# TOPOGRAPHIC AND GEOPHYSICAL SURVEYS OF A MOATED SITE AT MILLGATE, THIRSK

A PROGRAMME OF RESEARCH CARRIED OUT
ON BEHALF OF

CLEVELAND ARCHAEOLOGY SECTION

By

GeoQuest Associates

## INTRODUCTION

This report presents the results of topographic and geophysical surveys of an area of land adjoining the Millgate Carpark in Thirsk. The site includes a Medieval moated enclosure which is situated about 40m west of the Thirsk Beck together with areas of scrub and derilict orchard which may preserve associated archaeological features.

The objectives of the surveys were as follows:

1 Carry out a detailed topographic survey, using a total station, to produce a contour plan of the moated enclosure and its surroundings. This data to be archived as a digital terrain model on disc.

2 Use geophysical methods to obtain, where possible, information regarding archaeological features in the subsoil.

3 Map buried services of possible engineering hazard.

## LOCATION AND GEOLOGY

The study area is bounded on the north-west and east by the Thirsk Beck and comprises two enclosed fields together with a piece of waste land lying north of the Millgate Car park. Although used as horse pasture for some twenty years, an old apple orchard survives in the east field and the whole area is extensively covered in unkempt vegetation and hedges.

The solid geology comprises Triassic Mudstones which are almost certainly mantled with substantial deposits of river alluvium. Hence there are no surface outcrops.

## THE TOPOGRAPHIC SURVEY

### Introduction

Visible earthworks consist of a sub-rectangular platform and ditch with external bank and a subcircular mound to the west. One brick building, a wooden hut and a wheeled wooden shed are situated on the summit of this mound while a stone flagged area is visible in the south west corner of the orchard. The waste area north of the car park is partly made-up with rubble with original ground level preserved to the north and east.

## Survey Method

Because of difficulties in obtaining line of sight caused by high hedges and trees, a closed circular traverse of six stations was observed. Peg A, sited near the Car Park kerb, was given approximate OS coordinates scaled from the 1:1250 plan with the azimuth of Peg A-Peg B taken to be Grid North. Directions and distances were observed with a Geodimeter 408 Total Station in standard mode linked to a Psion Organiser running NSS logging software.

Site elevations were derived approximately AOD using the OS spot height of 31.4m on the foot-path near the NW corner of the site. The Bench Mark shown as sited on the west face of the west parapet of Mill Bridge could not be located and has presumably been covered by raising of the pavement. In addition to normal detail, positions of proposed auger holes, test pits and geophysical grids were surveyed together with the girths of mature trees. Approximately 1600 points were observed using the Geodimeter in tracking mode, the majority of which were suitable for terrain modelling. The pick up method was based on section lines approximately 4m apart with spot shots taken at changes of slope both along and between the section lines. Difficulty in obtaining line of sight visibility was a frequent constraint.

## Survey Processing

All survey data were processed using Survpro software to obtain x, y, z coordinates. Contours and form lines were calculated using DGM3 software and the terrain model fit to the observed heights was found to be well within quality assurance standards. Imaging and drafting were carried out using FastCAD and a Hewlett Packard pen plotter (Figure 1). An AutoCAD compatible .dxf file of the terrain model, together with a file of primary coordinates, was submitted on disc to Cleveland Archaeology for archiving.

# THE GEOPHYSICAL SURVEY

Geophysical surveys were carried out to detect anomalies in resistivity caused by variations in soil moisture content of possible archaeological origin. Measurements of apparent resistance were made at 1.0x0.5m intervals using a Geoscan RM15 resistance meter with 0.5m spacing of the mobile electrodes. A zig-zag traverse scheme was employed with survey in units of 20x20m. Owing to the great density of vegetation over most of the site, it was only possible to examine the area shown in Figure 2. Appendix **A** provides more information about this method of archaeological geophysical surveying.

The geophysical results were processed into a grey-scale image showing the residual resistivity anomalies and this is given in Figure 3 on a digital basemap derived from the

previous topographic survey. Appendix **B** describes the computer processing of the field data in more detail.

## DISCUSSION

### Topographic Survey

North of the car park the made-up ground amounts to 1145m$^2$ while the two remaining fields surveyed total 5050m$^2$. The area enclosed by the platform was measured to be approximately 284m$^2$. The contour plot provides clear evidence for a causeway bridging the moat on the NE side while upcast from the moat is visible as distinct linear banks on the north, east and south exterior sides of the moat. Below are some statistics computed from the topographic survey:

NW-SE diameter of moat (measured with respect to ditch bottom) = 26.5m
Maximum height of platform above ditch bottom = 1.16m
Maximum height of platform AOD = 31.89m
Typical depth of moat from bank crest = 0.7m
Typical moat width = 6m

### Geophysical Survey

The areas examined were characterised by low resistivity (reflecting a high water table) and anomalies of moderate intensity (standard deviation ~7 Ohms). No significant variation in resistivity values were detected in the area surveyed within the orchard, implying a uniform subsoil with no major stone archaeological structures (Figure 3).

