

**Archaeological geophysical survey of
land at Roseworthy
Cornwall
November 2021**

Report No. 21/105

Author & Illustrator: Adam Meadows



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Project Manager: John Walford

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Project: Roseworthy		OASIS No: molanort1- 503107	
ACTIVITY TYPE			
Project/Activity type	Geophysical survey		
Reason for investigation	Planning: Pre-application		
Development type	Non-residential - waste management		
Planning reference ID	-		
PROJECT LOCATION			
National grid ref	SW 609 396		
Site name	Roseworthy, Cornwall		
REVIEWERS/ ADMIN			
HER for project	Cornwall and the Isles of Scilly		
National organisation	Historic England		
WORK UNDERTAKEN			
Methodological summary	Magnetometer survey with a cart-mounted array of Bartington Grad-01-100L fluxgate gradiometers.		
Previous work?	None	Future works?	Unknown
Dates - Start date:	03-11-21	End date:	03-11-21
GEOPHYSICS			
Geology	Slate and Siltstone of the Mylor Slate Formation. No drift geology recorded		
Land use (i.e. arable)	Arable		
Survey type	Magnetometer survey		
Size of survey area	c5ha		
Instrumentation	Bartington Grad-01-1000L	Fluxgate – Multiple sensor	
Configuration	Pushed cart survey (6-probe array)		
Spatial resolution	Traverse spacing	0.8m	Reading interval 0.225m
Resolution (data values)	0.1nT		
BIBLIOGRAPHY			
Title	Archaeological geophysical survey of land at Roseworthy, Cornwall, November 2021		
Author(s)	Adam Meadows		
Publisher / place / date	MOLA Northampton / Northampton / 2021		
Report number	21/105		
Report release delay?	Six months		
PEOPLE			
Organisation	MOLA		
Project manager	John Walford		
Project supervisor	Graham Arkley		
Funding body	The Green Waste Company		
KEYWORDS			
Monuments found/ date	Undated and post-medieval field boundaries		
RESULTS			
Description of outcomes	The survey identified a multi-phased network of former field boundaries. Whilst some of these could be matched with boundaries recorded on 19th-century maps, others seem likely to be earlier in date. A modern pipeline was also detected.		
ARCHIVES			
Accession ID	None		
Finds Archive repository	None	Expected date of submission:	-
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Digital Archive repository	ADS	Expected date of submission:	TBC

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Archaeological geophysical survey of land at Roseworthy, Cornwall November 2021

ABSTRACT

MOLA (Museum of London Archaeology) was commissioned to undertake a magnetometer survey across c5ha of land south of the A30 at Roseworthy, Cornwall. The survey identified a multi-phased network of former field boundaries. Whilst some of these could be matched with boundaries recorded on 19th-century maps, others seem likely to be earlier in date. A modern pipeline was also detected.

1 INTRODUCTION

MOLA (Museum of London Archaeology) was commissioned by The Green Waste Company, via their agents Chris Thomas and Janine Banks, to undertake an archaeological geophysical survey on land to the west of Roseworthy, Cornwall (NGR SW 609 396) (Fig 1). The purpose of the survey was to identify and map any archaeological remains which may be affected by the proposed erection of a green waste processing facility.

The survey comprised a magnetometer survey and took place on the 3rd November 2021. It was conducted according to a Written Scheme of Investigation (MOLA 2021) and to Chartered Institute for Archaeologists and European Archaeological Council guidelines (ClfA 2020 and Schmidt *et al* 2015).

2 BACKGROUND

2.1 Location, geology and topography

The survey area comprises of a single arable field located c600m west of the village of Roseworthy. Bounded by hedges, the site is sandwiched between the A30 to the north and Roseworthy Hill (the old A30) to the south. Further agricultural land is located to the east and west.

The survey area lies on a north-east facing slope, falling from c61m aOD (above Ordnance Datum) in the south-west to c41m aOD to the north-east. The underlying geology is Devonian Slate and Siltstone of the Mylor Slate Formation, with no drift geology recorded (BGS 2021).

2.2 Historical and archaeological background

Consultation of Historic England's National Heritage List for England (NHLE) and Cornwall and Isles of Scilly Historic Environment Record (HER) shows that there are no Listed Buildings or Scheduled Monuments within the site. There are also no historic environment area designations upon the site (Registered Battlefield, Area of Archaeological Notification, Historic Conservation Area, etc).

