Geophysical Survey of Hexham Abbey

Scheduled Ancient Monument Area

By

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Executive Summary

Parts of Hexham Abbey date to the Anglo-Saxon foundation of St Wilfrid in 674 AD and much has been speculated about possible Roman predecessors in its vicinity. Remote sensing was applied in and around the Abbey and in the surrounding parks to the West and South to document known structures and to detect new ones without harming them. This report presents the results from the research done within the Scheduled Ancient Monument Area only. It is part of a larger program of geophysical surveys and 3D-laser scanning exercises carried out by the authors from November 2014 to April 2017. The results of the whole project – including the investigation on the Sele – will be presented in a further report and as a contribution to the journal Archaeologia Aeliana.

Three different geophysical methods – Ground Penetrating Radar, Gradiometry and Resistivity – were applied depending on surface conditions and the suitability of the methods for each area. In some areas two or – for example the former Cloister (1a) – even all three methods could be used and allow a comparison of the informative values. The most important results of the investigation within the scheduled area are: four negative anomalies in the Cloister area (1a), which from their shape, size, position and orientation seem to represent tomb-like graves associated with remains of the Romanesque Cloister walls towards the east. Robbed out walls of the Romanesque Cloister walls could be observed as negative parch marks. In the park to the West of the Abbey, it was possible to disprove a dowsing survey from the 1988, which claimed the existence of “quadruple ditches” indicating an “early [Roman] fort”. Neither Ground Penetrating Radar nor Gradiometry results from within or without the Scheduled Ancient Monument Area (4a+b) showed anomalies that could be interpreted as infilled manmade ditches.

The results of the geophysical survey together with other sources outside the Scheduled Ancient Monument Area will allow a new discussion of the limit of the monastic precinct as well as former layouts and uses of the adjacent park and the large open space of the Sele/Seal. The investigation demonstrates the potential of non-invasive archaeological research within the constraints of a standing monument with many modern alterations and supplies. It also shows the necessity to apply a wide range of methodologies because their results are able to complement each other.

The authors give recommendations on how non-invasive or invasive archaeological research could either be continued or how their results can be used to inform protection and management of the Scheduled Ancient Monument and adjacent park areas. For the authors, possible foci of future investigation with non-invasive methodology would be both in- and outside the Scheduled Ancient Monument. For example, there are still quite a few areas in and around the church that could be surveyed. Most promising would be the area of graveyards to the north and the car park to the west to the church. Another task would be to investigate the area of the bowling green in the park towards Hexham House. With advanced methodology the results of a Resistive Tomography survey done in 1996-1997 should be reappraised. Here in his report, Szymanski suggested the existence of “a N-S ditch” and “constructed dike on both the eastern and the western sides” (Szymanski 1998, 20). It would also be interesting to study more closely the lowest part of the Sele/Seal. Today temporarily used as a football pitch, this area seen on aerial photographs from the 1940ies has rectangular structures that cannot be dated or explained so far.

Introduction

This program of geophysical surveys was undertaken in February 2016 and April 2017 with a small research grant from the Society of Antiquaries of Newcastle upon Tyne and as part of the Marie Skłodowska-Curie project 'RESTOMO', funded by the European Commission. The survey was designed to assess the possible survival of hitherto undiscovered sub-surface archaeological evidence associated with the Anglo-Saxon church and the later Augustinian Priory of Hexham Abbey, but also possible Roman or earlier structures. Evidence from previous observations, particularly those of C. C. Hodges and J. Gibson (Hodges & Gibson 1912), and archaeological interventions like the ones published by E. Cambridge and A. Williams (Cambridge & Williams 1995) have allowed a glimpse into some of the early and later medieval archaeological remains but their exact position and context remained unclear. This survey is part of a wider attempt to better understand the early ecclesiastical site in their immediate landscape context. In this report only the results of the geophysical survey within the Scheduled Ancient Monument area are presented, the results of the whole project will be published in a second report and summarised in a paper for the journal Archaeologia Aeliana (Astbury/Hueglin/Turner forthcoming).

Date	Site (Area)	Surveyors	GPR (m^2)	Gradiometry (m^2)	Resistivity (m^2)
09/02/2016	outside Abbey (1a)	AT & SH	812		
09/02/2016	outside Abbey (1a)	DA		812	
10/02/2016	outside Abbey (3)	AT & SH	700		
11/02/2016	outside Abbey (1b)	AT & SH	356		
25/04/2017	outside Abbey (1a)	AT, SH, Richard Young & Robert MacFarlane			812
27/04/2017	Park (4b)	AT, SH & Gordon Scorer	1800		
28/04/2017	Park (4)	DA, SH, Richard Young & Gordon Scorer		9246	
total m^2	14538		3668	10,058	812

Table 1: Overview of the geophysical surveys within the scheduled monument area at Hexham Abbey (AT = Alex Turner, SH = Sophie Hueglin, DA = David Astbury)

Location, topography and geology

Hexham Abbey is situated in the town of Hexham, south of the River Tyne. Hexham is perched on a flat terrace over the broad flood-plain. The centre of the town lies to the north of a formerly very significant east-west route (represented in Hexham by the B6305, today, superseded as a trunk route by the A69) and at a crossing point of the River Tyne just to the east of the confluence of the North and South Tyne at Warden. Hexham is located in Northumberland c. 30 km west of Newcastle. Hexham's centre is dominated by the former priory, now the parish Church of St Andrew, universally known as Hexham Abbey. This church and former conventual structures sit to the west of the Market Place with parkland beyond this. (*Figure 1*).

Figure 1: Location of Hexham Abbey with parkland and the Sele/Seal to the west (Google Earth 2018. © Infoterra & Bluesky)

The superficial geology of the terrace at Hexham is composed of alluvial sands, clays and gravels, lying above sands and gravels of glacial origin which in turn lie above a solid geology of Carboniferous rocks, predominantly sandstones. (Hexham Extensive Urban Survey).

Scheduled Ancient Monument area

Hexham Abbey is a Scheduled Ancient Monument (Historic Environment Record (HER) HER8722) meaning that whilst Scheduled Monument Consent (SMC) is not required to conduct non-invasive geophysical survey, Section 42 licences[1] were obtained along with landowner permission, for both series of surveys.

General Historic and Archaeological Background

The following section is a brief depiction of the site's history and previous archaeological background, put together in order to provide a working knowledge of the site and the possible data available. Thus it should not be used as detailed account the history of the site.

[1] SL00123090 for 9/02/2016 to 31/06/2016 and SL00144886 for 1/11/2016 to 31/05/2017.

The centre of Hexham with the Abbey is designated as a Conservation Area. Hexham Abbey is a Grade I Listed Building (Northumberland HER, HER8722). Parts of it are a Scheduled Ancient Monument (SAM Nd51). The Keys to the past entry for Hexham Abbey describes the site as follows:

> *"The church at Hexham was built in AD674-8 by St Wilfrid, the Bishop of York. It was dedicated to St Andrew and became a cathedral in 681. The stone chair in which the bishop would have sat can still be seen in the chancel. After 821 the bishop moved to Lindisfarne and the church became the centre of a monastery. However, in 875 many of the buildings were destroyed by Viking raids. Little remains of this Anglo-Saxon church, though the crypt built by St Wilfrid is still visible. In 1113 the monastery was refounded by Augustinian monks. A strong gatehouse was built in the mid-12th century and a new church begun in 1189. The church was sacked by Scottish raiders in 1296. The monastery was abolished in 1536 during the Dissolution of the Monasteries, when it became the parish church of Hexham. The nave of the present church was built in the late 19th century."*

This demonstrates the very high potential for archaeological data along with the presence of above and below ground archaeological remains on the site.

History

In the early 670s, Queen Etheldreda of Northumbria granted land to Wilfrid, an Anglo-Saxon noble, to found a monastery at Hexham. It is not certain if anything sat on the site before Wilfrid was there, but Eddius (Wilfrid's contemporary and biographer) names the site of the monastery as *Hagustaldesei*. The last element of the name, probably derived from the Anglo-Saxon *eg* which although in the strictest sense translates as island, was also frequently applied to promontories and hills projecting into flatter land; very appropriate for the topography of Hexham. The remainder of the name, *Hagustaldes*, probably means 'young warrior' or 'warrior's enclosure', perhaps an indication of the use of the prominent and defensible site in times before Wilfrid.

Wilfrid built a church on the site dedicated to St Andrew and he may also have been responsible for the construction of another church, dedicated to St Mary, possibly a round building and the precursor of the later St Mary's (fragments of this later church can still be seen along St Mary's Chare). There may have been a third church, dedicated to St Peter, although its location, even its existence, is problematic.

St Andrew's became a cathedral in 681 and was a flourishing centre of both learning and administration. Wilfrid was succeeded as Bishop by Acca who improved and ornamented the church. In 821, the last Bishop, Tilberd, was forced to abandon Hexham following raids by the Vikings. But worse was yet to come, and Hexham was severely damaged by the Vikings in 876. Monastic life at the church of St Andrew continued in some form over the 10th and 11th centuries under the jurisdiction of the Bishops of Durham but there is little evidence for this. In post-Conquest times, Henry I quarrelled with Bishop Flambard of Durham. He took Hexham from Durham's jurisdiction and gave it and Hexhamshire to the Archbishopric of York. St Andrew's was refounded under Archbishop Thomas II in 1113 as a priory of Augustinian canons. The decline in Anglo-Scottish relations over the late medieval period is marked at Hexham by a number of Scottish military visitations. During the invasion of England by David in 1137 good relations with the canons was maintained by the Scots and Hexham remained untouched. A period largely of prosperity and peace followed over the remains of the 12th and almost the whole of the 13th century. This was terminated in 1296 with the invasion of Scotland by Edward I and the widespread destruction of Hexham and St Andrew's by William Wallace in the same year. The Scots again invaded in 1312, when Robert the Bruce is thought to have sacked the town. The canons temporarily fled. They returned, but the town was again attacked in 1364 during the time of Edward III.

When Henry VIII's Commissioners arrived in Hexham in 1536 to dissolve the Priory, the canons defended it so strongly that they were forced to temporarily retreat to Corbridge. Five months later, the dissolution of the Priory was carried out with no violence. The priory church was handed to the parishioners and the conventual buildings to Reginald Carnaby who lived as lord of the manor. On Carnaby's death the land reverted to the Crown and in 1572 an Act of Parliament finally abolished the regality and special liberties of Hexham (Hexham Extensive Urban Survey 2009, pp. 5-6).

Antiquarian Interest

Hexham has attracted much antiquarian interest. Consequently there is a wealth of secondary source material available, much of it dating to the 19th century. The architect, C.C. Hodges carried out much work on the Priory church and wrote extensively about remains he had seen and the standing structure between 1888 and 1913. Gibson published with Hodges slightly later, in 1919 (Hexham Extensive Urban Survey 2009, p. 7).

Historical Maps

The earliest maps showing any detail of Hexham are John Ogilby's road map from 'Tinmouth to Carlisle' dated 1675 and Armstrong's map of Northumberland dated 1769. Ogilby's road map shows a wooden bridge crossing the Tyne near Hexham and Armstrong's map shows the extent of urban development in Hexham in the mid-18th century. Wood's town plan of 1826 is the first survey to provide a detailed picture of the town. The first edition of the Ordnance Survey map for Hexham was published in 1859 (Hexham Extensive Urban Survey 2009, p. 7).

Archaeology

Archaeological excavations also provide evidence of the development of Hexham. There have been a number of small-scale excavations in Hexham. Most of these excavations have focused on the Abbey. (Hexham Extensive Urban Survey 2009, Appendix 1)

Prehistoric Period

There are a number of cup and ring marked stones held at the Abbey but their provenance is uncertain. A number of Bronze Age funerary sites lay in the vicinity of Hexham. A stone cist was found in the 19th century during the construction of a house on Eilansgate. This is probably the same site from which came a small pottery urn (HER 8726), given to the British Museum in 1874 and often cited as coming from Windmill Hill. It is uncertain whether the surviving burial represents a single examples or originally lay within a cluster (Hexham Extensive Urban Survey 2009, p. 9).

Roman Period

The existence of numbers of reused Roman stones in the Priory and most notably in the early-medieval crypt below the nave, has led to much speculation that a Roman site lies in the immediate area. However, recent work has shown that many of these re-used stones derive from the Roman Bridge across the Tyne at Corbridge and from the Roman mausoleum at Shorden Brae also near Corbridge. There is little evidence for any significant Roman route running to Hexham and certainly no evidence for a crossing of the River Tyne, which was adequately catered for at Corbridge less than 3 miles to the east (Hexham Extensive Urban Survey 2009, p. 10; Bidwell 2010).

A **dowsing survey** (Fig. 2) by Raymond Selkirk in 1988 on land around the Priory church located what was interpreted as parallel ditches (HER 8979). Their context was suggested as Roman, but additional evidence would be required to confirm their presence and their chronology. A series of **geophysical surveys** (including tomography, which provides a sectional view of below-ground features) was carried out on the bowling green to the north-west of St Andrew's in 1997 again to investigate the possible survival of Roman remains around the precinct (HER 8981; Event No 83). Features were located but their interpretation was problematic (Hexham Extensive Urban Survey 2009, p. 10).

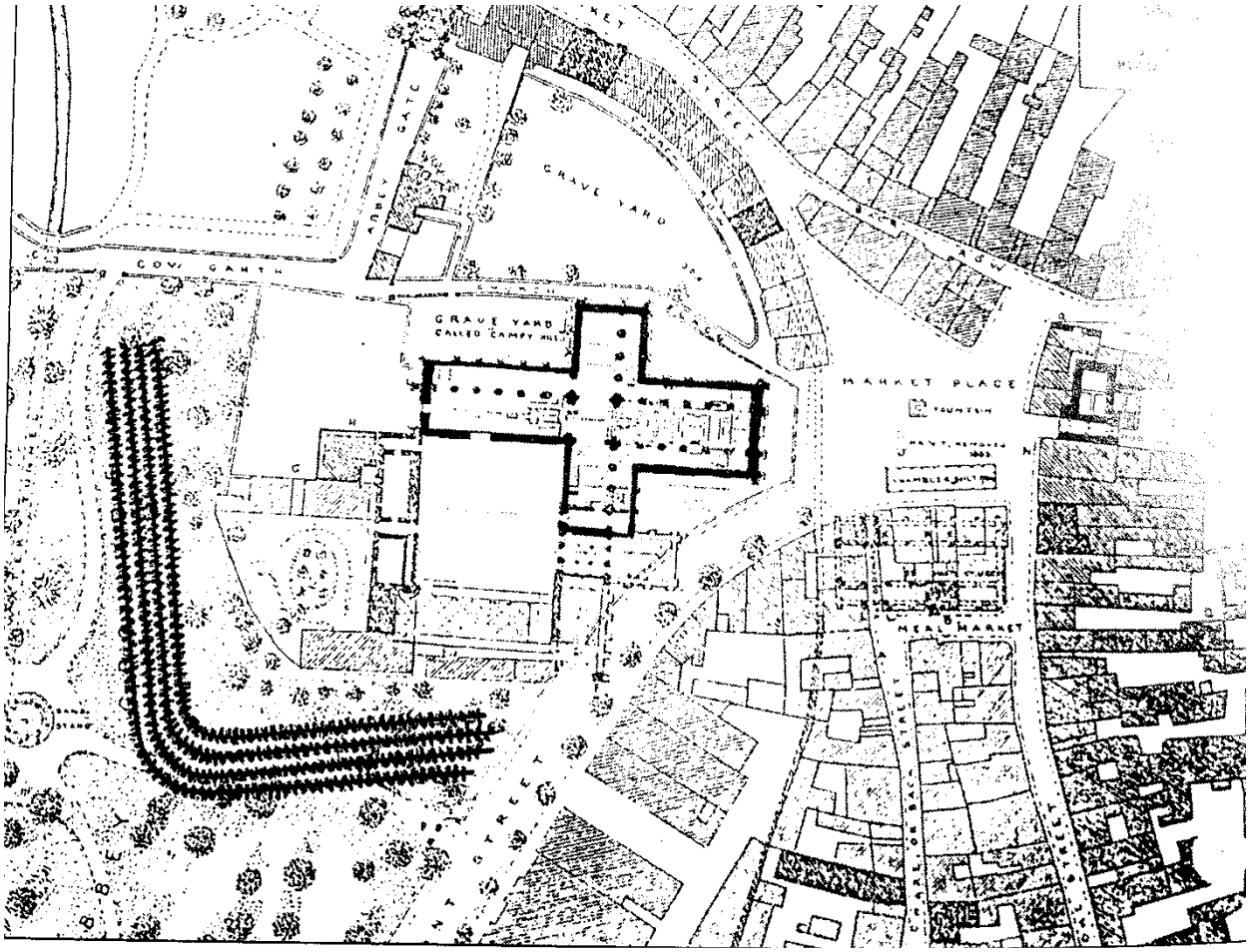

Figure 2: Sketch drawing of the dowsing "results" in the park around Hexham Abbey. (Selkirk 1995, 310)

Early-medieval period

Wilfrid built a church at Hexham, part of a Benedictine monastic foundation, and dedicated it to St Andrew on a site set back from the edge of the river terrace. Wilfrid's biographer, Eddius, writing around 720 said that the first church was built around 675-680 and that no other this side of the Alps could compare with it. In 681 it became a cathedral. Wilfrid gained the Hexham privilege of sanctuary for the church, which extended for a mile radius around and was marked by four crosses, of which some fragments have probably survived (HER 8724, 8735, 8736 and 8737).