A 'halo' of reduced electrical resistivity was found to enclose the platform in a position reflecting the topographic expression of the moat (Figure 1). On the basis of the low measured resistance values it can be inferred that the moat deposits are fully saturated. A compact zone of high resistivity is present near the SW corner of the platform suggesting that a stone structure or more stoney soil may be present here, although no further detail could be extracted from the data via image processing. Two additional zones of high resistivity have also been detected near the NW extremity of the survey area, at a point which should be outside the projected continuation of the moat; these anomalies may also reflect increased stoney deposits in the subsoil of possible archaeological interest.

## SUMMARY AND CONCLUSIONS

The results of this study can be summarised as follows:

1 A detailed topographic survey has produced a digital terrain model from which earthwork features within this densely vegetated site can be visualised and dimensions derived.

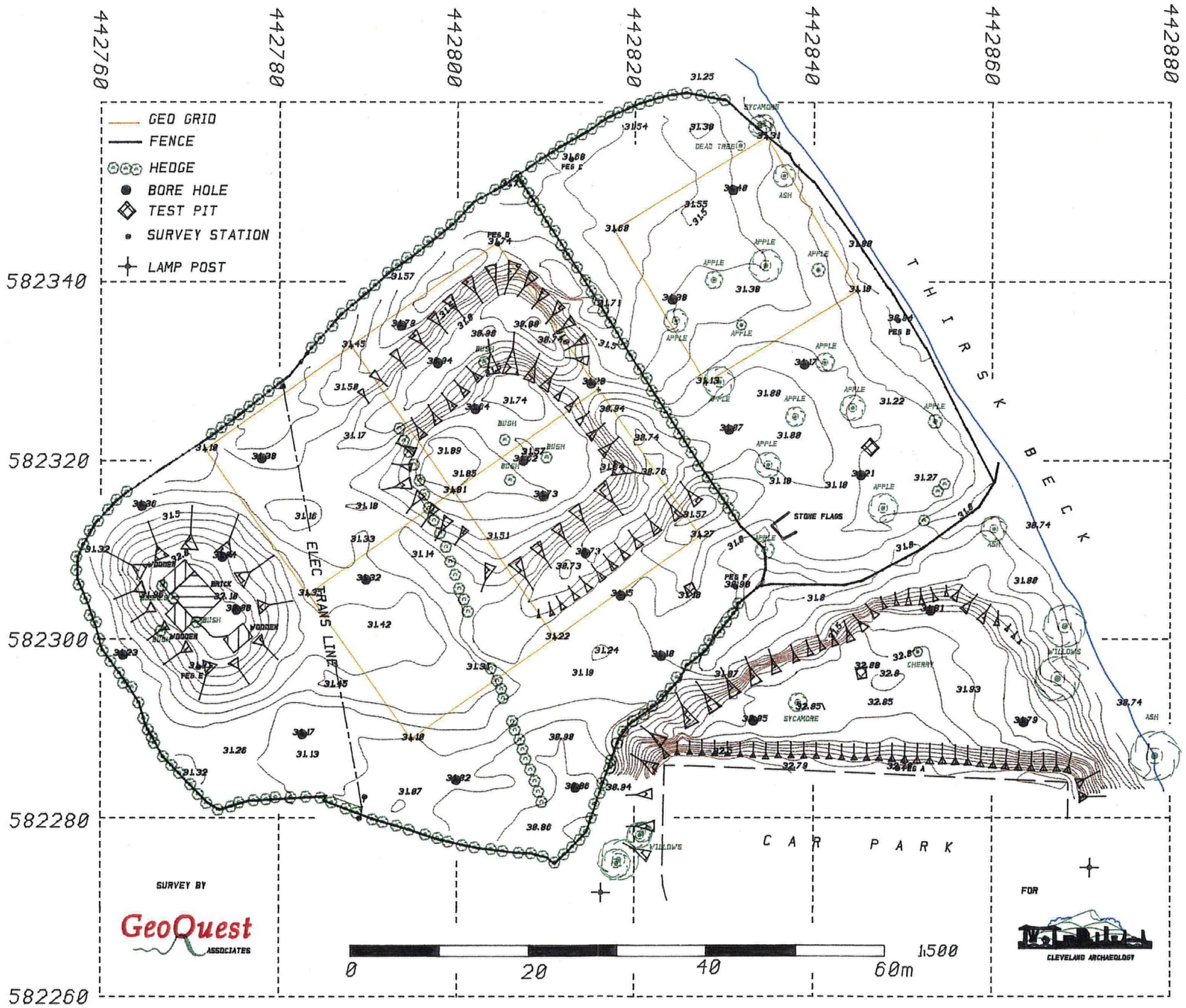
2 Geophysical survey provides some evidence for stoney areas or structures on the moated platform. The geophysical expression of the moat reflects the topography.