A Bronze Age standing stone turned medieval cross was once located south of the old A30, c300m west of the survey area (MCO5143). The stone is thought to be a

Bronze Age menhir that was reworked into a cross in the 11th or 12th centuries and positioned at a crossroads. The cross now sits in Camborne churchyard, having been removed from this site after being used as a gatepost.

The remains of an Iron Age to Roman curvilinear enclosure are visible as cropmarks in aerial photography approximately 500m to the south of the survey area (MCO36545). Other cropmarks are present in that area, possibly indicating the presence of a settlement there.

Further cropmark banks and ditches have been observed c500m south of the survey area, east of the enclosure. They form what would have been a rectilinear field system that fits into the existing field pattern and so may be medieval in origin (MCO36548), though some parts, especially to the west may relate to the earlier enclosure (MCO36545).

An early medieval field system is recorded in the field immediately east of the survey area. The former boundaries, detected through cropmarks, form a cross-like shape and not complete enclosures, suggesting that the full extent of the site is yet to be determined (MCO36542).

Immediately west and north-west of the survey area, on land at Hope Farm, four linear features are present as cropmarks. These have been interpreted as the remains of post-medieval field boundaries that fit into the existing pattern of regular, straight sided fields (MCO36540).

A series of linear earthworks have been observed on the floor of a stream valley c450m north-east of the survey area. The HER records a total of 39 linear earthworks, aligned predominantly north-east to south-west, and suggests that more are likely to present in the same area. It is thought they relate to an extensive post medieval drainage system (MCO36597).

The remains of part of the Rose in the Valley mine is thought to be located on land east of the survey area, with indications of a shaft and spoil tip visible in aerial photography (MCO12483). The earliest record of this mine's operation is in 1754, and it was known as the Silver Valley silver-lead blende and copper mines in 1861.

A post medieval, Grade II listed, milestone is positioned on the south side of the old A30, south of the survey area. It is inscribed with distances to Hayle, Camborne, Penzance, Redruth, Land's End and Truro (MCO53953).

Historic mapping indicates the presence of an abandoned settlement named Rose-in-Valley positioned c50m to the south-east of the survey, alongside the old A30. It features on the Gwinear Tithe map (circa 1839, available online at map.cornwall.gov.uk) and later Ordnance Survey mapping, but by the time the 1963 OS Plan was published no buildings survived (NLS 2021).

3 METHODOLOGY

3.1 Fieldwork

The magnetometer survey was undertaken with a Bartington magnetometer cart. This is a two-wheeled, lightweight sensor platform designed to be pushed by hand. It incorporates a bank of six vertically-mounted Bartington Grad-01-1000L magnetic sensor tubes, spaced at consistent sub-metre intervals along a bar aligned crossways to the direction of travel. These sensors were calibrated ('zeroed') at the start of the survey to minimise heading errors and offsets in their zero values.

The cart also incorporates a Leica Geosystems Viva GPS antenna mounted on the central axis, 1.02m astern of the sensors. The magnetic sensors each output data at

a rate of eight readings per second and the GPS antenna outputs NMEA format data (GGA messages) at a rate of one position per second. These data streams are compiled into a single raw data file by MultiGrad601 logging software specifically developed for that purpose.

The cart was propelled along straight and parallel traverses across the survey area, with data logging being toggled on and off at the start and end of each traverse to avoid the collection of spurious data whilst turning. Traverse ends were marked with ranging poles to aid even coverage, and the evenness of coverage was further checked by monitoring the positional trace plotted in real time by the MultiGrad601 logging software. The typical speed of coverage was under 1.8m/s, with an effective data resolution thus approximated to better than 0.225m x 0.50m.

3.2 Data processing and presentation

The raw survey data was initially processed with MLGrad601 software, which calculated a UTM co-ordinate for each data point by interpolating the GPS readings and applying offset corrections based on the array geometry and calculated heading direction. This produced an output file in XYZ format which could be imported into TerraSurveyor software for data visualisation and further processing.

The raw XYZ data exhibited minor striping caused by slight mismatches in the calibration of the individual magnetic sensors. This was removed in TerraSurveyor by applying the median de-stripe function to runs of data from each sensor.

The processed survey data is presented in this report as greyscale raster images which have been rotated and scaled to fit against topographic base-mapping at a scale of 1:2000.