Wilfrid was succeeded by Acca as Bishop of Hexham who carried on improving and ornamenting the Church of St Andrew, encouraging church music, setting up a library and completing the Church of St Mary begun by Wilfrid. The monastery survived for some years despite Viking attacks and the departure of the

last Bishop, Tilberd, in the 820s. But it was in decline and came under the jurisdiction of the Bishops of Durham. A coin hoard, probably concealed at the time of the Viking raids, was discovered during the digging of graves in the north transept of St Andrew's in 1832. It consisted of 8000 stycas with dates between the mid-790s and mid-830s all in a bronze bucket (HER 8744). More coins were found close by in 1841 (Hexham Extensive Urban Survey 2009, pp. 10-11).

Early medieval churches

The only known in-situ remains of early-medieval Hexham lie below and around the Church of St Andrew. Most notable is the crypt of Wilfrid's church under the present nave, but foundations of early structures have also been seen during restoration and building works on the site over the later 19th and early 20th centuries, recorded mainly by C. C. Hodges, the church architect. Many of these foundations, long believed to be part of the Wilfridian church have recently been shown to be of 12th century and later phases of construction. Only a few of the walls revealed are certainly of early-medieval date. Other early remains have also been identified; a small excavation within the church in 1978 revealed the south wall of the early church, contemporary with the crypt.

The most recent conjectured ground plan of Wilfrid's church and associated buildings appears in Cambridge and Williams (1995, 78 fig. 16, 87 fig. 21). This proposes a church with a long nave and narrow, square-ended chancel with porticus to north, south and west, possibly with a porch to the west, and a separate apsidal-ended (probably mortuary) chapel placed axially to the east discovered during construction work in 1908. Beneath the eastern end of the early church (and the nave of the present church) lay the crypt, similar to the early-medieval crypt at Ripon where Wilfrid was Abbot. It is composed of a vaulted antechamber to the west accessed by steps running down from the nave, and with a door into the vaulted main chamber to the east which would have contained relics for pilgrims to view. Two passages with twisting stairs – now blocked – ran in from the east (probably from beyond the walls of the early church) and provided access to the antechamber (north passage) and to the relic chamber (south passage). At some point over the later medieval period the crypt was abandoned and lost. It was only re-discovered when foundations for tower buttresses were being excavated in 1725 (Horsley 1732, 248). It was used for some time as a burial vault and only in the 19th century was its significance realised.
Although two probably contemporary foundations were seen running to the north from the early church's north-east corner, there is little evidence for the layout of associated monastic ranges. Excavations at other Anglo-Saxon monasteries such as Jarrow show that buildings were frequently located to the south of the church but this need not have been the case at Hexham. There is as yet no evidence for any contemporary structures to the west of the early church.

Fragments of the late-medieval Church of St Mary (HER 8729) are incorporated within later buildings at the northern end of St Mary's Chare, to the east of St Andrew's. Eddius, Wilfrid's biographer, records that whilst Wilfrid was in France in 705, he fell ill. During his illness he had a vision of the Archangel Michael, who told him to build a church in the honour of the Virgin Mary. This he began on his return to Hexham (the later medieval church, a rectangular structure, is thought to lie over the location of the early-medieval church). It was reportedly completed by Acca after Wilfrid's death and destroyed by the Danes in 875, but rebuilt, following the original plan, as a circular church with four apses facing the cardinal points (Hinds 1896, 201). No evidence for this church has as yet been recovered from the site although remains of its medieval successor are incorporated into Nos 11-13 Market Street.

Evidence for an early-medieval Church of St Peter at Hexham is derived only from a 12th century documentary reference by Prior Richard of Hexham (Raine 1864-5, 14-15). It is described as being further from St Andrew's than the Church of St Mary. It may have been destroyed during the Viking raids of the 9th century but even its existence is uncertain (Hexham Extensive Urban Survey 2009, pp. 10-13).

Early medieval graveyards

A number of probably early-medieval graves have been located to the south and east of the present St Andrew's church including a grave marker to 'Tundwini' (Cambridge and Williams 1995, 78, fig 16, 82, fig 17, 100). Possibly pre-Conquest burials were also seen in the 1984 excavation of the vestibule of the chapter house (*ibid.* 56) (Hexham Extensive Urban Survey 2009, p. 13).

Medieval churches and other religious foundations

St Andrew's Church and Claustral Ranges (SAM Nd 51); church (HER 8722) and claustral ranges (HER 8822) listed grade I. The church was re-founded under the jurisdiction of Archbishop Thomas II of York in 1113 as a priory of Augustinian canons. The church was rebuilt above the foundations of the early-medieval church. The new church had an eastern apse and transepts, a nave probably only aisled on the north side (the western respond of this survives) and ranges round a cloister to the south (Cambridge and Williams 1995, 80-89). Stone-built ranges were erected around 1130 (HER 8822).

This church was swept away over the late 12th and 13th century when a six bay choir and transepts were constructed along with a new nave. During the reign of Henry III the church received many gifts, and work continued on the church, the cloister walk, chapter-house, a school room and refectory. In 1296, Scottish forces attacked Hexham. Documentary evidence – the Lanercost Chronicle (Maxwell 1913, 136-137) – suggests that much damage occurred during this raid and it is probable that both the church and ranges were affected. Legend has it that the church was burnt down and many schoolchildren killed within it. A range of eastern chapels, projecting from the east end of the choir, was constructed in the mid-14th century.

The nave was lost at some time over the later-medieval period, but the choir and transepts and eastern chapels survived. The 14th century eastern chapels were demolished only in 1858 when John Dobson remodelled the eastern end. The nave was rebuilt by Temple-Moore in 1908 over the lower portions of the south and west walls. The remaining parts of the monastic buildings dating to this period are described in Pevsner (1992, 326) and details of the monastic cemetery can be found in Cambridge and Williams (1995, 100-8).

Ryder (1988, part 3ia) notes that Prior Richard's history mentions an enclosing wall of great thickness and strength, a defensive *vallum monasterii* enclosing the ecclesiastical precinct, probably constructed at the same time as the 12th century priory gatehouse, known as Wilfrid's Gateway to the north of St Andrew's on Gilesgate (listed grade I; HER 8844). This wall has been traced at a number of points around the perimeter of the precinct.

The Canons Graveyard (HER 14752) extended to the south of the chancel of St Andrew's and 12th century (probably earlier) graves run below the area of the 13th century south transept. It was contained to the east by the precinct wall and eventually by the eastern chapels. Beaumont Street was cut across the cemetery in the 1860s. The parochial cemetery (HER 14751) lay on the north side of the church and several

medieval memorials have been found here. This continued over post-medieval times as Campy Hill (Hexham Extensive Urban Survey 2009, pp. 14-15).

The Sele/Seal

The Sele, today mostly an open area of parkland, lies between Market Street and Hencotes and lies to the west of the priory precinct. The name may be a corruption of *Champs du Ciel*, a name sometimes applied to monastic enclosures (Hinds 1896, 307). It is likely that the area was cultivated. Samuel Hieronymus Grimm's drawing of Hexham Abbey c. 1778 (Figure 10) shows a detached rectangular building with a wooden turret – probably a dovecote – capping its gabled roof (Ryder 1988, part 3ic), possibly an early monastic barn, but by no means certainly so (Hexham Extensive Urban Survey 2009, p. 15).

Historic and Archaeological Background of Specific Survey Areas

Areas 1a (Cloister) and 1b (car park)

The open green area (1a) south of the contemporary nave of the Abbey church is called Cloister after its former function. Adjacent to the south wall of the nave foundations of early structures have been seen during restoration and building works over the later 19th and early 20th centuries. They have been recorded mainly by CC Hodges, the church architect. Many of these foundations, long believed to be part of the Wilfridian church have recently been shown to be of 12th century and later phases of construction. Only a few of the walls revealed are certainly of early-medieval date (Hexham Extensive Urban Survey 2009, 11 – Cambridge and Williams 1995, 53-60, 72-94).

In 1113, when the church was re-founded under the jurisdiction of Archbishop Thomas II of York in 1113 as a priory of Augustinian canons. The church was rebuilt above the foundations of the early medieval church. The new church had a cloister to the south (Cambridge and Williams 1995, 80-89, esp. 84, Fig. 18) which was not as wide as the area is today. Over the late 12th and 13th century, during the reign of Henry III the church received many gifts, and work continued on the church, the cloister walk, chapter-house, a school room and refectory. In 1296, Scottish forces attacked Hexham and documentary evidence suggests that much damage occurred during this raid and it is probable that both the church and ranges were affected. Legend has it that the church was burnt down and many schoolchildren killed within it (Hexham Extensive Urban Survey 2009, 14).

Area 1b describes part of the car park to the south of area 1a. Here Wood's plan of 1823 (Fig. 8) shows a building which closes off area 1a to the south. In 1888, on Hodges plan of Hexham (Fig. 9) this part of the conventual building is lost already, but its former function is given as 'fratry' and ' kitchen'.

Area 3 (Prior's Court)

Architectural and historical context (from Prior's Court, The Archaeological Practice 2016)

The West Range of Hexham Abbey was remodelled in the late 15th century under Prior Leschman (1480-1491) and it is generally accepted that the north-west range was built in the same period; some older fabric survives in the east part of its north wall, although externally this building is almost entirely of late 18th or early 19th century appearance. Following the Dissolution of the Priory in February 1537, the Crown granted the monastic buildings in 1538 to Sir Reginald Carnaby, who probably added the Carnaby Building within the angle between the Prior's House and the northern part of the west range, although

Ryder (2012, 13) suggests that the building may have been constructed a few years before the Dissolution. The Carnaby building seems to have been little impacted by late 18th and early 19th century fires which largely destroyed the Prior's House to the south. The building of the Carnaby Building completed the complex of buildings now collectively known as the 'Abbey House', consisting of the west range of the cloister and, to the west of it, buildings around the 'Prior's Court', including the north west range (the Prior's House) and, behind it, the early 16th century 'Carnaby Building'.
The Abbey House continued to be altered and extended in the 17th and 18th Centuries, as detailed by Ryder (2012), but medieval fabric was not extensively impacted at ground and under-floor levels. By the end of the 19th century parts of the Abbey House were used by the police and parts as a court house; in 1976 the basement of the northern section of the conventual west range, now known as 'The Monastic Workshop', was converted into a meeting room for the Abbey.

Archaeological test pits in the Prior's Court December 2015

Invasive archaeological evaluation by test-pitting within the Prior's Court, Hexham Abbey was carried out over the course of three days in late December, 2015 (Fig. 3-7). The works comprised test-pit excavations to determine the archaeological potential of the site in advance of the determination of Scheduled Monument consent for groundworks associated with the proposed construction of a formal garden.

A total of four pits were excavated to depths between 0.40 and 0.80 m. Three of four test-pits produced no results of archaeological interest, encountering natural boulder clay below made gravel surfaces at depths between 0.30 – 0.49 m, while the fourth, also excavated through a compacted gravel road surface, revealed a much greater depth of mixed overburden sitting upon a stone-built feature, likely to be a drain made of re-used masonry, 0.70 m below current ground level. This, in turn, had cut two other, earlier pit- or gulley-like features of unknown character and origin.

Conclusion and Interpretation regarding the test pits

The three trenches of no archaeological interest were excavated in the west part of the Prior's Court and revealed sub-soil at relatively shallow depths, between 0.30 - 0.40 m. A fourth test-pit, excavated in the south-east part of the area, revealed a much greater depth of mixed overburden sitting upon a stone-built feature which lay 0.70 m below current ground level. This feature appeared to be a stone-capped drain constructed, at least in part, of reused masonry and with a later repair, or insertion, incorporating concrete. It is suggested that this feature is a modern drain, its projected course running between the south-west and north-east corners of the courtyard. The linear stone feature presumed to be a drain, in turn, had cut two other, earlier pit- or gulley-like features of unknown character and origin (Prior's Court, The Archaeological Practice 2016, 10).

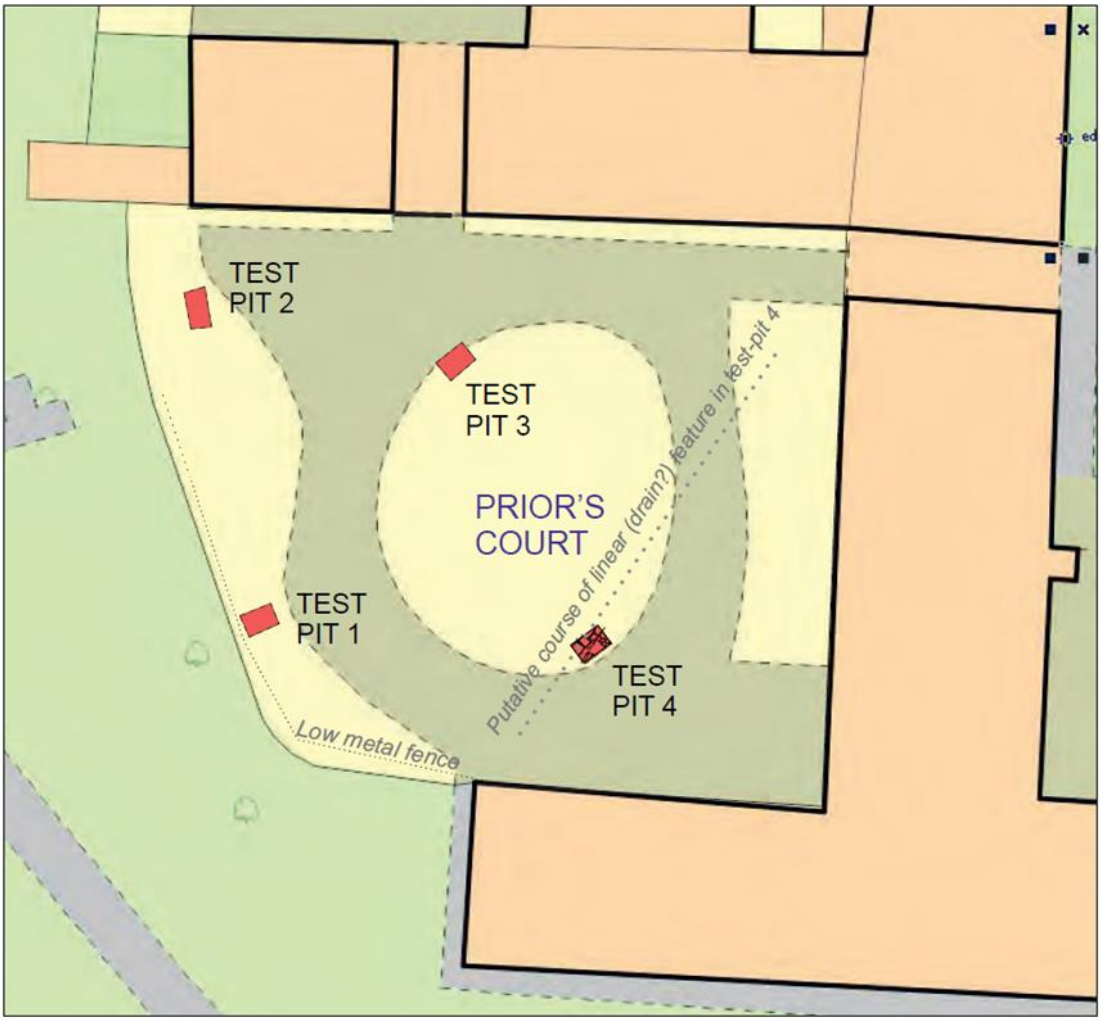

Figure 3: Position of the archaeological test-pits excavated in December 2015 within Prior's Court, Hexham Abbey (from: Prior's Court, The Archaeological Practice 2016, p. 8, Ill. 5)

Figure 4: Photographs illustrating excavation results of test pit 3 (from: Prior's Court, The Archaeological Practice 2016, p. 13, Ill. 18)

Figure 5+6: Photographs illustrating excavation results of test pit 4 (from: Prior's Court, The Archaeological Practice 2016, p. 16, Ill. 26-27)

Figure 7: Appearance of refilled test pit 3 (lower right) at the time of the GPR survey on 10/02/2016 (Photo: S. Hueglin)

Area 4 (Park)

The Abbey Grounds were remodelled in the late 18th/early 19th century as the grounds to Abbey House. In 1911 they were purchased and laid out as public park (The Hexham Parks, HE online).

