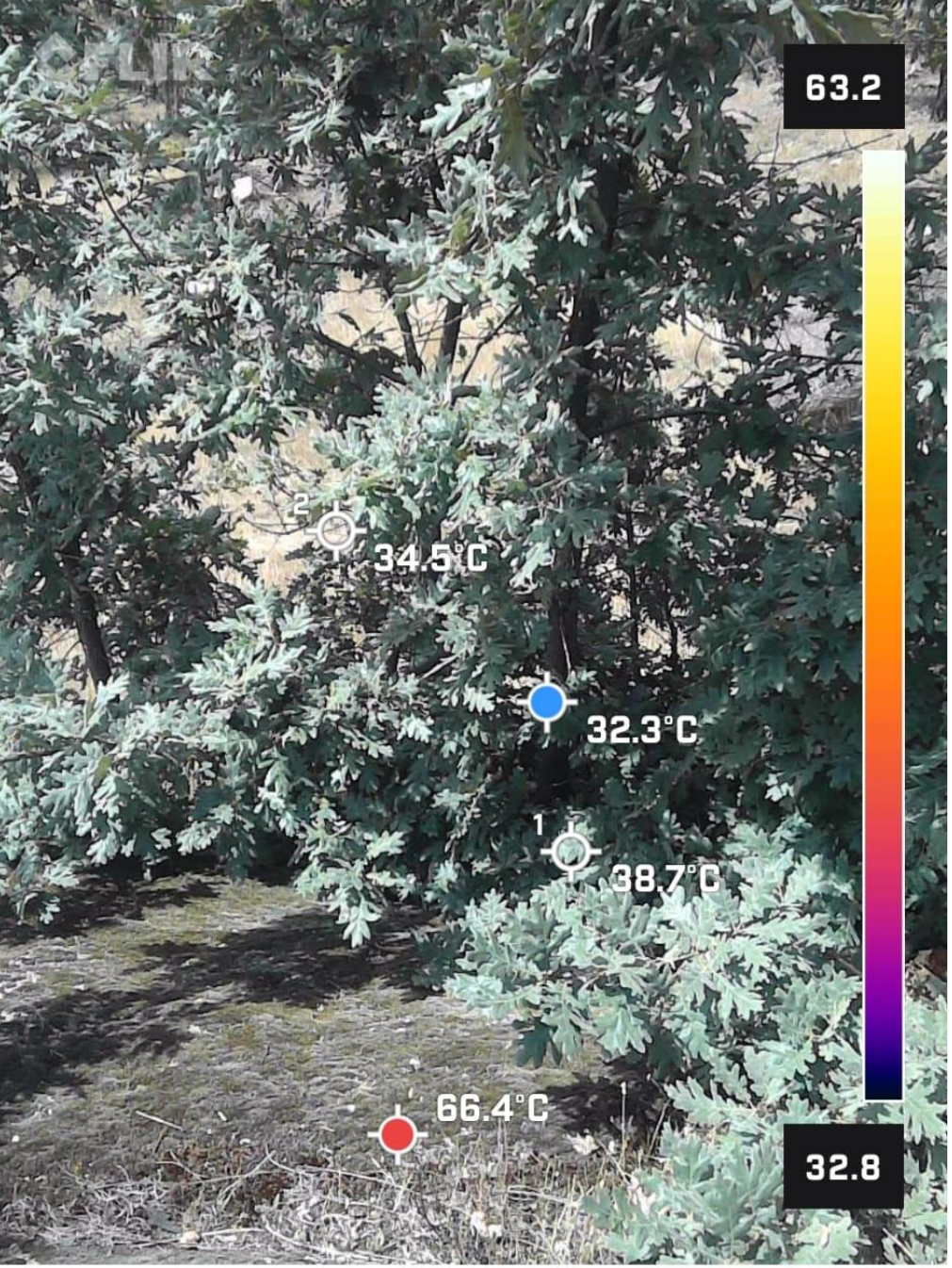
¾" brass coupling valve, plastic ap