The processed magnetometer data is displayed at +/-5nT (Figs 2 to 5). An interpretive overlay highlights notable anomalies for discussion (Fig 3, 4 and 5). A minimally processed version of the magnetometer data is presented at a scale of +/- 10nT (Fig 6) for comparison with the final de-striped results.

4 SURVEY RESULTS

4.1 Archaeological and historic features

The survey detected a series of linear anomalies which represent old field boundaries of various dates (Figs 2-3). Many of them exhibit the 'double' positive magnetic response which is a common characteristic of Cornish field boundaries and probably attributable to an earthen bank either flanked by a pair of ditches or revetted on both sides by igneous stone walls (Gaffney and Gater 2003, 123-125). Other field boundary anomalies are single positive responses which are more likely to represent individual ditches.

Some of the boundaries match perfectly with those recorded on the early 19th-century Gwinear Tithe map (Fig 4), which shows the modern field to have been subdivided into six smaller enclosures. A partially similar layout is present on the 1880 Ordnance Survey Six Inch mapping (Fig 5), though with some of the boundaries having been removed and a new subdivision made in the northern corner.

The data also contains other linear anomalies that have the same characteristics as those arising from the known historic field boundaries. These probably represent boundaries that pre-date the 19th-century mapping. Given the occasionally awkward overlapping of different elements, it is likely that the field system as a whole underwent multiple phases of development and re-modelling.

Along the southern side of the broadly north-west to south-east aligned historical field boundary lies a broad, elongated anomaly which shadows the boundary's curve. It has a magnetically positive core with a slight negative halo on its southern edge and a larger negative halo to the north. This feature is not fully explicable but may represent a small, backfilled extraction pit or perhaps a build-up of magnetically enhanced material (industrial residue, midden deposits *etc*) against the edge of the former field.

In the north-western portion of the survey area there is a short, weakly magnetic, linear anomaly aligned broadly south-west to north-east (Figs 2-3). This feature does not appear to correlate with any other linear detected during these works and may prove to be archaeological in origin if not just another unmapped historical field boundary.

4.2 Modern features

The magnetometer has detected strong positive linear anomalies that run in parallel with the southern, eastern, and northern edges of the modern field, sometimes with multiple lines aligned the same and positioned closely together. These are a result of modern ploughing. Weaker linear trends present across the body of the field are also due to modern ploughing. The latter are not highlighted on Fig 3, due to their ubiquity and trivial nature.

A thin, slightly meandering double negative anomaly, aligned broadly north-east to south-west, represents modern wheel tracks from a farm vehicle.

Along the western edge of the survey area, aligned north-north-west to south-south-east, there is a magnetically strong linear anomaly with alternating polarity (*ie* alternative positive and negative segments). This represents a buried pipeline.

The survey data, like that from most rural sites, exhibits a random spread of small strongly magnetic dipoles distributed across the investigation area. These will mostly relate to small ferrous objects, including agricultural debris and general litter, found within the plough soil.

4.3 Geological features

The survey data exhibits a magnetically variable background, with weak irregularly shaped anomalies representing minor changes in the local geology. One such anomaly, located on the northern boundary of the field, is larger and more prominent than the rest. It lies close to a spring-fed stream, depicted on Ordnance Survey maps from 1888 onwards, and might be explained by an area of iron deposition and oxidation within the soil around a spring, though other causes, natural or man-made, cannot be completely ruled out.

5 CONCLUSION

The survey has detected a network of historic field boundaries that run across much of the survey area and represent multiple periods of agricultural land use. Some, like those located in the north-eastern portion of the survey area are represented by a single positive linear, often with a tight negative halo enveloping them, which is likely to represent an infilled ditch. Others are represented by distinctive 'double' positive linear anomalies of a style that is known to occur commonly within Cornwall. These double anomalies may be attributed to an earthen bank flanked on both sides by ditches or faced on both sides with igneous stone (Gaffney and Gater 2003, 123-125).

Some of the detected boundaries align with features shown on the Gwinear Tithe map of 1839 and the 1888 Ordnance Survey maps. However, these maps only indicate dates when the boundaries were in use; their original dates, and those of other boundaries not appearing any known mapping, are unknown. Further map evidence shows that all the boundaries forming internal divisions of the present field were removed sometime prior to the publication of the 1963 edition of the six-inch Ordnance Survey map.