Abbey House, to the south-west of and adjacent to the Abbey and also part of the Hexham estate, is shown in a drawing by Samuel Hieronymus Grimm of c. 1778 (Figure 10) with rough pasture and a narrow valley to the west (Hinds 1896). In 1792 the Hexham estate was inherited by Colonel T.R. Beaumont who made major changes to the house and grounds. In 1823 the ground to the west was described as 'a little ornamental foreground bounded by an invisible fence or haha! [sic] from the Seal' (Wright 1823). A lan by Wood of 1826 shows the L-shaped 'Abbey Ground' laid out with an approach drive from Battle Hill to the south which also forms part of a tree-lined circuit drive in the south of the grounds. A narrow belt of trees appears to mark the western boundary of the grounds with the Seal, on the line of the Halgut Burn which is culverted to the north. By 1865 (Ordnance Survey) the Abbey Grounds are indicated as extending further to the west, the boundary with the Sele marked by a wide north/south path, the Sele Walk. In c. 1869 the grounds were reduced with the construction of Beaumont Street (Local History Newsletter 2000) across the south-east corner and on the 1896 Ordnance Survey map the southern approach drive is no longer shown. In 1911 the grounds were purchased by Hexham Council, with financial assistance from Alderman T. W. Benson, for use as a public park (The Hexham Parks, HE online).

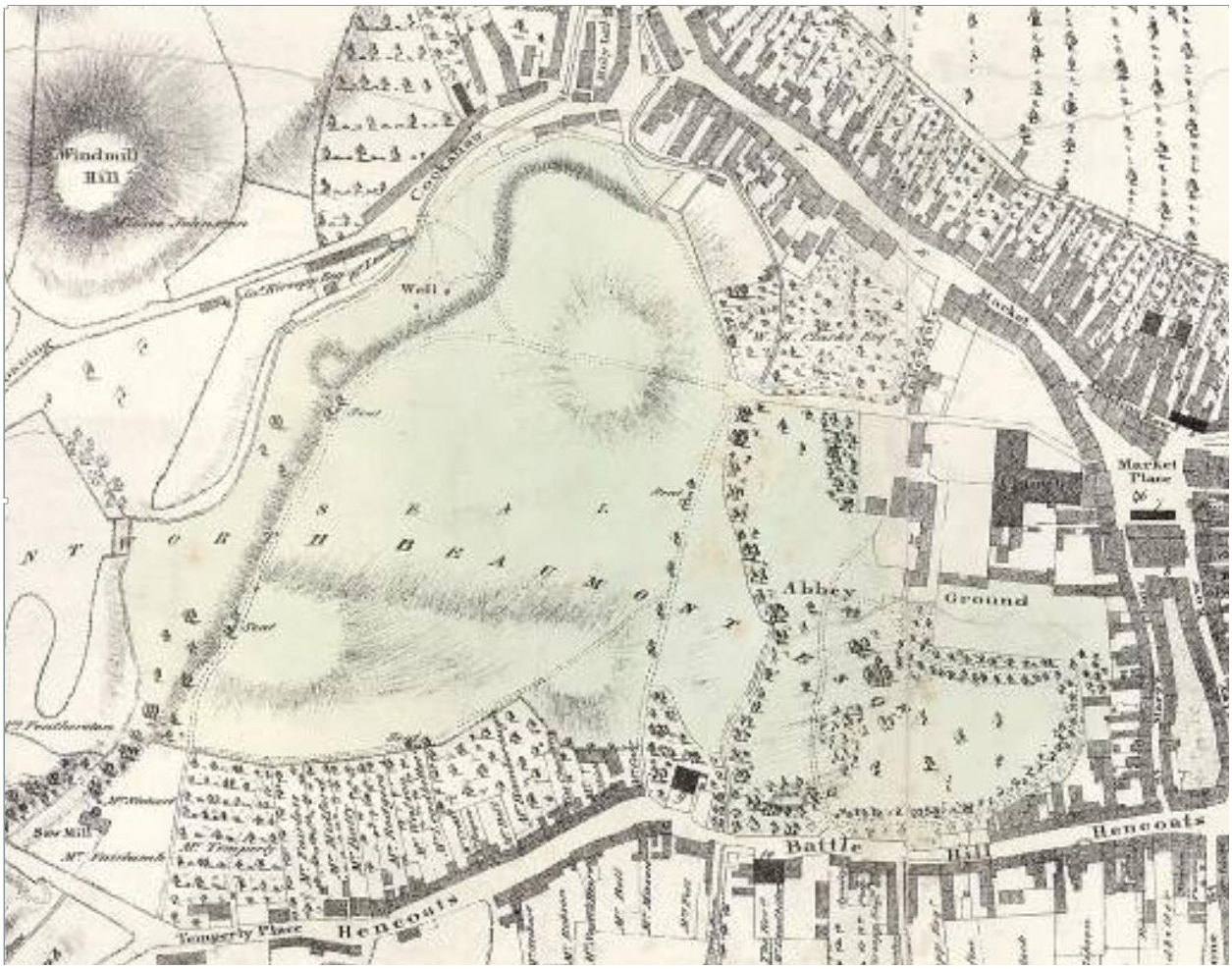

Figure 8: Detail of the Seal and the Abbey Grounds from J. Wood, Plan of Hexham 1823 (Hexham, Extensive Urban Survey, 2009, fig. 7)

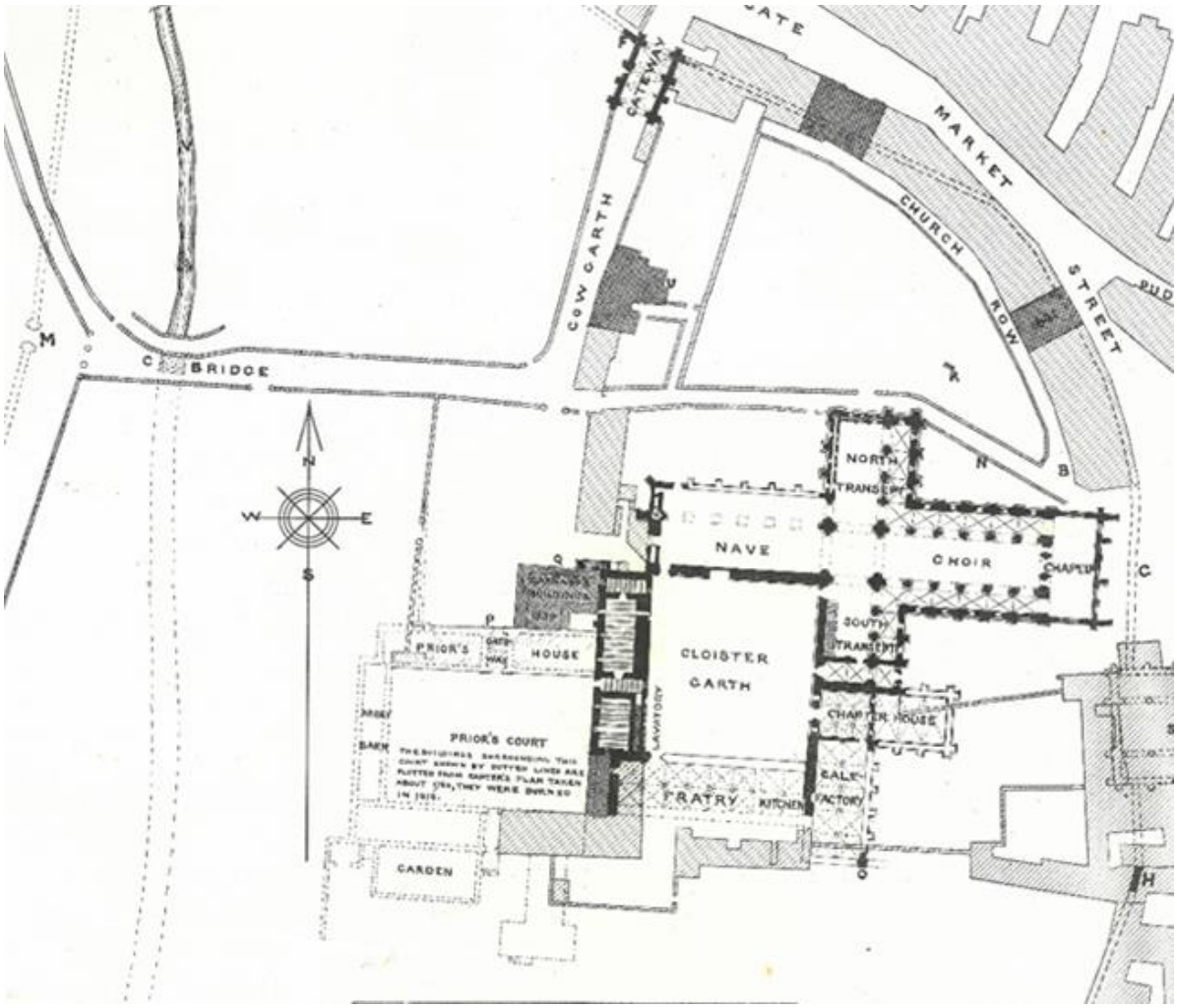

Figure 9: Probable extent of the Prior's House, later housing Hexham College, in the parkland west of Hexham Abbey (to the right of the north arrow) (Hodges 1888, Plate 53, detail).

Figure 10: Hexham Abbey, College and part of the Sele/Seal, pair of drawings by Samuel Hieronymus Grimm, c.1778 (British Library http://www.bl.uk/onlinegallery/onlineex/grimms/ontheborders/index.html). The building to the left of the tree is thought to have been a tithe barn, the one to the right a dovecote. Most of the college burned down in the late 18th c.

Research Aims and Objectives

Research Aims

- To address the call for further investigation into the sub-surface survival of parts of Wilfrid's early-medieval monastery in Hexham which is of national and international interest and significance (Hexham Extensive Urban Survey 2009, p. 27).
- To add to the so far only partial picture of the extent of the early-medieval foundation at Hexham as there are numerous alternatives for its overall layout which may include axial or non axial arrangements of churches and of associated ranges to north or south, or potentially, both (Hexham Extensive Urban Survey 2009, p. 27).
- To attain a better understanding of the development of the Church of St Andrew and ranges to the south when it was rebuilt as a priory church in the early 12th century above the foundations of the early-medieval church. It included. There is evidence that some structural remnants of the smaller 12th century ranges survive but hardly anything of the church other than some foundations (Hexham Extensive Urban Survey 2009, p. 28).
- We believe further study of Hexham Abbey and its surroundings especially with non-invasive methods has a far higher potential for investigation than previously attempted.

Research Objectives

- Conduct a geophysical survey with an appropriate level of detail and accuracy on selected areas of the site, focusing on the Abbey and the immediate surroundings in order to complement previous surveys which focussed on areas further away from the Abbey, on deeper layers and remains of possible prehistoric and Roman date.
- To verify the exact positions of walls observed in different excavations and to combine them with signals from unexcavated areas. Graves and other features with lower density should also show up. It can be expected that so far unknown features will become visible.
- To further geophysical survey methods in order to produce usable, useful data that progress our understanding of the site as well as that of other early medieval sites with similar structures (Turner, S., Semple, S. & Turner A. 2013, p. 11).

Survey Methodology

Methods – Survey Grids and Markers

A survey grid size of 30mx30m was chosen for the gradiometer and resistance surveys and was laid out using a Total Station and tapes. Each survey area was located on the National Grid using a combination of differential GPS and Total Station survey before being transferred to the project GIS. Survey markers were fixed within the tarmac or paved areas of both sites to provide a number of permanent points of reference for the survey. Due to the ferrous content of these markers all magnetically sensitive methods of survey were carried out prior to these being fixed in place. GPR survey was undertaken as a series of transect within the standard 30m x 30m grid but the length of each transect was varied to enabled the best fit within the survey area. Internal GPR surveys at Jarrow were initially conducted as a series of transects 30cm apart within the chancel of the church. Upon advice from Neil Linford at English Heritage these transects were reduced to 5cm apart and the area re-surveyed.

As far as was possible the surveys and reporting were conducted in accordance with English Heritage guidelines, Geophysical survey in archaeological field evaluation (David, Linford & Linford 2008), The use of geophysical techniques in archaeological evaluations (Gaffney, Gater & Ovenden 2002) and the Archaeology Data Service Guide to Good Practice: Geophysical Data in Archaeology (Schmidt & Ernenwein 2011)

Figure 11: All areas were located by differential GPS. A. Turner on 11/02/2016 in area 1a (Cloister) (Photo: S. Hueglin)

Methods – GPR

Ground Penetrating Radar (GPR) is a very high frequency EM technique used to produce high-resolution images from the subsurface. GPR is used for both the detection of material remains and the characterisation of subsurface stratigraphy. The GPR surveys were carried out using an Utsi GV3 single channel GPR controller equipped with a 400MHz antenna. For the survey four areas of zigzag traverses (Areas 1a, 1b, 3 and 4b) were surveyed at half metre intervals *(Figures 12-17)*. Samples readings were taken at 0.05 metre intervals along each traverse. As with all GPR survey the computation of depth is reliant on an understanding of the velocity of the electro-magnetic signal through the material being surveyed. Since GPR signal attenuation is greater in soils with a high conductivity (Linford 2006, 2236), reference to soil and geological data was made for each survey area. GPR was used for external survey and subject to the limitations caused by attenuation due to ground moisture, detection of sub-surface features was possible to depths of up to 2.07 metres. GPR was the only technique capable of detecting sub-surface features in external areas laid with concrete or tarmac. Given the nature of the site and the existing information regarding the depth of burial of remains, penetration to such a depth was probably unnecessary. Calculation of velocity estimates for the sites was done using hyperbola matching during the processing stage. Analysis was undertaken using a combination of ReflexW and Reflex3D software. Data within this report is presented as a series of either X or Y scans and combined XY slices.