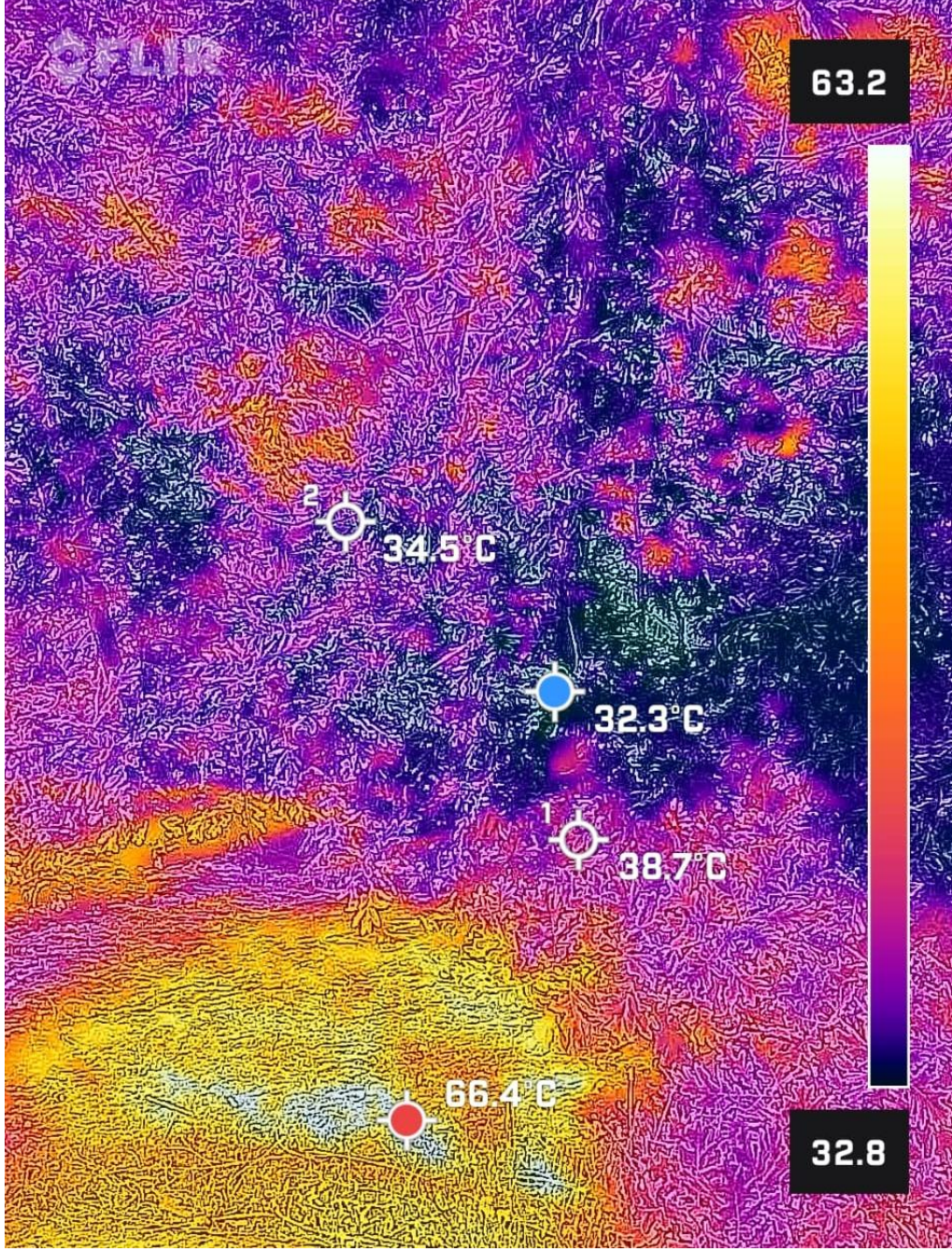
Restoration strategy: impact of shading (12 PM)



