



**COPTRZ**



**ARCHAEOLOGICAL  
RESEARCH SERVICES LTD**  
*Digging with Purpose*

# CASE STUDY

## Archaeological Research Services



**Archaeological Research Services have innovated archaeological research, leveraging drone technology to uncover hidden history with unprecedented speed and accuracy.**

## Overview of the Archaeological Research Services

Archaeological Research Services (ARS) is an organisation dedicated to conducting a wide range of archaeological and heritage-related work. Their services cater to various clients, including esteemed national organisations like English Heritage, Historic Environment Scotland, and infrastructural projects like HS2. Unlike others who may see heritage as obstacles to development, ARS values heritage assets for their societal importance. Roger Doonan, an associate with ARS, brings to the table a rich academic background. With 22 years of experience lecturing at the University of Sheffield, Doonan has developed various techniques in the archaeological domain.



**Roger Doonan:**

**“People have been researching this landscape for over 100 years. Just one drone flight gave a 50% increase in the known number of archaeological sites. It's amazing.”**

# Before Drones

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Before the introduction of drones, archaeological research heavily relied on aerial photography. Previously, archaeologists used maps to mark and describe sites, a process prone to error and inconsistency due to its manual and interpretative nature. Also, in regions like Russia, the unavailability of detailed maps and the poor quality of Google Earth in 2006 meant researchers had to resort to rudimentary methods. Examples include using kite-based cameras for photogrammetry, which did give great results. Yet, these methods were very time-consuming and depended heavily on various factors like wind conditions. Roger states that now “UAV based work is absolutely vital because of all the techniques we used, drones allow us to cover huge areas very, very quickly.”

Roger Doonan:

**“We didn't expect to see this. I've started talking about the “haunted soil” because, you don't know it's all there. And suddenly it's like putting a new pair of glasses on, you suddenly see things for the first time.”**



# After Drones

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The integration of the DJI Zenmuse L1 LiDAR sensor and MicaSense RedEdge Altum-PT multispectral camera into archaeological research has revolutionised the field by revealing previously undetected sites and subtle landscape features.

As part of some work for Historic England, a single drone survey increased known archaeological sites by 50% in a historically rich English region, highlighting the powerful impact of this technology in uncovering and managing hidden archaeological landscapes.

# The Hardware

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**DJI Matrice 300:** The M300 is a versatile UAV capable of carrying various payloads for diverse research and monitoring applications.



**AgEagle RedEdge Altum-PT:** The 3-in-1 sensor offers a high-resolution, five-band spectral imaging solution tailored for intricate remote sensing in agriculture and archaeology, and works seamlessly with the M300 drone.



**DJI Zenmuse L1:** The L1, when paired with the Matrice 300 RTK and DJI Terra, provides a comprehensive system that offers instant 3D data, enabling efficient capture of intricate details and yielding precise reconstructions of complex formations.

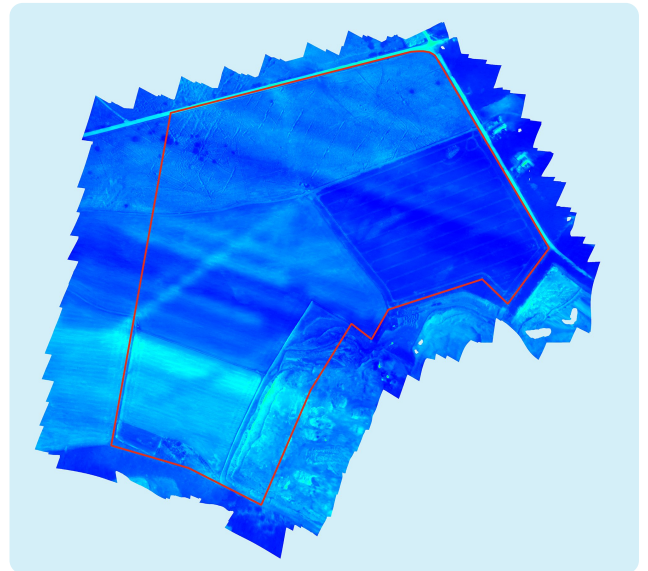
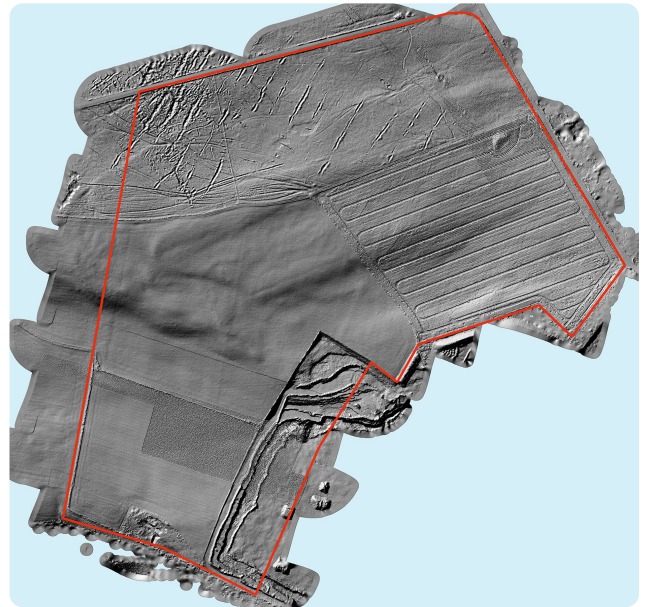




# Westmorland Site

In Westmorland, the team discovered a wealth of archaeological features previously unknown, spanning a period of over 5,000 years that includes Neolithic structures, Bronze Age field systems, and medieval farmsteads. Roger reflects on the significance of these findings, remarking, "It's all there. I mean it literally is just like sweeping the fog away and you can see it." For state managers responsible for landscape stewardship and conservation, these insights are invaluable. Roger elaborates on the efficiency of modern methods, "the traditional way of doing that would have been walking over it which would have taken months, cost a fortune, and even then, what you can see at ground level is minimal really."

The archaeological unit received the King's (formerly Queen's) Award for Innovation, marking a first for such professional groups in the country, in recognition of their pioneering work with UAV technology, facilitated by James Pick and Coptrz. This accolade not only validates their innovative approach but also serves to reassure clients about the credibility and cost-effectiveness of their methods.



Roger Doonan:

**"It was on the back of the work with UAVs, the work we've effectively done with James Pick and the support of Coptrz, to get all that together which allowed us to get that award."**