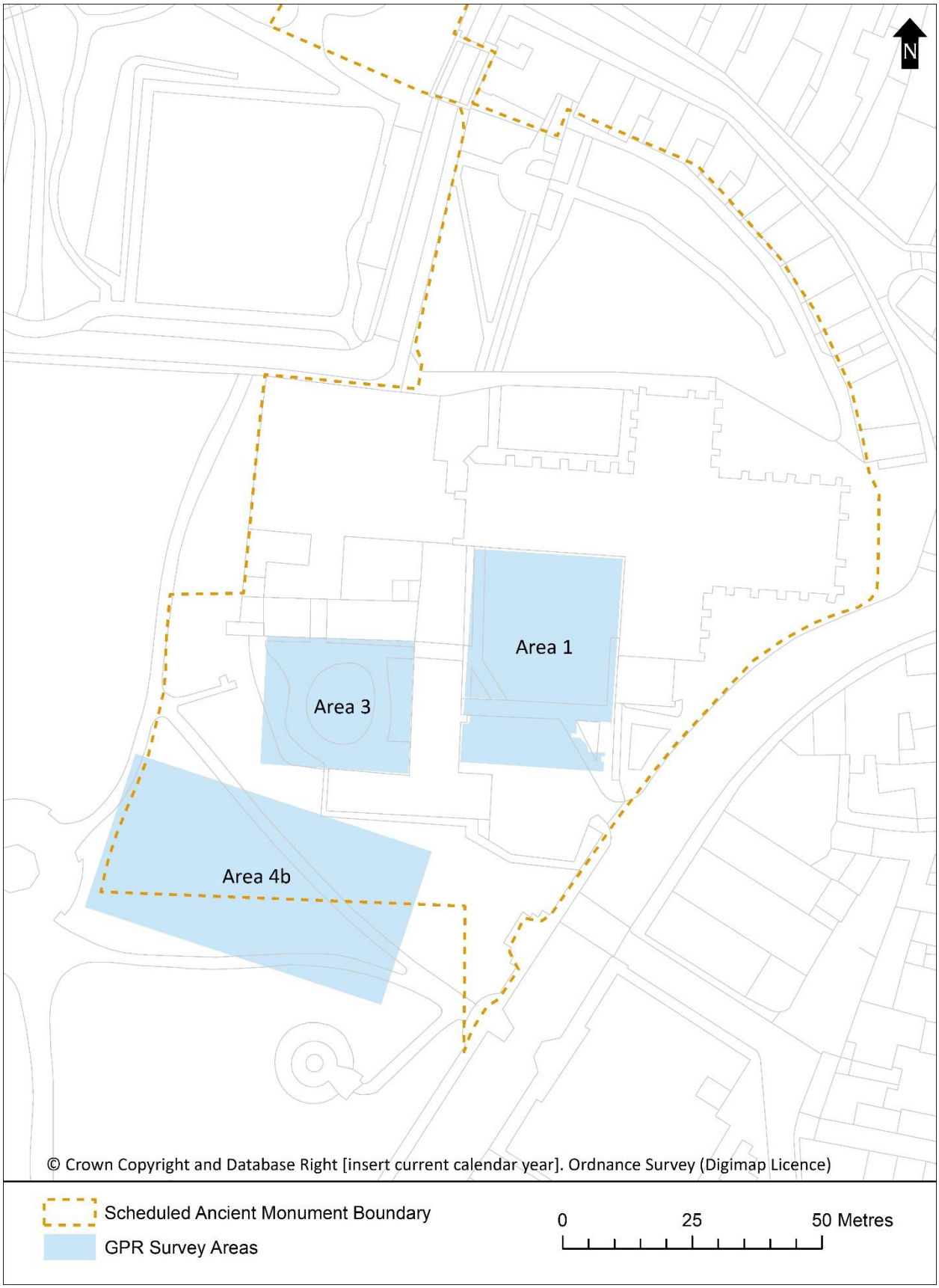

Figure 12: Location of areas 1a (Cloister), 1b, 3 (Prior's Court) and 4b (Park) of the GPR survey (Graphics: A. Turner)

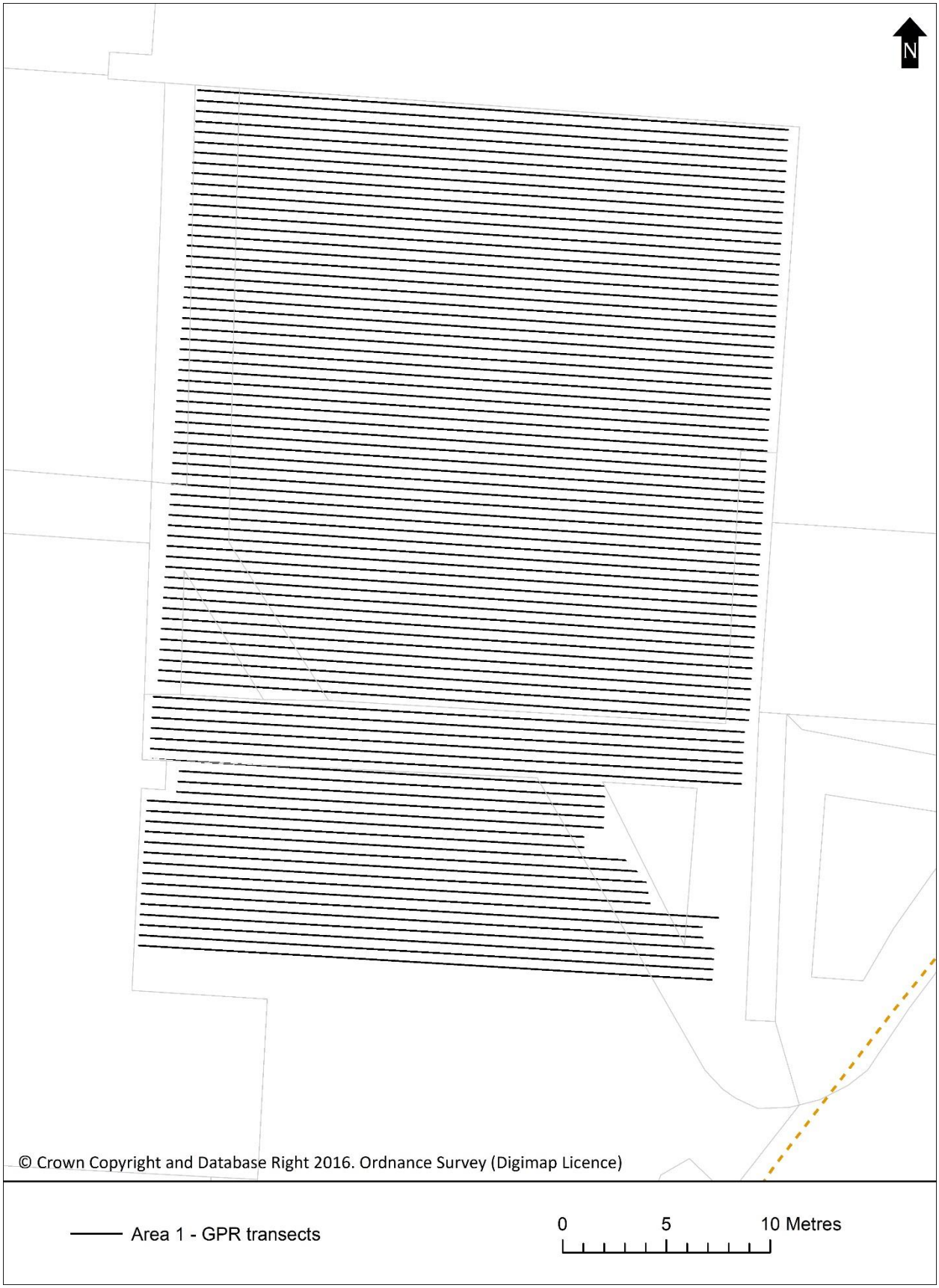

Figure 13: Ground Penetrating Radar, survey transects in areas 1a (Cloister) and 1b (Graphics: A. Turner)

Figure 14: Ground Penetrating Radar, survey transects in area 3 (Prior's Court) (Graphics: A. Turner).

Figure 15: Ground Penetrating Radar, survey transects in area 4b (Park) (Graphics: A. Turner).

Figure 16: S. Hueglin pulling the GPR sledge across area 1a (Cloister) 9/02/2016 (Photo: D. Astbury)

Figure 17: S. Hueglin and A. Turner taking GPR readings, area 1a (Cloister) 9/02/2016 (Photo: D. Astbury)

Methods – Fluxgate gradiometer survey

Although fluxgate gradiometer survey is an established and trusted technique for the rapid detection of sub-surface archaeology in non-igneous geologies, it has severe limitations in close proximity to the plethora of underground services and metallic street furniture found at Hexham Abbey. The large number of trees in the park coupled with street lighting and a number of metal benches meant that the gradiometer survey for Hexham Abbey was limited to the open areas of the Cloister and the Park.

To control the position of the measurements separate 30m grids were constructed in GIS for the Park survey areas prior to the survey, and laid out in the field using differential GPS. The park survey area, immediately west of the Abbey precinct, was hampered by multiple obstacles including trees, benches, paths, and a bandstand. This led to numerous partial grids and the recording of dummy-logs.

Methods – Fluxgate gradiometer common methodology

The survey was carried out using a Bartington Grad 601/2 fluxgate gradiometer. In accordance with accepted practice initial (EH 2008, 4) initial data collection was done using a one metre traverse and 0.25 metre sample within a framework of 30m x 30m grids.

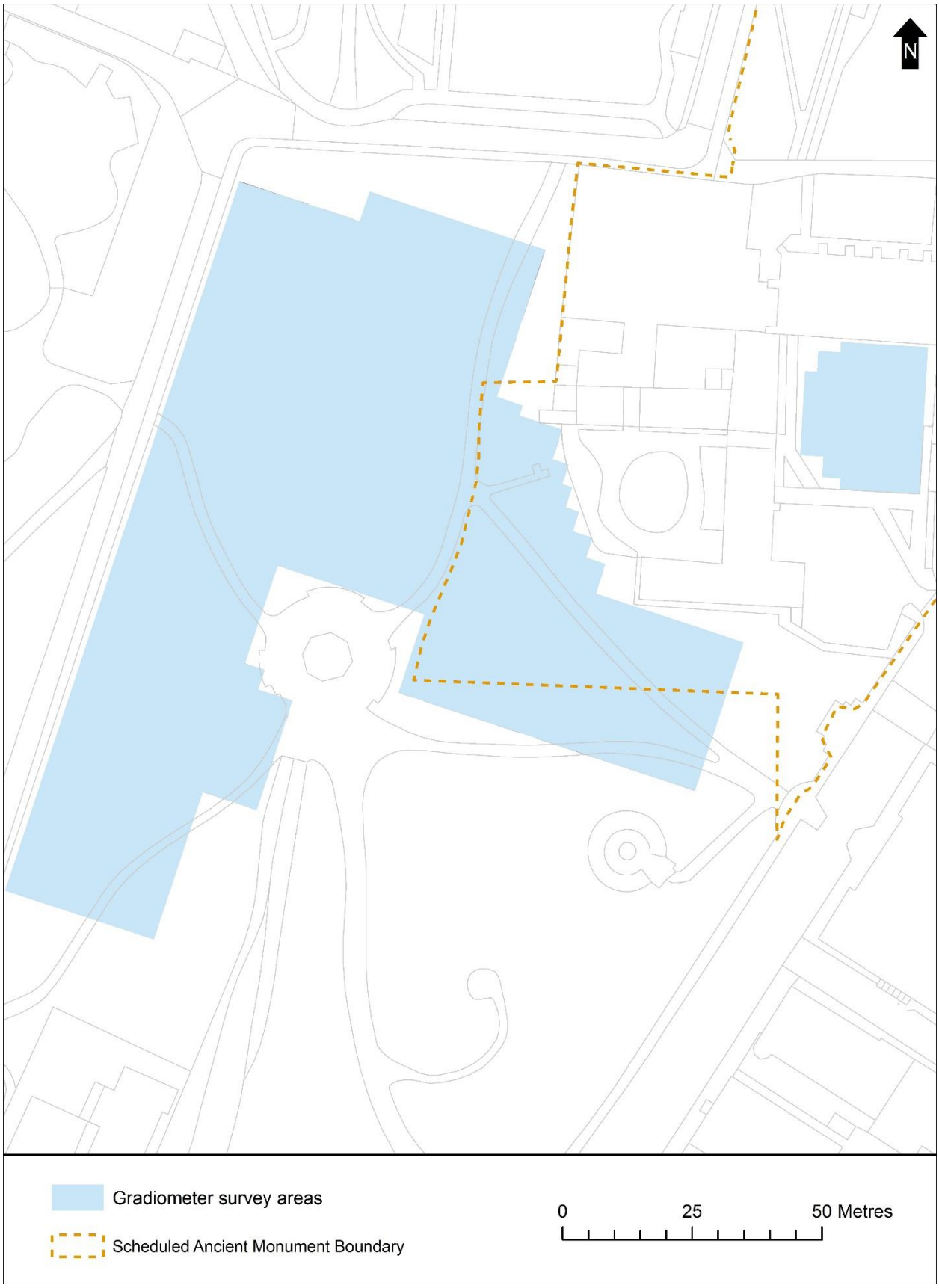

Figure 18: Location of gradiometer survey in areas 1a (Cloister) and 4 (Park) (Graphics: A. Turner)

Figure 19: D. Astbury taking gradiometer readings in area 1a (Cloister) 9/02/2016 (Photo: S. Hueglin)

Figure 20: D. Astbury and R. Young doing gradiometry in area 4 (park) 24/04/2017 (Photo: S. Hueglin)

Figure 21: D. Astbury taking gradiometry readings in area 4 (park) 28/04/2017 (Photo: S. Hueglin)

Methods – Resistivity survey

In 2017 a resistivity survey was made in the Cloister area (1a) at Hexham Abbey. The area chosen was informed by the 2016 GPR survey (*Figure 24*). At the western edge of the survey a trees presented a physical obstacle as well was obscuring the results. The Cloister area (1a) was also surveyed because of the extant monastic remains documented in Hodges' and Gibson's excavations in the 1900s (Hodges & Gibson 1912).

Methods – Resistivity common methods

Resistance survey was carried out using a Geoscan RM15 Advanced equipped with a MPX15 multiplexer. The data were collected on a standard 30m x 30m grid using 0.5 metre traverses and 0.5 metre between samples. Due to the slowness of this technique it wasn't used as widely as the other two methods.