The earliest Ordnance Survey mapping shows the site to have been located c50m to the west of a since-abandoned settlement named Rose-In-Valley. This proximity would suggest that the site formed part of the farming landscape of which this village was situated and worked in. Interestingly, as the settlement shrank the internal field divisions also reduce (as shown on historic mapping), perhaps reflecting changes in land tenure or farming techniques.

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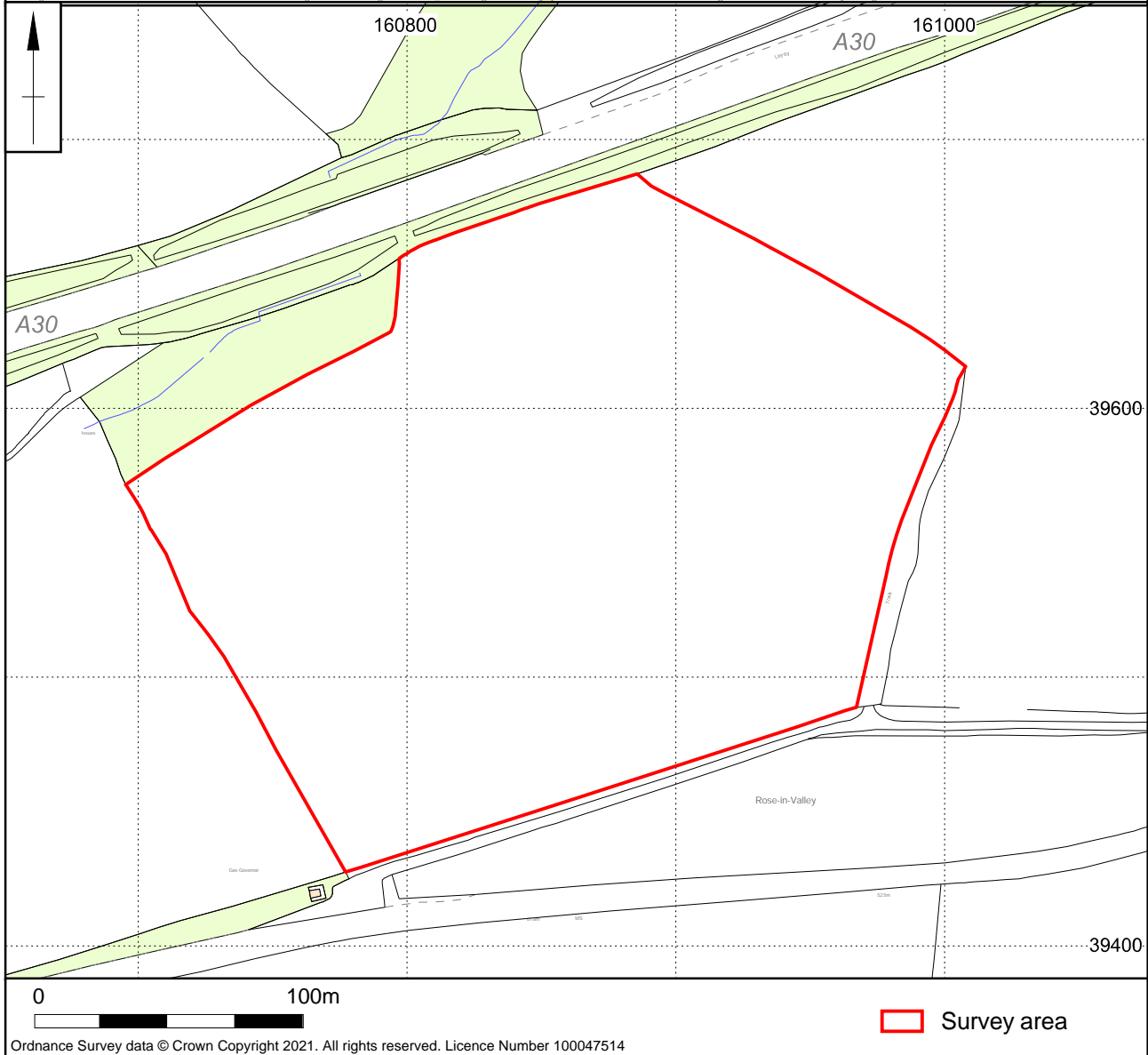
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MOLA

6th December 2021



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Scale 1:2500 (A4)