**Credits** *Field survey*: J. Wright, C. Lambert
*Report*: J. Wright, M.J. Noel
*Date*: 10/11/93

**Note** Whilst every effort has been taken in the preparation and submission of this report in order to provide as complete an assessment as possible within the terms of the brief, GeoQuest Associates cannot accept any responsibility for consequences arising as a result of unknown and undiscovered sites or artifacts.

**FIGURE 1**

Topographic contour map of the study area at Millgate, Thirsk at a scale of 1:500. Note the positions of the areas examined geophysically.

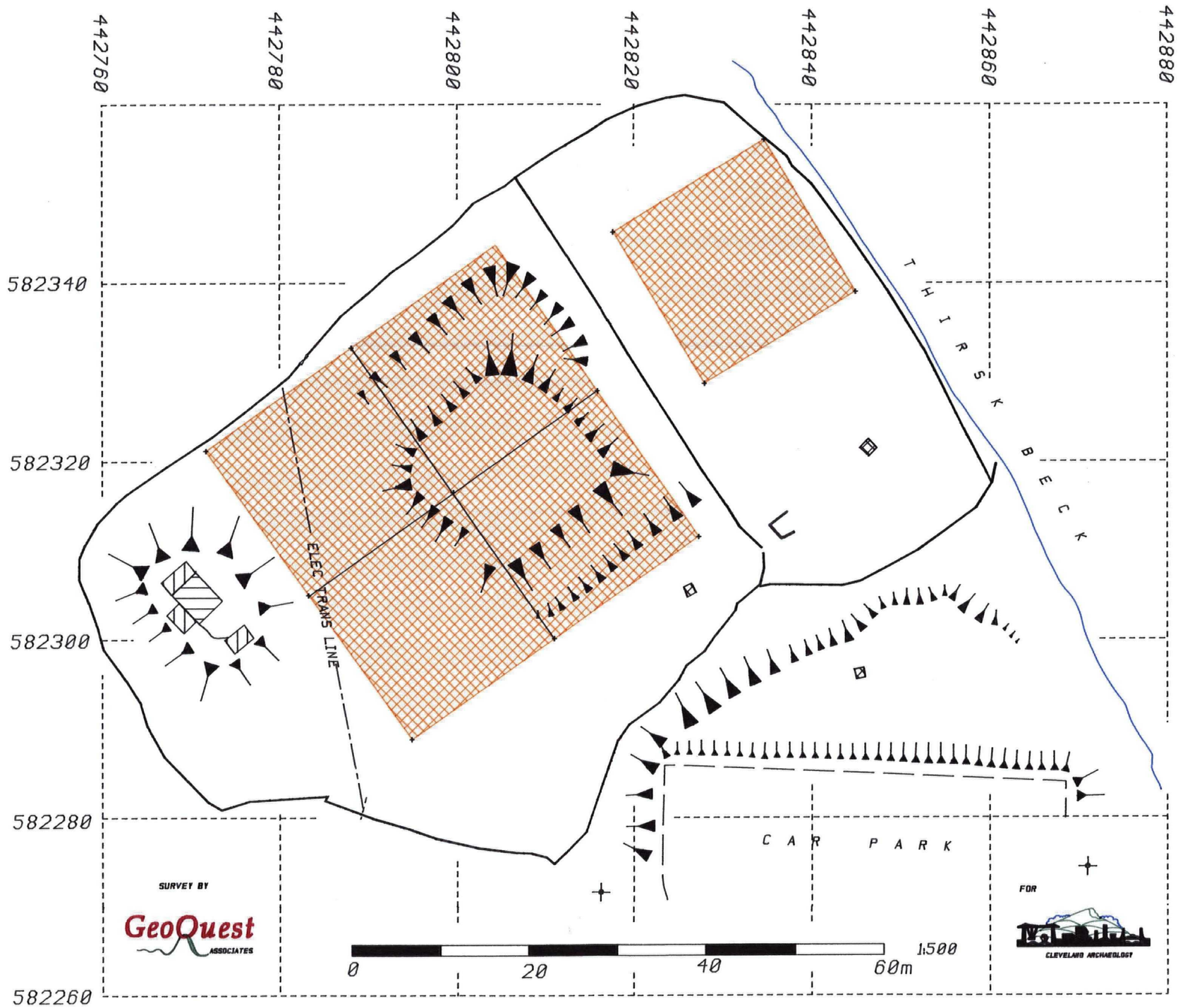



# MOATED SITE, MILLGATE, THIRSK

Contour Interval 0.1m Approx. OS datum used

**FIGURE 2**

Positions of the areas surveyed geophysically shown in relation to major topographic features.




MOATED SITE, MILLGATE, THIRSK

GEOPHYSICAL SURVEY AREAS

# MOATED SITE
# MILLGATE, THIRSK

# RESULTS OF
# RESISTIVITY SURVEY


SURVEY BY

GeoQuest ASSOCIATES

FOR

CLEVELAND ARCHAEOLOGY

## FIGURE 3

Results of the electrical resistivity survey of the two study areas. High resistivity zones are shown dark, low resistivity zones, light. Refer to the scale below (in Ohms) for absolute values.