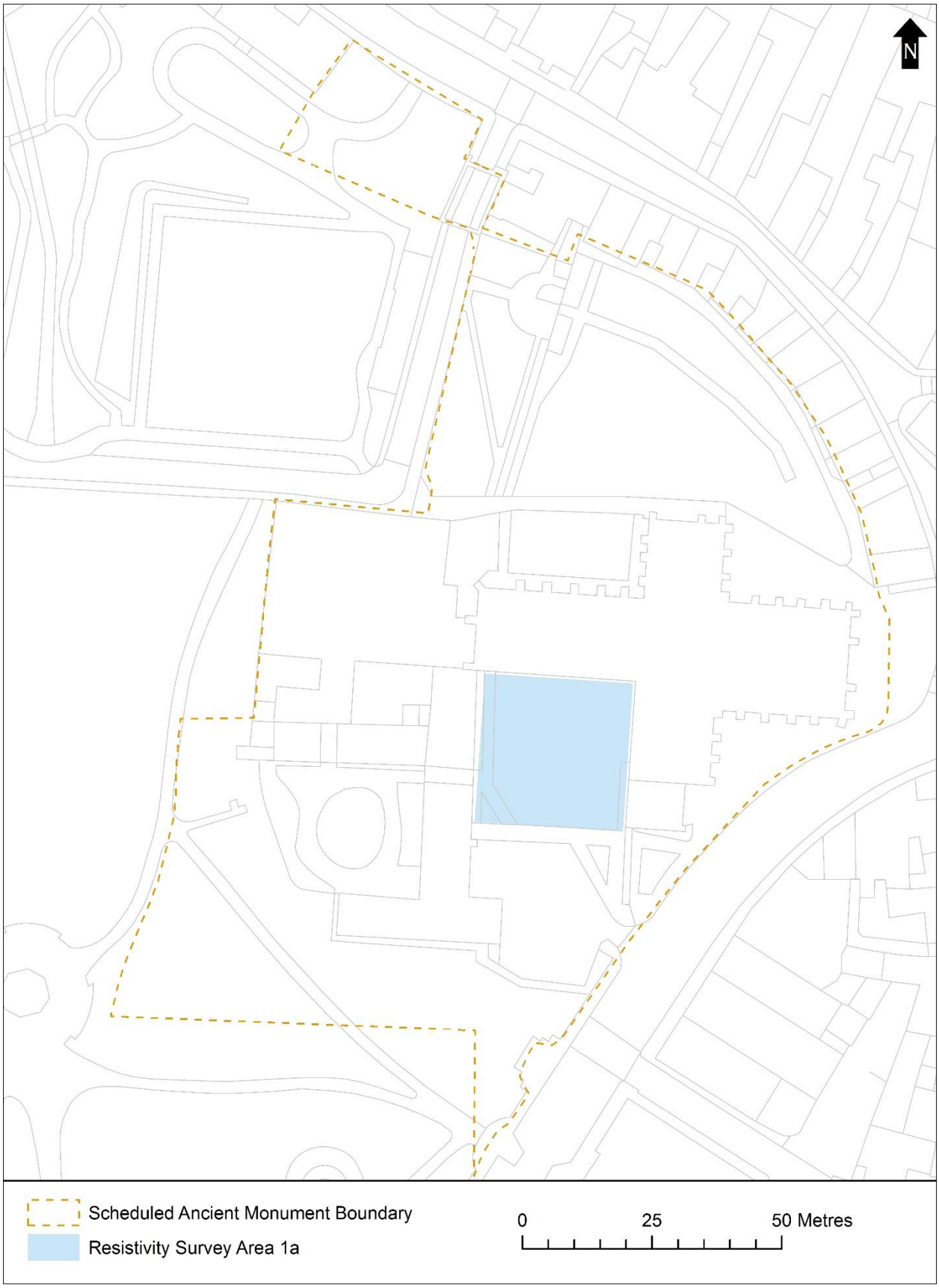

Figure 22: Location of the resistivity survey in area 1a (Cloister) (Graphics: A. Turner)

Data processing and presentation

Gradiometer and Resistivity Survey

The data from both the gradiometer and resistivity surveys was processed and analysed using Geoplot 3.0v in combination with modern and historic mapping data in ArcGIS. The integration of digital output from the geophysical survey with the geospatial and cartographic data within the underlying GIS enable overlay comparison of the results from the different geophysical survey methods. This also enabled the rapid cross-correlation with known features on historic Ordnance Survey and Non-Ordnance Survey maps.

GPR

The GPR data was processed using a combination of Reflexw, Reflex3Dscan and ArcGIS. British Geological Survey data was used in both the assessment of field survey methodology and the analysis of the final survey data. The output from the GPS survey consisted of a sequence of vertical Z slices from each survey plus a sequence of XY plan slices for each of the survey areas. Both these outputs have been used in the interpretation and are presented as sequenced plots with each of the survey areas. The use of MPG output from Reflex 3D was a particularly useful tool when used in conjunction with Video to Picture Image Convertor, a freeware utility that allows for the rapid production of slices from GPR sequences. Timing of each sequence slice was determined by a combination of the step rate for output from ReflexW and the frame rate for conversion from digital video to digital stills. Correct numbering of each slice with the time/depth estimate was achieved using 'Total Commander' file management software. These sequences are presented with each relevant section.

The results for all methods are presented as an interpretive overlay with features numbered on the illustrations. A number of features are represented in the results of more than one survey methodology. To help comparison of such results a single number is used for each of these common features. Overlays are presented for each individual method and are then compiled into a single interpretation of the final results for the combination of survey techniques. Where appropriate these interpretations are also presented with relevant historical maps and data derived from excavation plans. These are use as backdrops to for each interpretation to better emphasise the correlation with already known features and highlight those previously unknown features revealed during the surveys.

Survey Results and Interpretation

Fluxgate Gradiometer Survey – Results and Interpretation

Area 1a

A large service pipe (feature 3) can be seen running east to west across the whole survey area. Feature 3 was also detected in the GPR and resistivity surveys. Features 43 are the dipolar responses to the substantial amount of ferrous litter within the survey area.

Area 4

Features 41 represents the existing paths within the survey area. Features 42 are the alignment of former paths. These coincide with entrances marked on earlier maps. Features 43 are the dipolar responses to the substantial amount of ferrous litter within the survey area.

Figure 23: Gradiometry results in area 1a (right) and in area 4 (left) (Graphics: A. Turner)

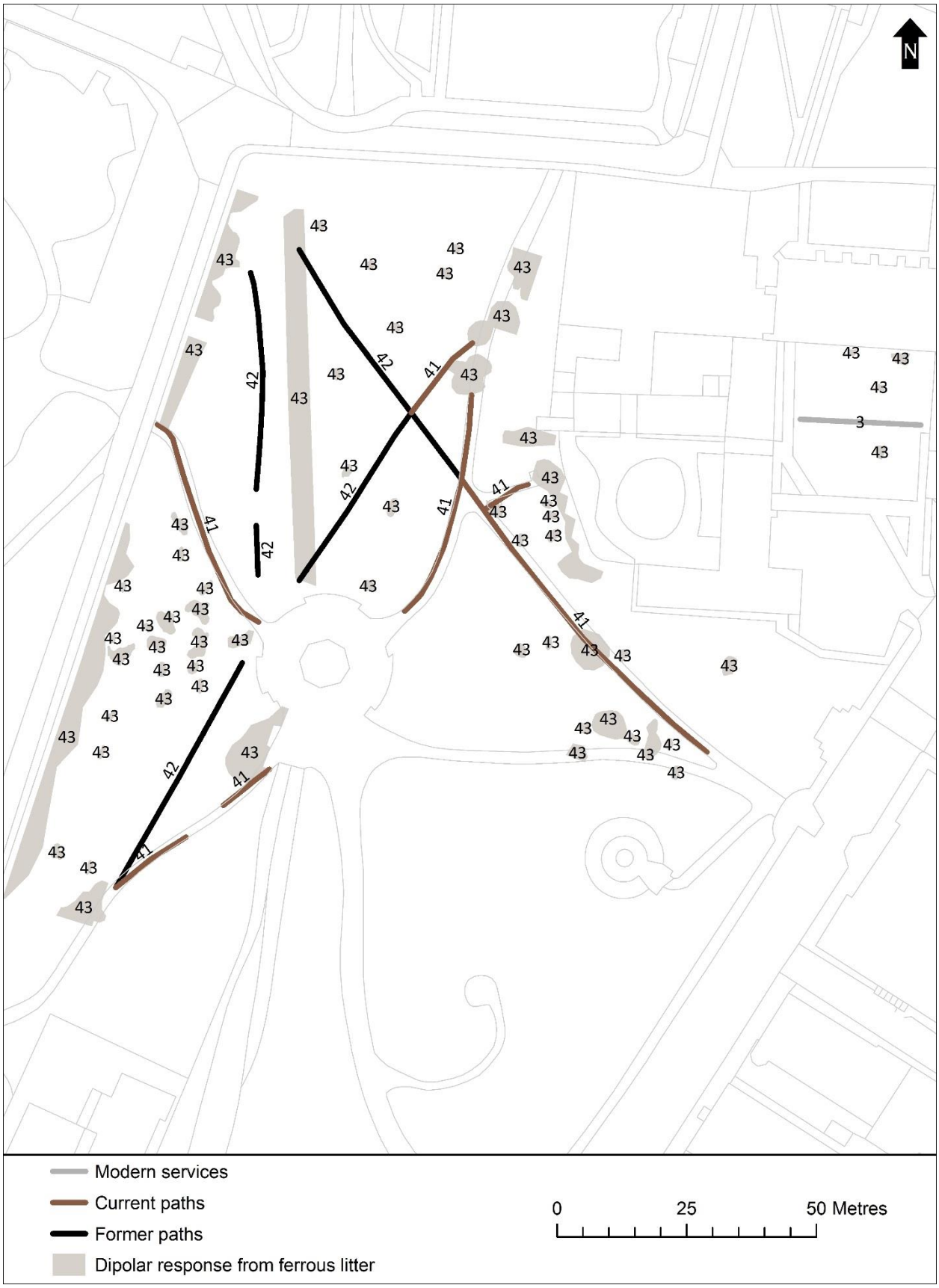

Figure 24: Gradiometry interpretation in area 1a (right) and in area 4 (left) (Graphics: A. Turner)

Ground Penetrating Radar (GPR) – Results and Interpretation

Estimated depth c. 0.2 metres in areas 1a, 1b, 3 and 4b (Figures 25+26)

Features 1, 2, 3 and 4 are all service hatches for modern pipework beneath the cloister. Feature 5 was an area of disturbed ground and probably represents the spoil from the excavations of the walls excavated in 1909 (Taylor and Taylor 1965-78, 299, Fig. 130). Feature 6 was an area of paving associated with the entrance to the new exhibition space to the southeast of the Abbey. Feature 7 was a tarmac path surrounding a central flower bed. This feature was higher reflective and produced a persistent response at all but the lowest levels. Feature 8 was an area of paving associated with access to the archway between buildings to the west of the Abbey. Features 9 and 10 were the modern paths within the area of parkland to the south of the Abbey. There is a slight variance between the plotted result and the Ordnance Survey Mastermap layer. This is partly due to the distortion caused by the east to west downward slope. Feature 11 is a linear feature that runs parallel to the pathway south of the cloister and returns at right angles parallel to the west front of the building to the west of the Abbey. Its alignment coincides with the conjectured line of the Romanesque church and monastic remains shown in Cambridge and Williams (1995, Fig. 18). This feature was also detected by the resistivity survey. Features 12 and 13 are a modern pipe that crosses between the Abbey and its ancillary buildings to the east. This was also detected by the gradiometer and resistivity surveys.

Estimated depth c. 0.4 metres in areas 1a, 1b, 3 and 4b (Figures 27+28)

Features 5-13 inclusive are also present at this level. Feature 5, however shows a greater spread than at the 20cm level. Features 14 and 15 are services beneath the car park in Area 1b and are associated with feature 44, a drain running parallel to the pavement on the eastern side of the car park. Feature 16 appears to be the interface between edge of the flower bed and the surrounding circular lawn within Area 3. Feature 18 appears to be the remains of a former, no longer visible, path in Area 4 the parkland to the south of the Abbey.

Estimated depth c. 0.6 metres in areas 1a, 1b, 3 and 4b (Figures 29+30)

Feature 17 persists from the 40cm level and now has a relationship with further services 17, 19 and 20. These appear to be drainage from the building to the main outlet feature 21. Feature 22 would also appear to link-up with feature 21 providing draining for the building in the southeast corner of the garden. Feature 18 in area 4 persists from the 40cm level but is now truncated to the west. Feature 28 is a service drain in the northeast corner of Area 1, the car park to the south of the Abbey. Feature 23-27 inclusive represent the remains of a structure seen in 1909 and illustrated on Taylor and Taylor's plan of excavation around the Abbey. This is associated with Feature 5, the area of disturbance to the north of the cloister.

Estimated depth c. 0.8 metres in areas 1a, 1b, 3 and 4b (Figures 31+32)

Features 17 and 19-28 inclusive persist from the 60cm level.

Estimated depth c. 1 metres in areas 1a, 1b, 3 and 4b (Figures 33+34)

Features 22-24 inclusive and feature 28 persist from the 80cm level. Feature 29 may be an earlier service pipe within Area 3.

Estimated depth c. 1.20-1.60 metres in areas 1a, 1b, 3 and 4b (Figures 35-38)

Feature 30 seems to be the remnants of an earlier surface that aligns with the path surrounding the building to the south of the Abbey. The area east of this feature returned a more neutral response and may reflect re-landscaping of the area after the destruction of the building by fire in 1818.

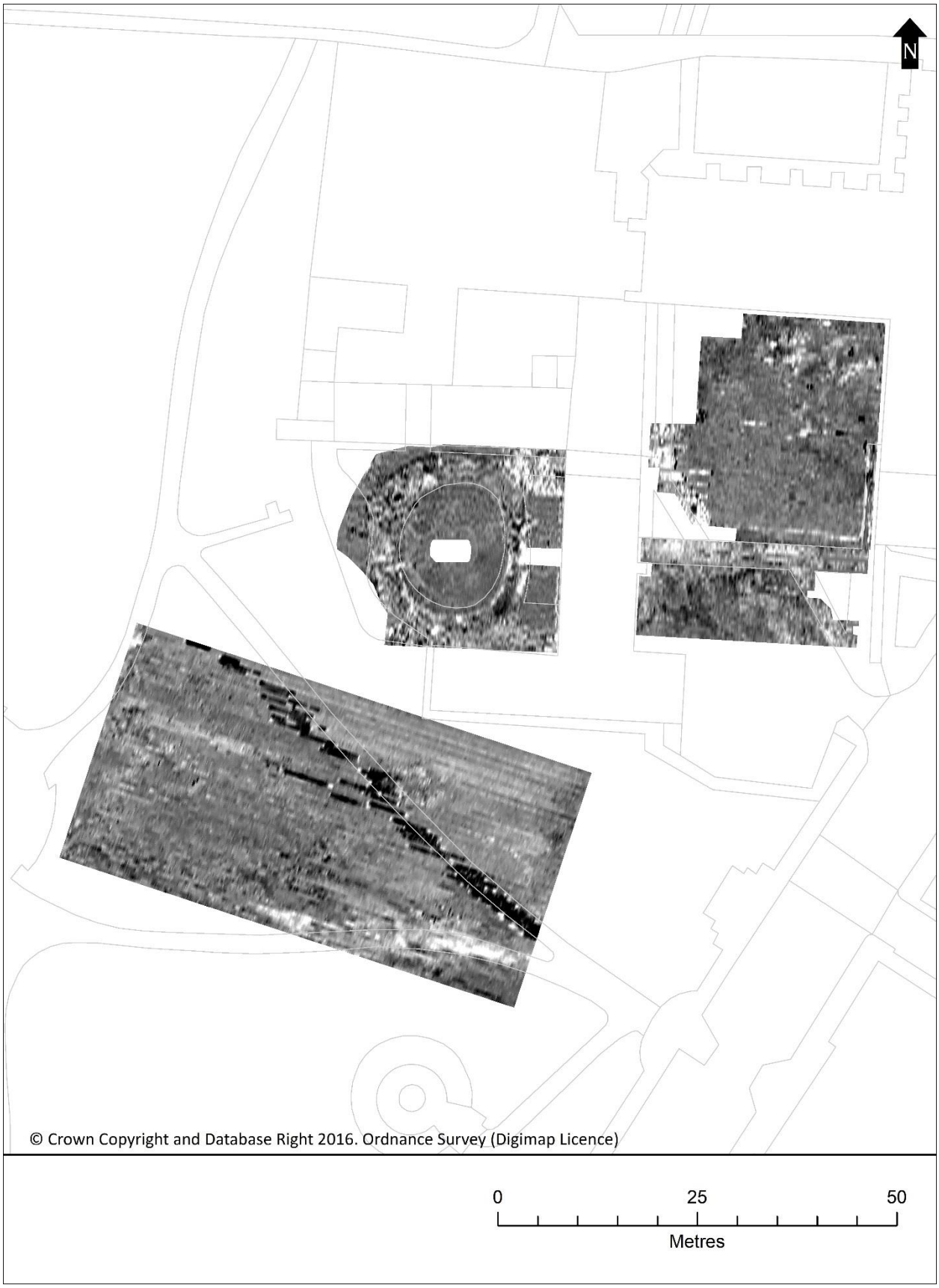

Figure 25: GPR results -0.2 m in Areas 1a, 1b, 3 and 4b (Graphics: A. Turner)