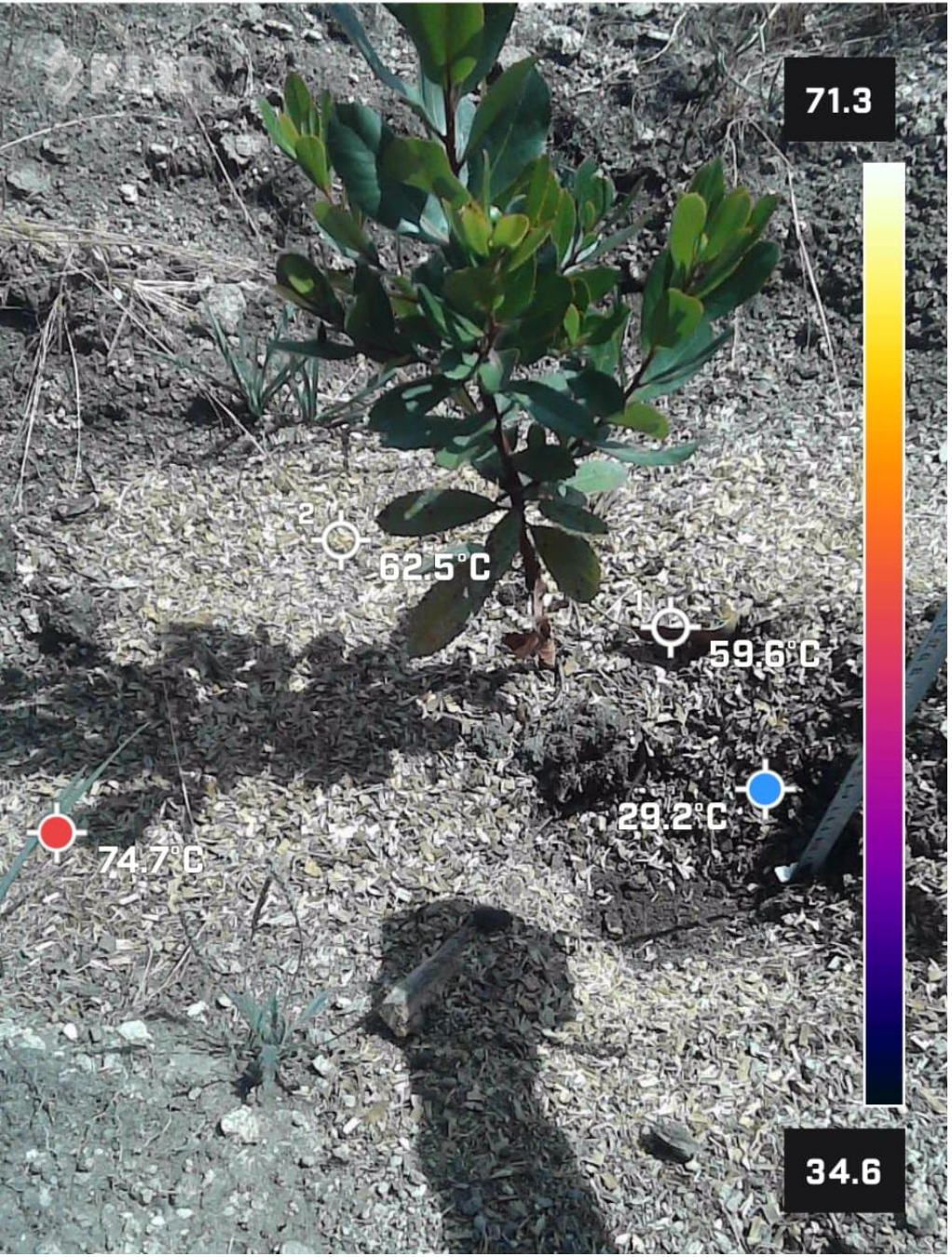


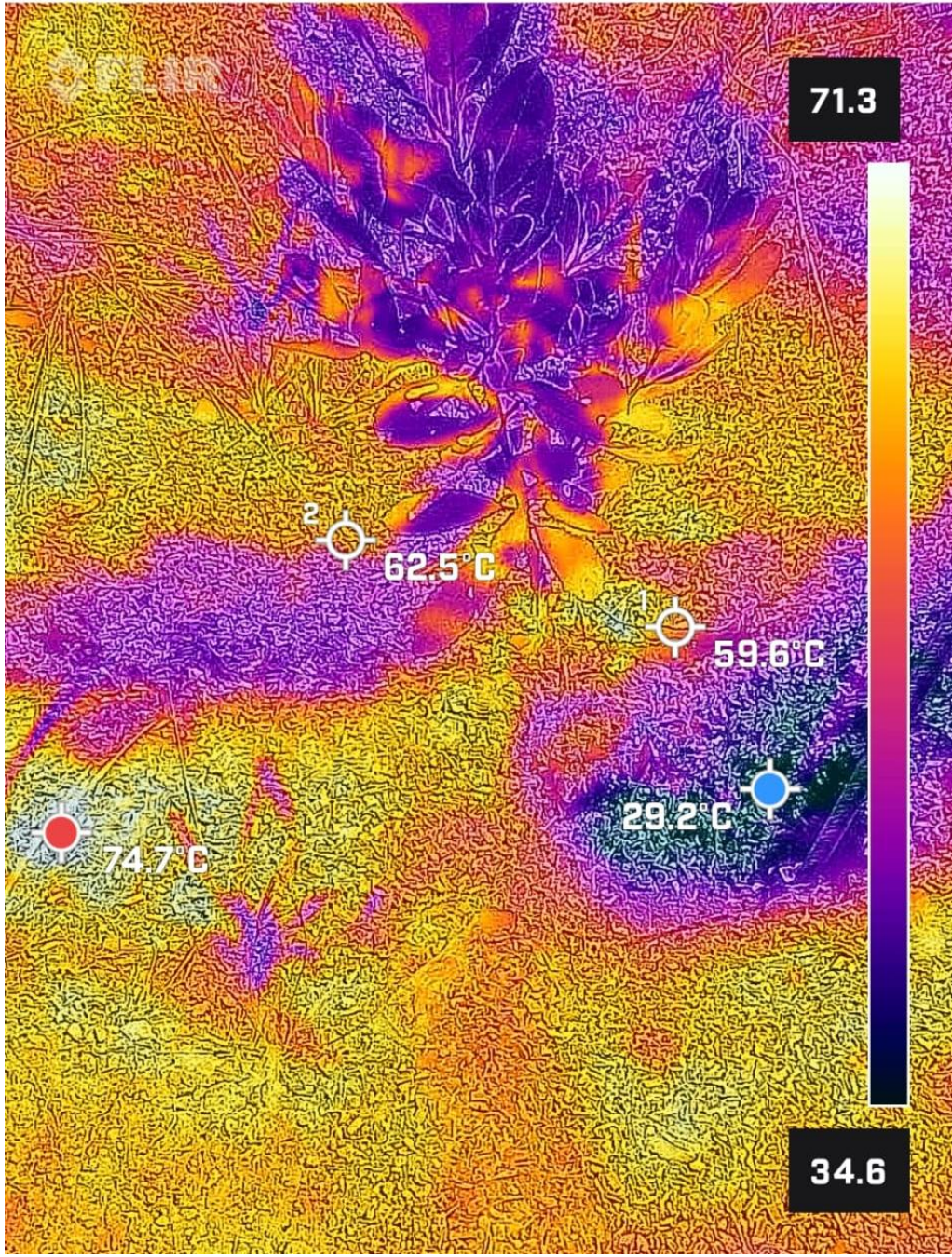
Impact of pine canopy cover on surface temperature (12 PM)





Impact of oak canopy cover on surface temperature (12 PM)





Impact of mulching on soil temperature (12 PM)

Restoration strategy

Preparing holes for planting

using a clam digger or a hoe

using a backhoe

Restoration strategy

2020-02-15

Restoration strategy

2026-06-21

Conclusions

The **success of a restoration project** in the Serra da Estrela Mountains depends on the following **key factors**:

1. Installation of an **irrigation system**
2. Application of **wood chips as mulch to protect the soil, conserve moisture, and improve soil conditions**
3. Use of **different species to create multiple vegetation strata**
4. In compact and rocky soils, **use a backhoe to excavate planting holes**

Conclusions

Identification of ***Arbutus unedo*** as a **pioneer species**:

1. Well adapted to rocky environments
2. Dense evergreen canopy
3. High C ratio → slow litter decomposition compared with other broadleaved species (e.g. oaks). As folhas, devido ao teor elevado em fenóis, demoram muito tempo a ser decompostas, pelo que formam uma espessa camada e vão enriquecendo os horizontes superficiais do solo em matéria orgânica.
4. Leaf litter accumulation → **enhanced soil cover** / **moisture retention** / **increased soil organic matter**, crucial on the soil formation process

In Autumn 2025–Winter 2026, we initiated the establishment of an ex-situ conservation reserve of *A. unedo* clones developed by the Coimbra Polytechnic Agriculture School

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