Site location Fig 1



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Scale 1:2000

Magnetometer survey results, ± 5 nT Fig 2



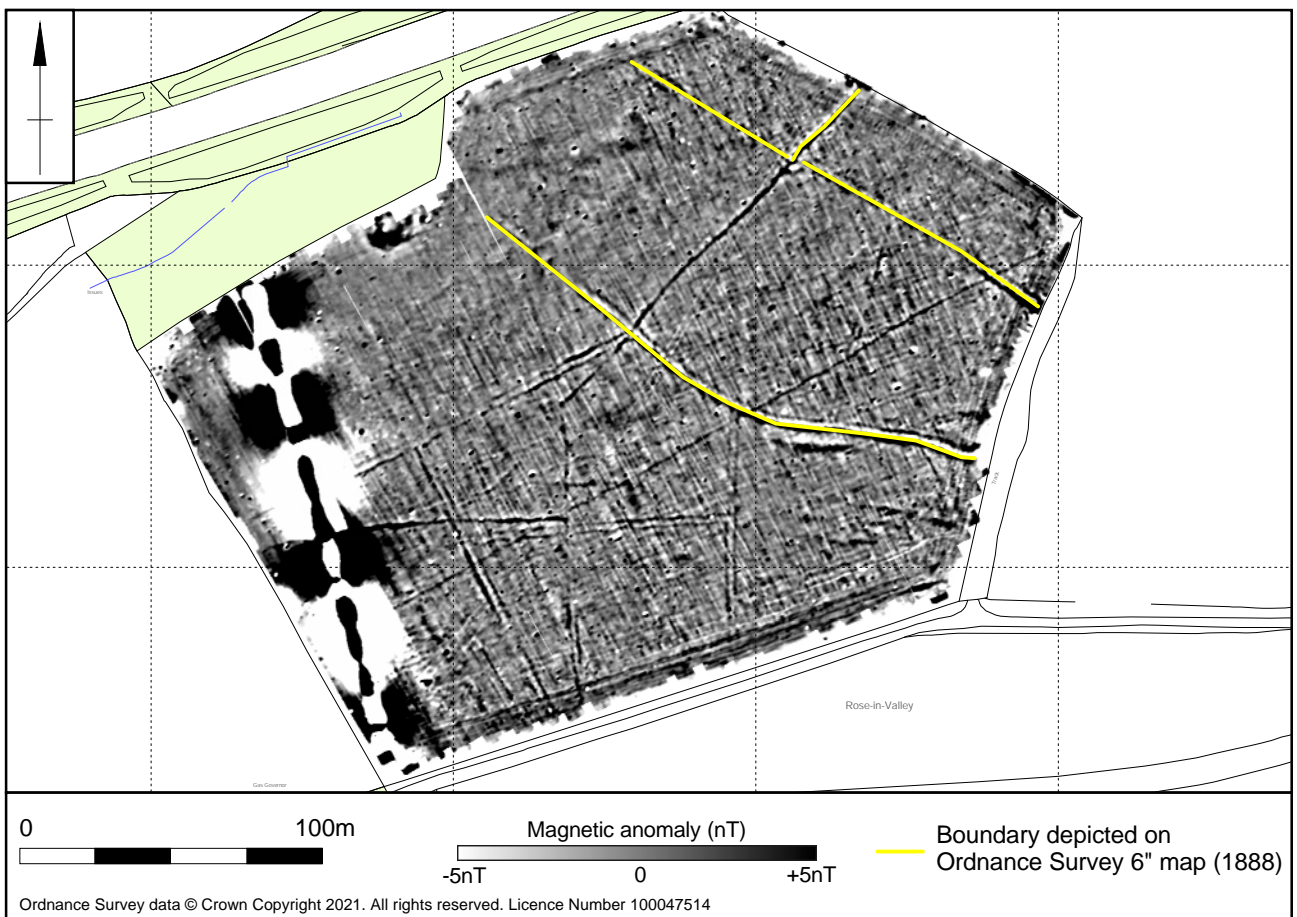
Scale 1:2000

Magnetometer survey interpretation Fig 3



Scale 1: 2500

Known 1839 field boundary remains Fig 4



Scale 1: 2500

Known 1888 field boundary remains Fig 5



Scale 1:2000

Unprocessed magnetometer data, $\pm 10\text{nT}$ Fig 6



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