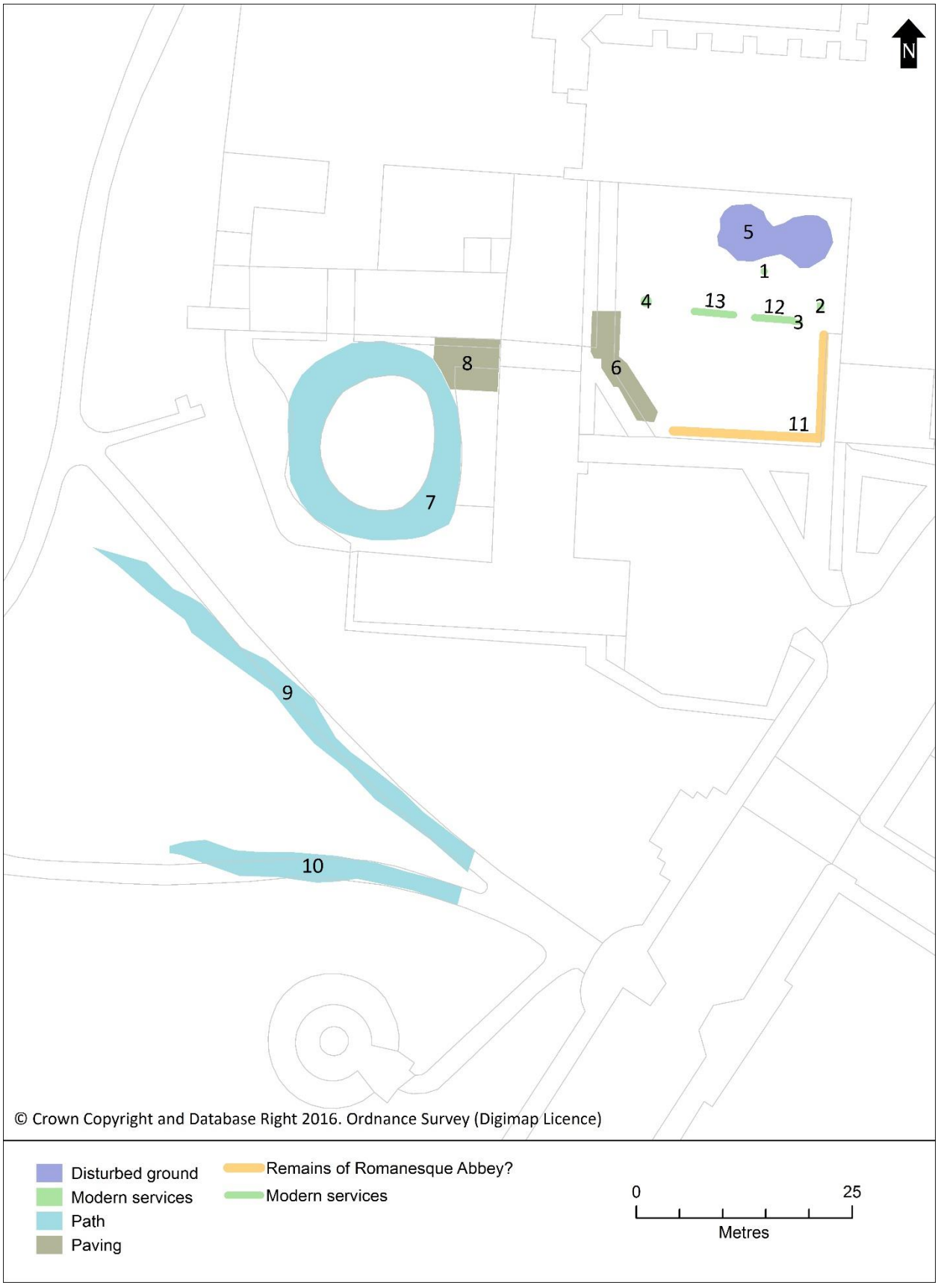

Figure 26: GPR interpretation -0.2 m in areas 1a, 1b, 3 and 4b (Graphics: A. Turner)

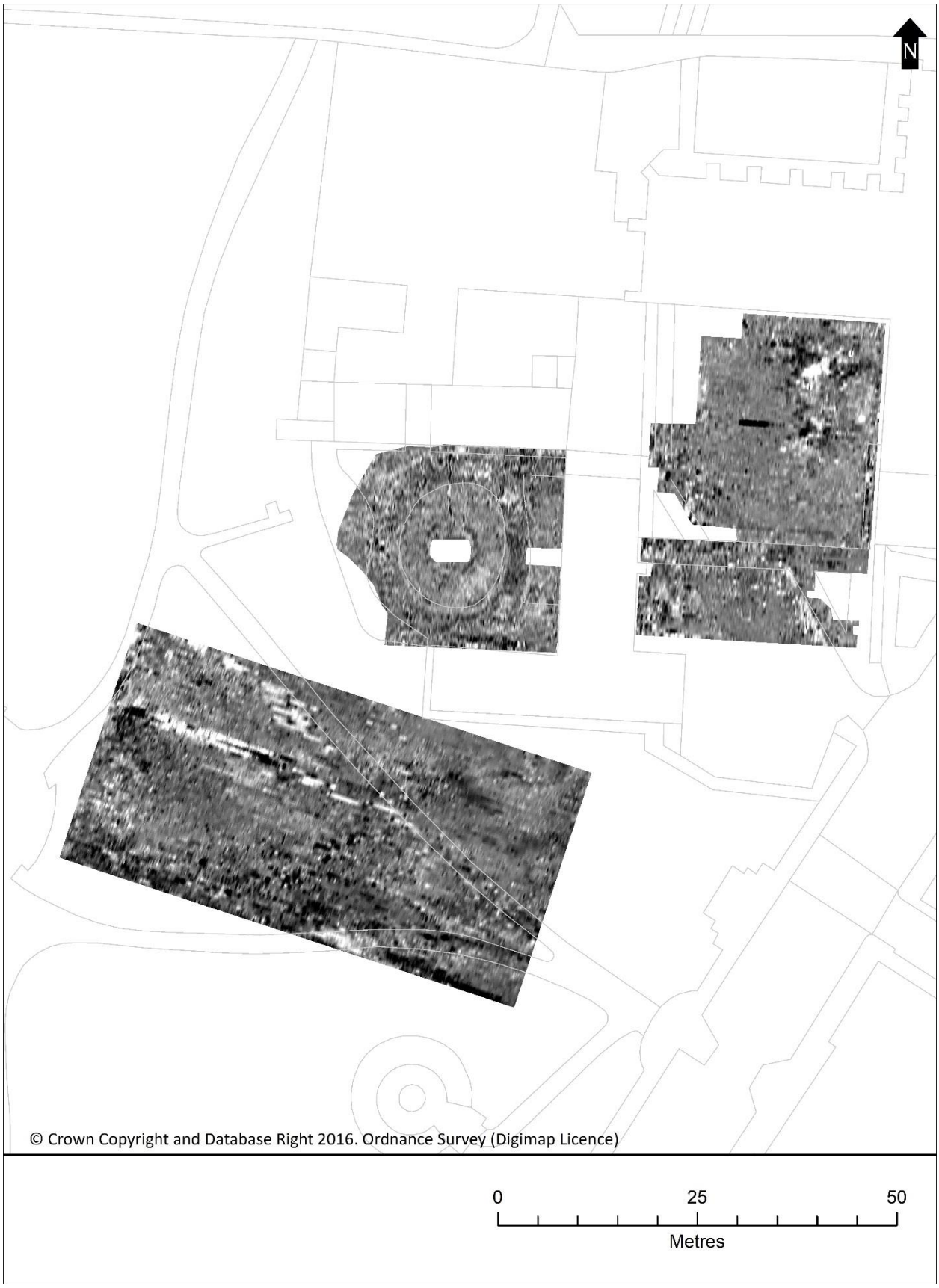

Figure 27: GPR results -0.4 m in areas 1a, 1b, 3 and 4b (Graphics: A. Turner)

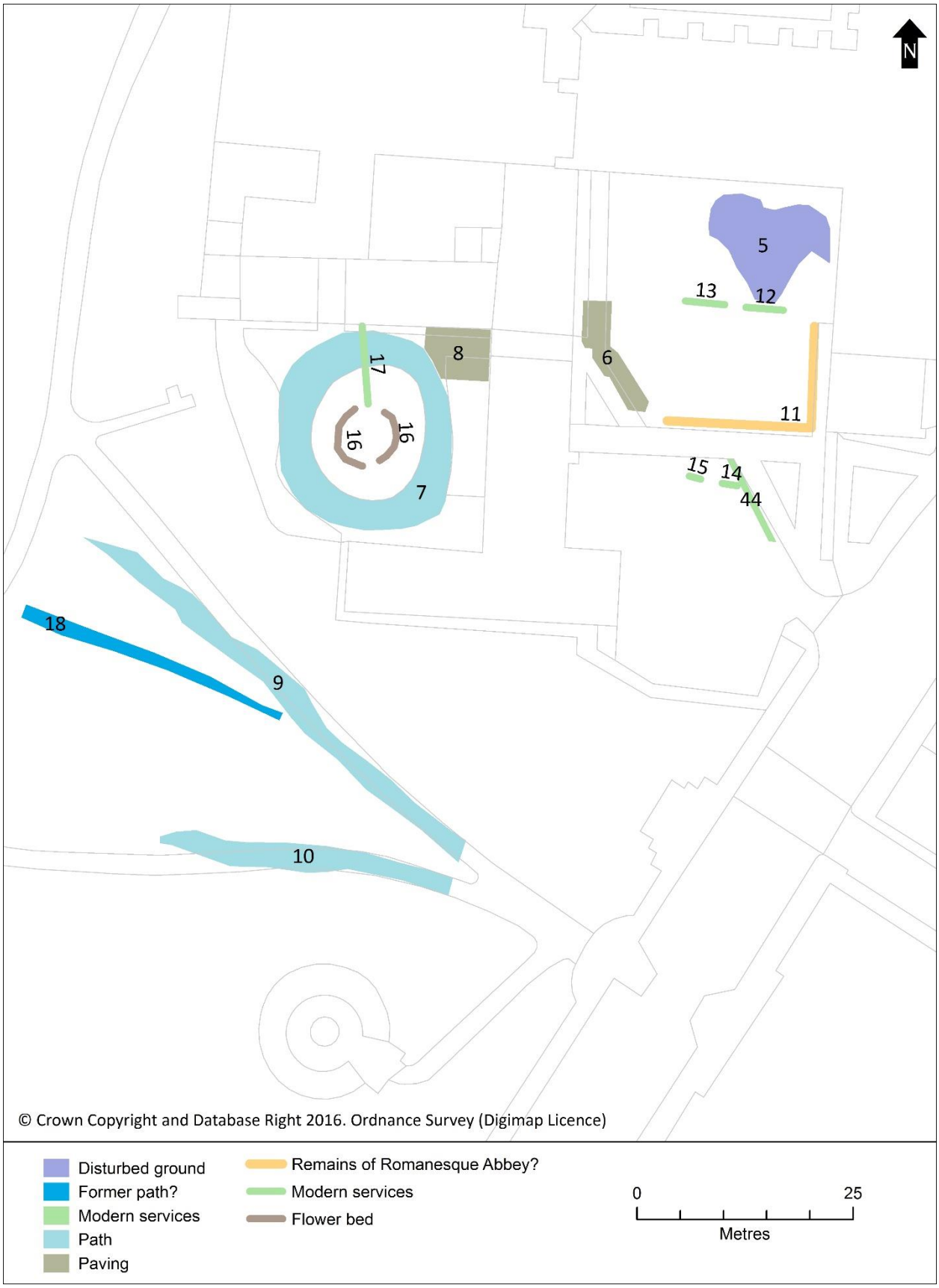

Figure 28: GPR interpretation -0.4 m in areas 1a, 1b, 3 and 4b (Graphics: A. Turner)

Figure 29: GPR results -0.6 m in areas 1a, 1b, 3 and 4b (Graphics: A. Turner)

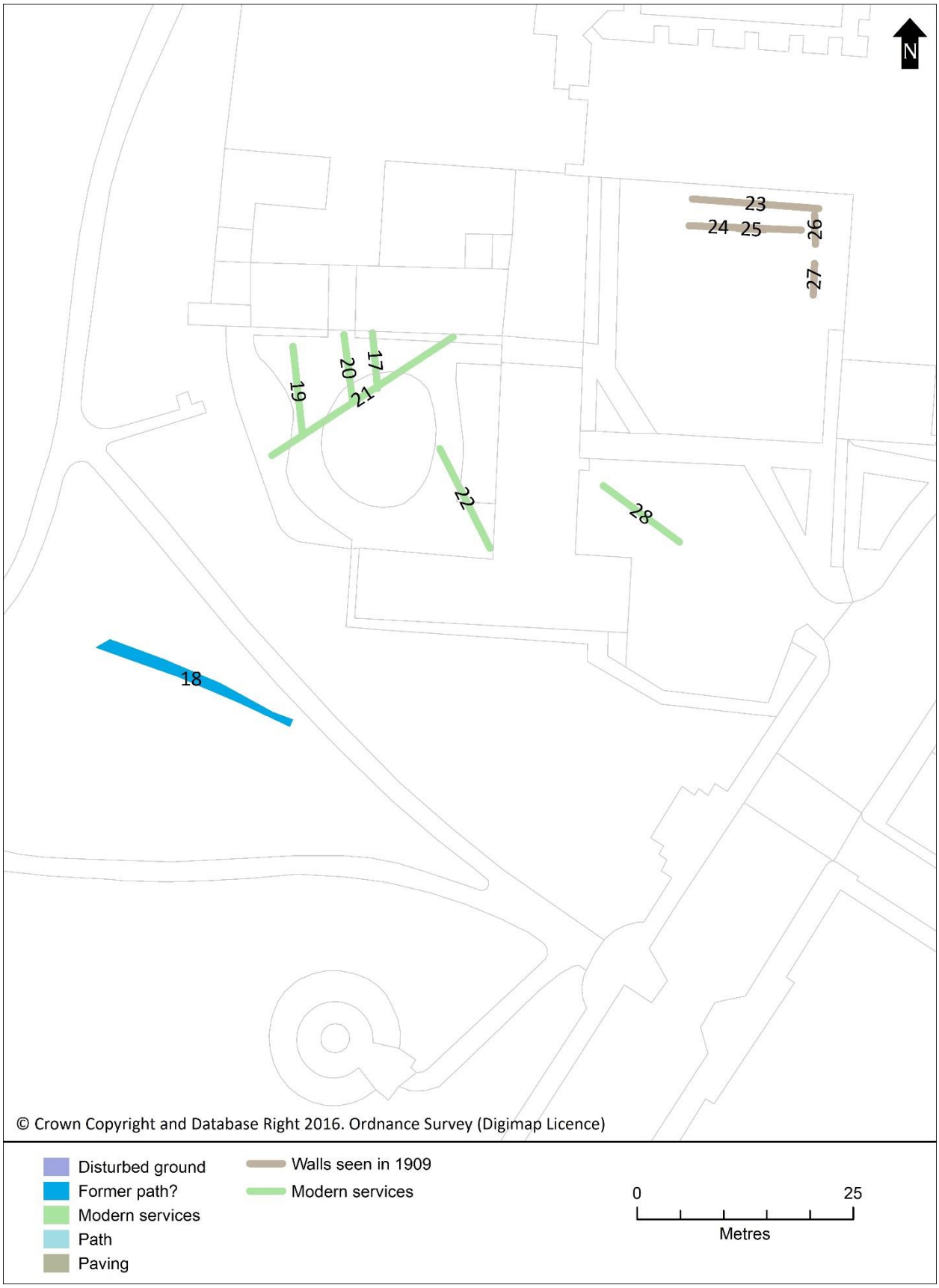

Figure 30: GPR interpretation -0.6 m in areas 1a, 1b, 3 and 4b (Graphics: A. Turner)

Figure 31: GPR results -0.8 m in areas 1a, 1b, 3 and 4b (Graphics: A. Turner)

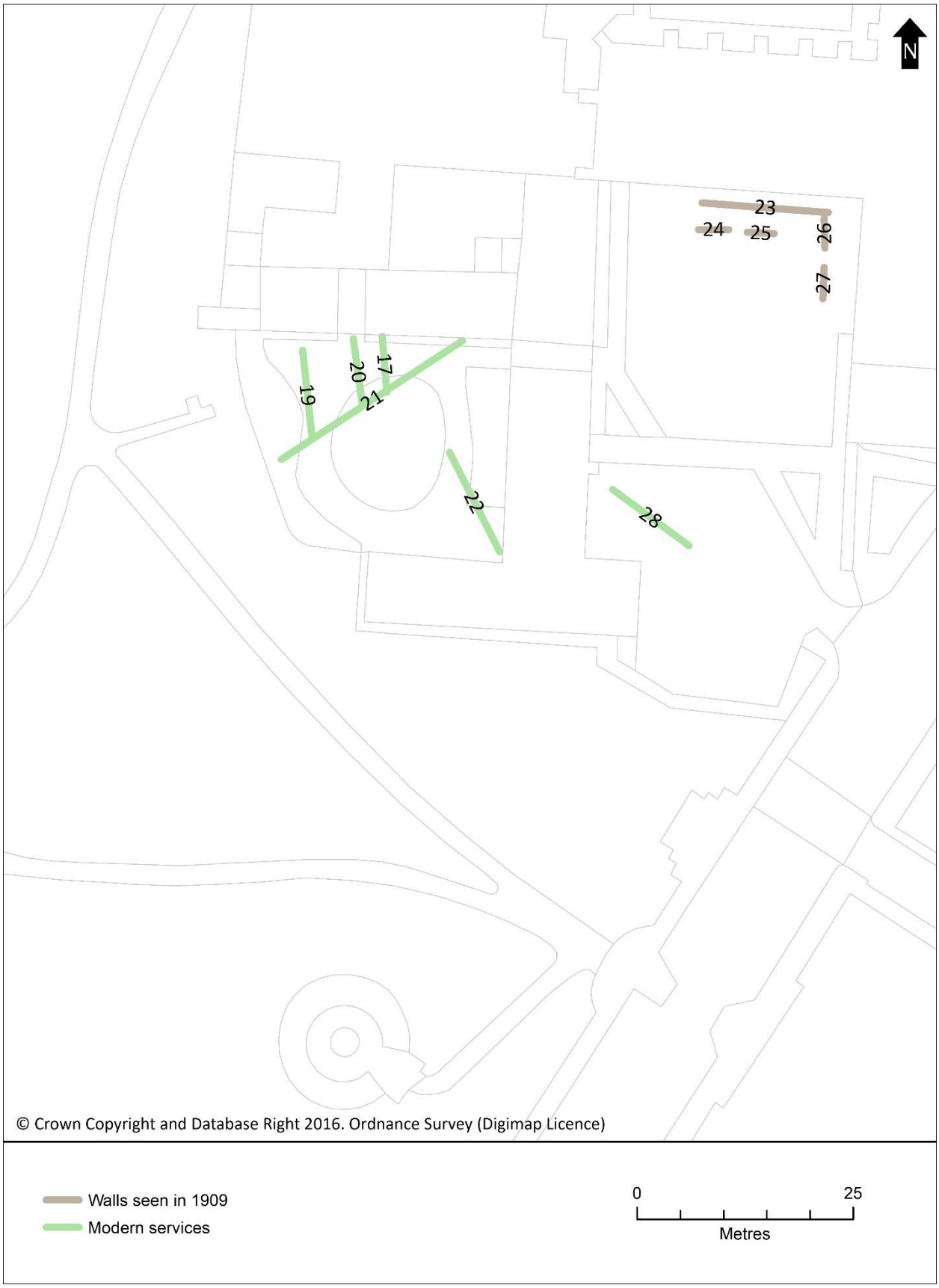

Figure 32: GPR interpretation -0.8 m in areas 1a, 1b and 3 (Graphics: A. Turner)

Figure 33: GPR results -1 m in areas 1a, 1b, 3 and 4b (Graphics: A. Turner)

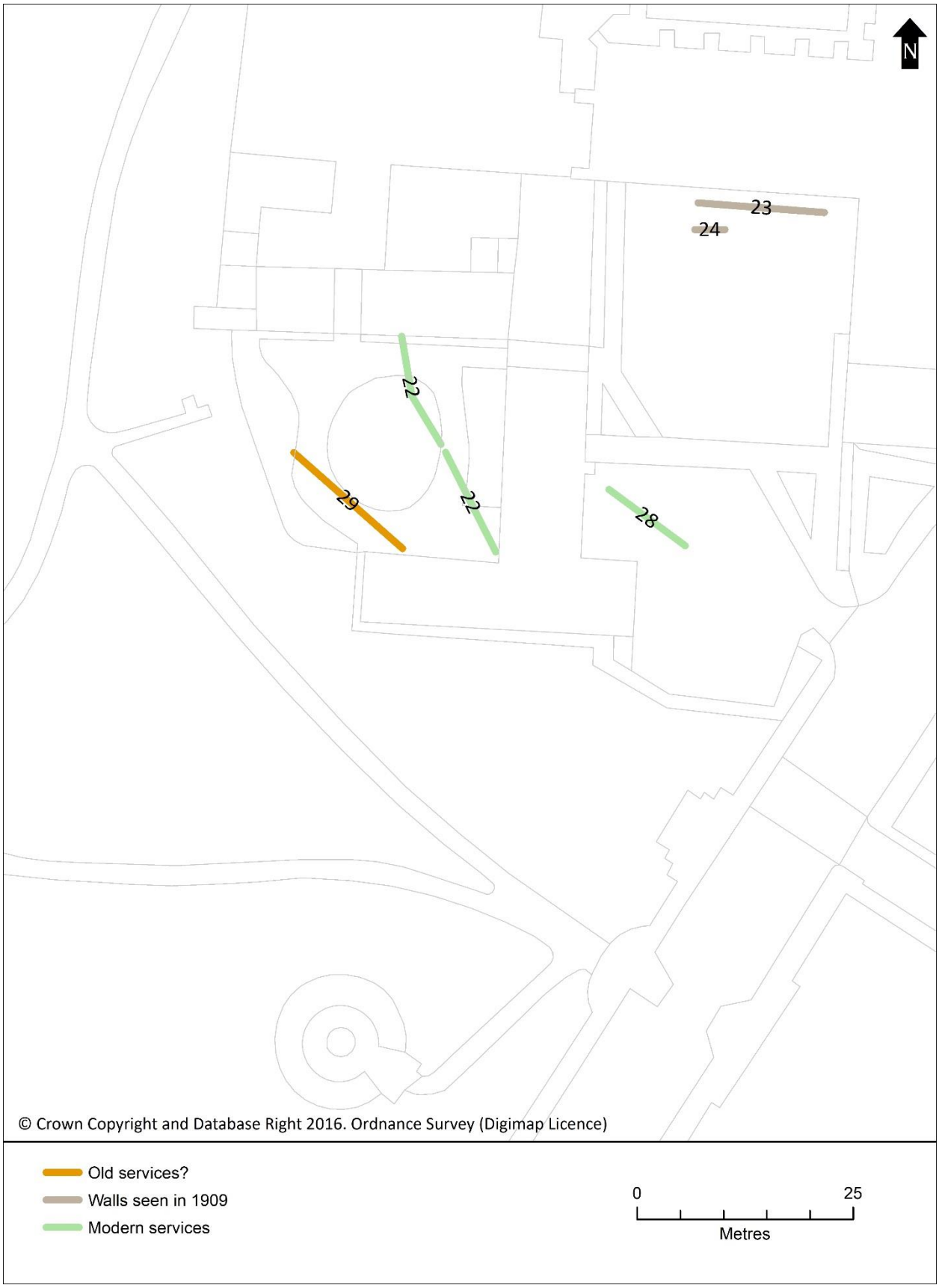

Figure 34: GPR interpretation -1 m in areas 1a, 1b and 3 (Graphics: A. Turner)

Figure 35: GPR results -1.20 m in areas 1a, 1b, 3 and 4b (Graphics: A. Turner)

Figure 36: GPR results -1.40 m in areas 1a, 1b, 3 and 4b (Graphics: A. Turner)

Figure 37: GPR results -1.60 m in areas 1a, 1b, 3 and 4b (Graphics: A. Turner)

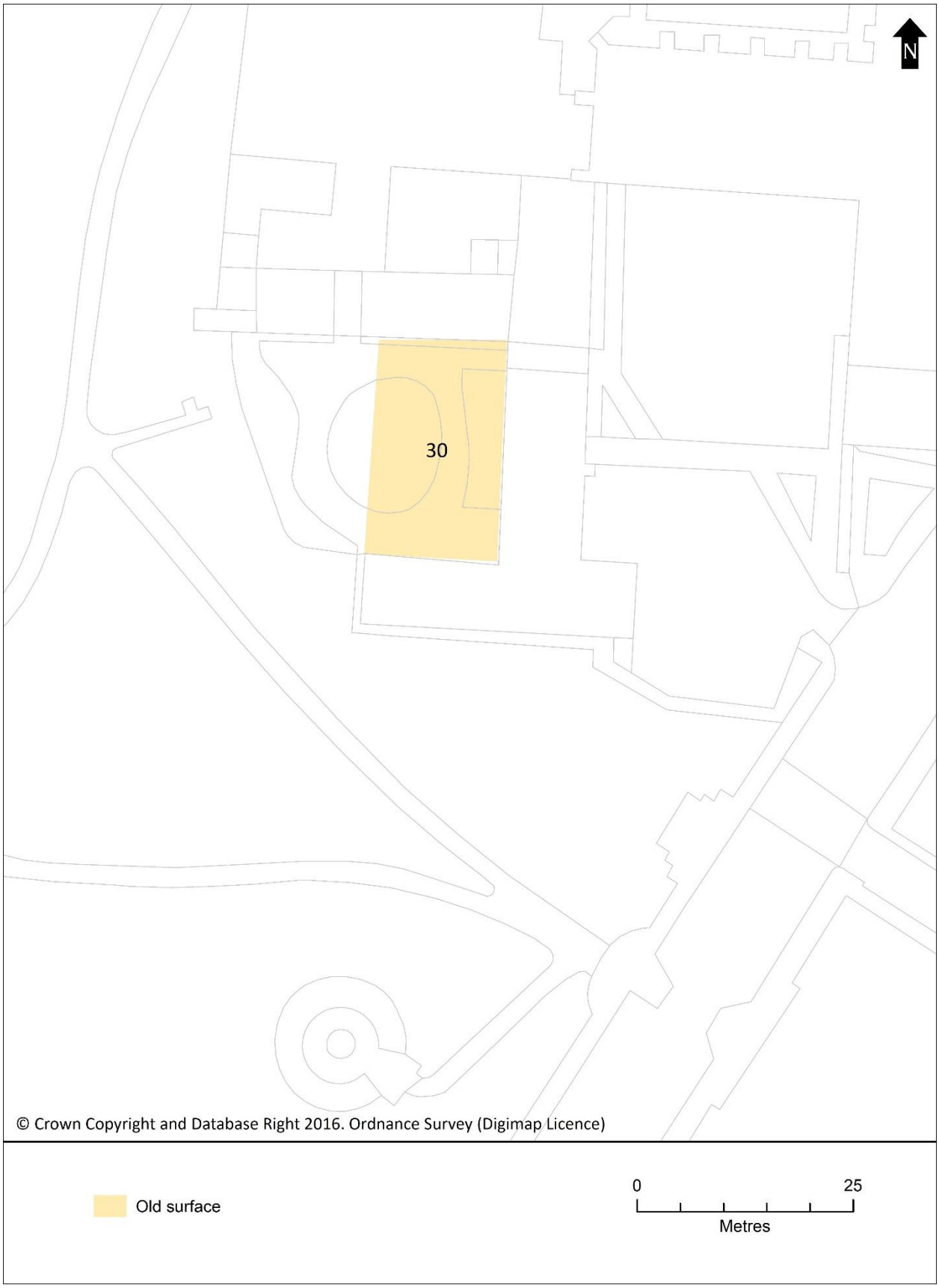

Figure 38: GPR interpretation -1.20-1.60 m in area 3 (Graphics: A. Turner)

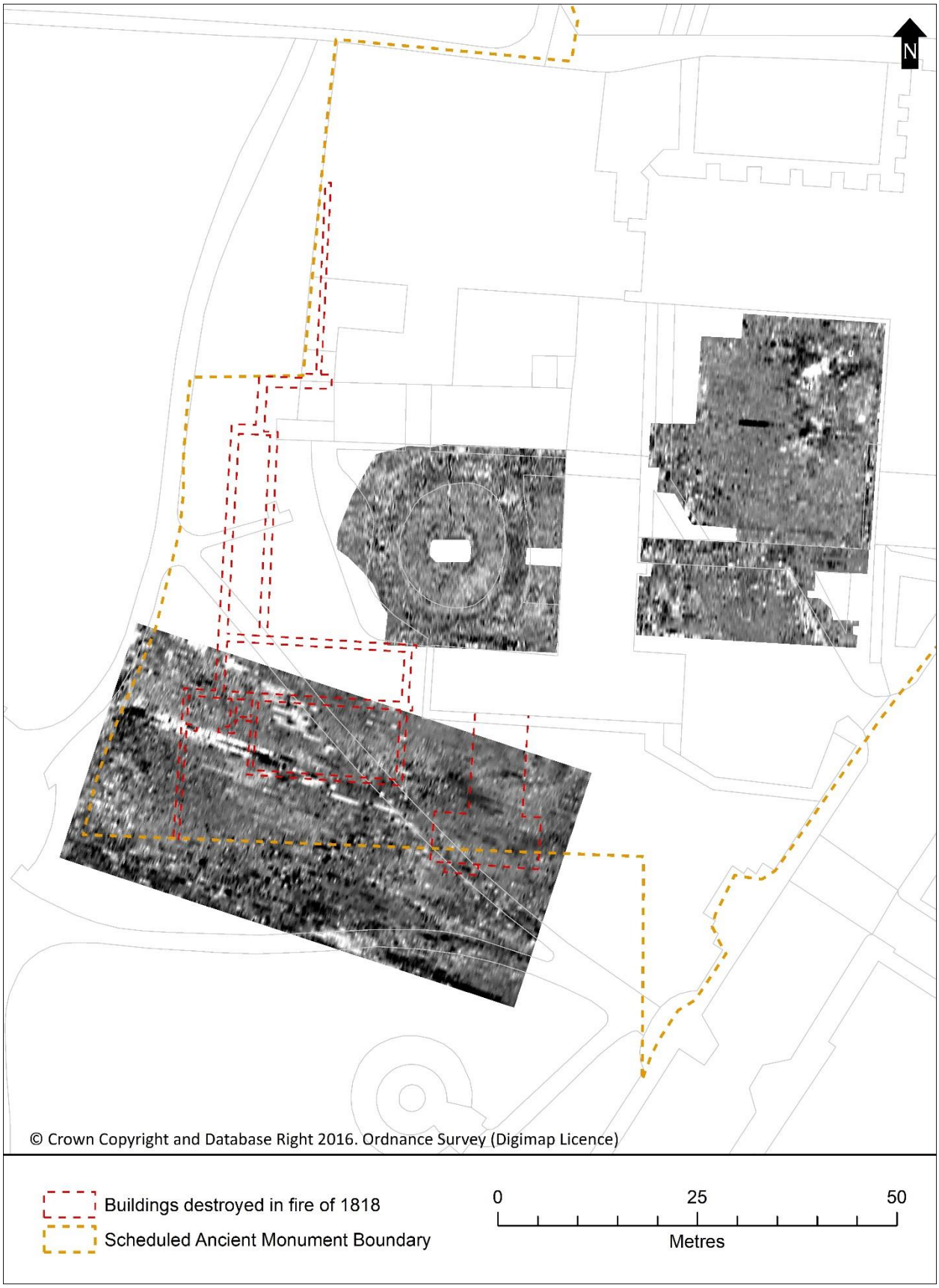

Figure 39: GPR result at -0.4 m shows no remains of the buildings destroyed in 1818 (outline redrawn from Hodges 1888, plate 53) (Graphics: A. Turner)

Figure 40: GPR result at -1.4 m shows no remains of the buildings destroyed in 1818 (outline redrawn from Hodges 1888, plate 53) (Graphics: A. Turner)

Resistivity Survey – results and interpretation

Area 1a (Figures 41+42)

Feature 2 is a modern service cover and corresponds to feature 2 in the GPR survey. Feature 5 coincides with the rubble spread found during GPR survey and probably represents disturbance from the excavations of 1909. Feature 11 is a linear feature that runs parallel to the pathway south of the cloister and returns at right angles parallel to the west front of the building to the west of the Abbey. Its alignment coincides with the conjectured line of the Romanesque church and monastic remains shown in Cambridge and Williams figure 18 (Cambridge and Williams 1995). This feature was also detected by the GPR survey. Feature 39 may represent the edge of the covered walkway at the southern edge of the cloister.

Feature 12 is a modern pipe that crosses between the Abbey and its ancillary buildings to the east. This was also detected by the gradiometer and resistivity surveys. Features 31 and 32 are modern service covers. Features 33, 34, 35 and 38 are possible grave at the eastern edge of the cloister. Features 36 and 40 are a modern service pipes.

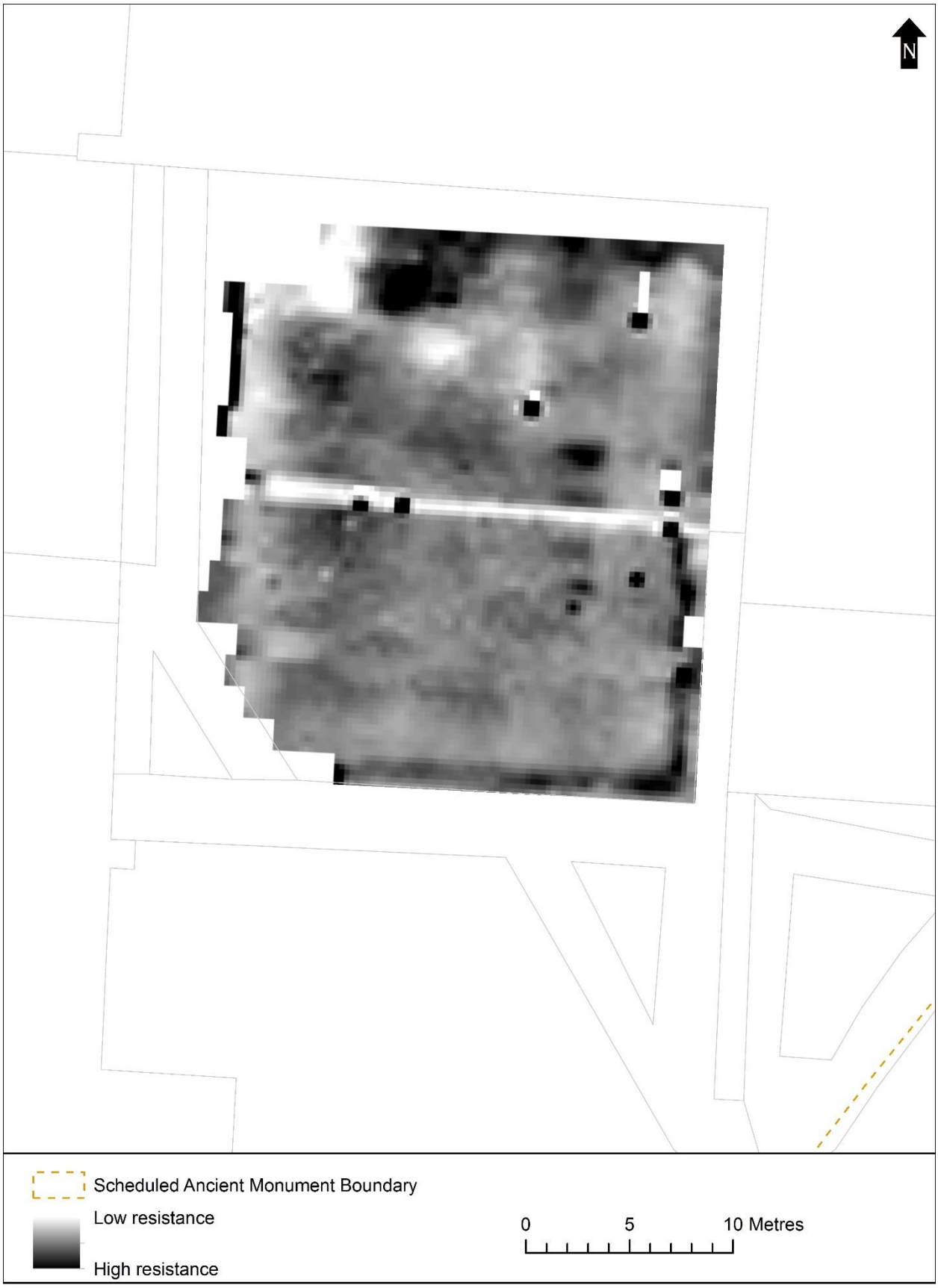

Figure 41: Resistivity result in Area 1a (Graphics: A. Turner)

Figure 42: Resistivity result interpretation in Area 1a (Graphics: A. Turner)

Discussion of the survey results

Area 1a and 1b

The gradiometer survey was obstructed by strong dipolar responses to modern services within the survey area. The range of features detected using GPR was broadly similar to those detected using resistivity, but with the latter features could be much more defined. Due to time and financial constraints, only a very small amount of resistance survey was undertaken. Within the scheduled area, just Area 1a was subject to a resistivity survey. The most important results here were three parallel buried features (33, 34 and 35), each measuring approximately 2.5m by 1.6m and a smaller one (38). It is highly likely that these are medieval grave cuts associated with the Romanesque phase of the cloister. To our knowledge there is no historical or archaeological source that would refer to these tomb-like structures. Remains of the Romanesque Cloister itself could be represented by feature 11, which was detected in both the GPR and the resistivity surveys and matches very well with the conjectural reconstruction plan of the Romanesque church and monastic buildings for the mid-twelfth century by Cambridge and Williams (Cambridge 1995, 84, Fig. 18). Additionally parch marks observed in area 1 during an exceptional dry period (Figs. 43+44) are likely to relate to the Romanesque cloister. In this instance the positive growth marks in the grass indicate a higher moisture content probably due to filled ditches of robbed walls underneath. Here, it is not the outer walls of the cloister as in feature 11, but the inner boundary towards the cloister garth.

Figure 43: Parch marks in the Cloister area (1a) looking northeast on 26/04/2017 after an exceptional dry period (Photo: S. Hueglin)

Figure 44: Parch marks in the Cloister area (1a) looking northwest on 26/04/2017 after an exceptional dry period (Photo: S. Hueglin)

Area 3

The GPR survey combined with the results from test pits allowed to explain a clear division of the area in an eastern part with an older surface that was exposed in test pit 4 in a depth of about -0,7 m.

Area 4

Both GPR and gradiometry survey within the park failed to identify a system of parallel ditches recorded through a dousing survey and the interpreted to represent Roman defences at the site (Selkirk 1995, 310) (Figure 45).

The possible continuation of a path that first appears on the 2nd edition Ordnance Survey map (1890s) could be identified as a positive magnetic anomaly. A line of three trees marks the line of this feature in the modern park.

A positive linear response can be seen projecting from an extant path that first appears on the 2nd edition Ordnance Survey map (1890s). A line of three evenly-spaced trees runs parallel to this feature in the modern park. The linear feature could not be identified on LiDAR data. This feature probably represents a continuation of the existing path.

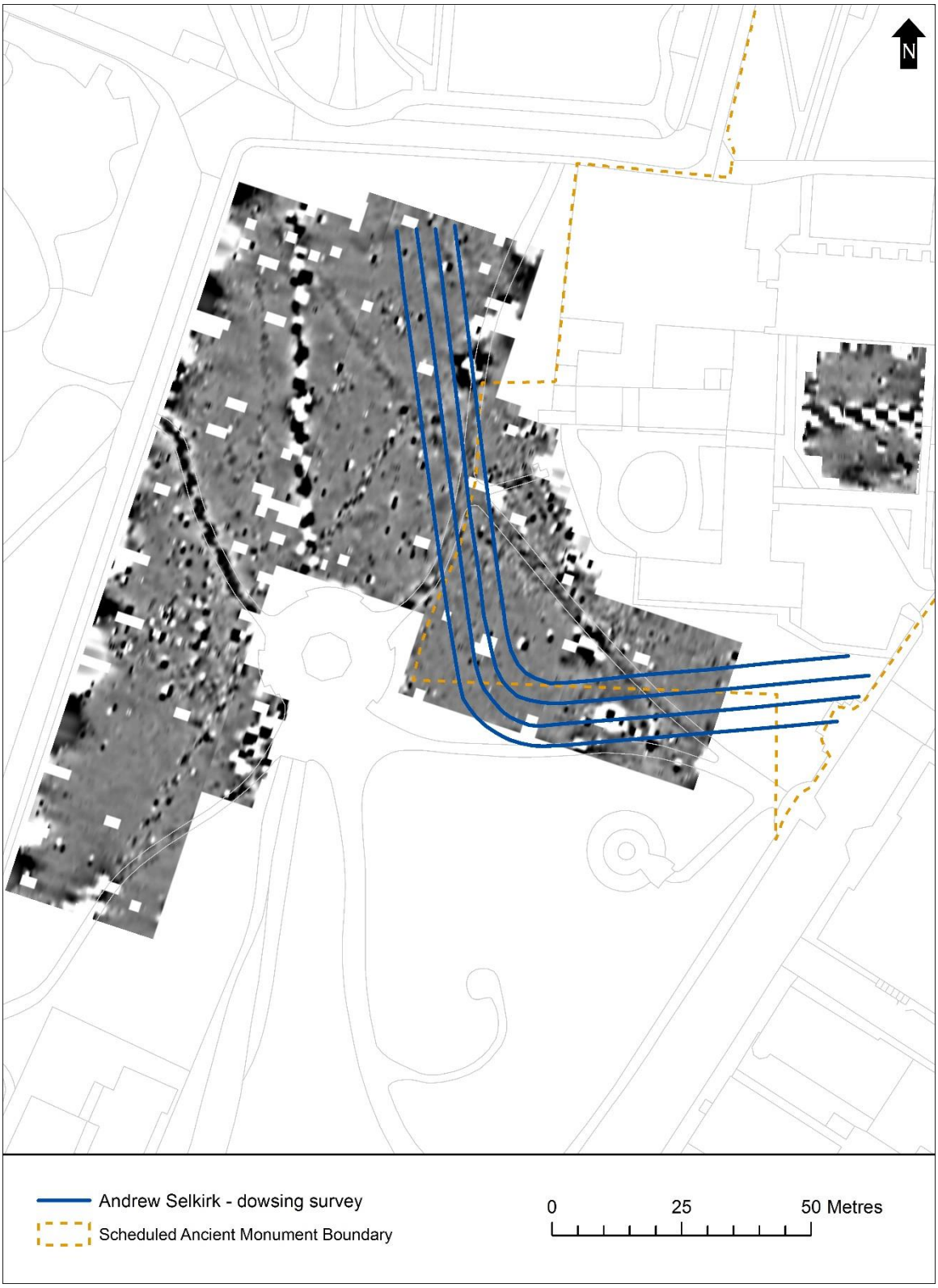

Figure 45: The proposed Roman ditches from dowsing (blue) on the gradiometer survey in the parkland to the west of Hexham Abbey. There are no anomalies in the gradiometer results that would indicate manmade infilled ditches (Ordnance Survey: Digimap Licence; redrawn Selkirk 1995, 310).

Recommendations regarding future archaeological research

Invasive methodology

Excavation

The survey has provided important information for the responsible management of the historic monument as regards the area of the Scheduled Monument. If intrusions by building activities cannot be avoided they might be used to answer the questions raised by the results of the geophysical survey in the light of other sources discussed above.

Area 1a, the cloister is especially sensitive and excavations should be avoided here, because there are possibly still remains of the Anglo-Saxon church along the south wall of the present 19th c. church nave. Remains from Romanesque church and cloister, which were excavated by Cambridge in 1984 (Cambridge & Williams 1995, 53-63) are not only along the north and east end of todays' open green space, but also along the open south end, what the geophysical surveys and crop marks indicate.

Also special care should be taken with the area where at least four graves have been detected. They are aligned north-south along the eastern end of the former Romanesque cloister wall adjacent to the south transept of the Abbey today. They are likely to have been adjacent to the covered walk way of the Romanesque cloister and seem to be contemporary with it.

Area 1b, the paved area to the south of the Cloister, is heavily disturbed by modern services and had partly been built over. Necessary excavations could be done there, provided they can be adequately monitored and documented by archaeologists.

Area 3, the former Prior's court seems to have an older stone lined surface preserved in its eastern half in a depth of about -0.7 m. Interventions beyond the superficial gardening here should always be archaeologically monitored.

Area 4b and the adjacent park within and just beyond the area of the Scheduled monument was heavily landscaped. Here the monitoring of building activities or limited research excavations could contribute a lot to the understanding of the original topography and the situation of likely natural – former Halgut Burn beds – and artificial – early and later medieval monastic precincts – structures.

Non-invasive methodology

Geophysical survey

Possible foci of future investigation with non-invasive methodology would be both in- and outside the scheduled area. There are a few areas in and around the church that have not been surveyed or could be surveyed again with another methodology, especially with time-consuming resistivity. Most promising here would be – within the scheduled monument area - the graveyards to the north and the car park west to the Abbey. Outside the scheduled monument area, we would recommend to investigate the area of the Bowling Green in the Park of Hexham House and to comment with advanced methodology on the results of the Resistive Tomography survey done in 1996-1997. Szymanski suggested in his report the existence of "a N-S ditch" and "constructed dike on both the eastern and the western sides" (Szymanski 1998, 20).

Other sources and methods

Within the Scheduled Ancient Monument area, specifically in area 1a, the former cloister, the observed parch marks would be worth documenting with a photograph from higher up and with a total station. The shapes are very distinctive and relate clearly to walls in connection with the Romanesque Cloister garth.

Conclusion

The geophysical surveys with GPR, gradiometry and resistivity of parts of the Scheduled Ancient Monument area showed the potential and the limitations, but also the complementarity of the methodologies in confined, heavily built-over and furnished spaces with lots of underground services. In the Cloister area four potential graves could be located, that should be avoided in future building activities. In the park to the south and west of the Abbey the existence of the proposed Roman ditches could be disproved. There are more results from surveys outside the Scheduled Ancient Monument area, which will be published and discussed in a forthcoming paper in Archaeologia Aeliana.

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