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Geophysical surveys at Higham Ferrers Castle Northamptonshire July 2024 – April 2025

Report No: 25/071

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John Walford

MOLA

REGISTERED ORGANISATION CIfA

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NGR: SP 961 687

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OASIS REPORT FORM

Higham Ferrers Castle			**OASIS No: molanort1-536641**	
ACTIVITY TYPE				
Project/Activity type	Geophysical survey			
Reason for investigation	Research			
PROJECT LOCATION				
National grid ref	SP 961 687			
Site name	Higham Ferrers Castle			
REVIEWERS/ ADMIN				
HER for project	Northamptonshire Historic Environment Record			
National organisation	Historic England			
National org. Identifier	Scheduled Monument (NHLE No. 1012113)			
WORK UNDERTAKEN				
Methodological summary	Multiple surveys with 160MHz and 450MHz GPR antennae, earth resistance meter, and magnetometer cart.			
Previous work?	Yes		Future works?	Not known
Dates - Start date:	15-07-2024		End date:	12-04-2025
GEOPHYSICS				
Geology	Blisworth Limestone Formation			
Land use	Churchyard, Garden and Playing Field			
Technique 1 - Magnetometer survey				
Size of survey area	*c*1.7ha			
Instrumentation	Bartington Grad-01-1000L			
Configuration	Multiple			
Spatial resolution	Traverse spacing	0.8m	Sample interval	0.225m
Resolution (data values)	0.1nT			
Technique 2 - Earth resistance survey				
Size of survey area	*c*1.5ha			
Instrumentation	Geoscan RM15		Twin probe	Single array
Resolution	0.1Ω		Probe separation	0.5m
Traverse separation	1m		Reading interval	1m
Notes	20m grids, zig-zag traverses			
Technique 3 - Ground Penetrating Radar survey				
Size of survey area	*c*1.0ha			
Instrumentation	MALA GX450 *and* MALA GX160			
Spatial resolution	Traverse spacing = 0.5m		Sample interval = 0.05m	
GPR parameters	Central freq. = 450MHz / 160MHz		Time window = 180ns / 200ns	
Sub-surface velocity	0.07m/ns, estimated by 'analysis of hyperbolic response'			
Profile type	Parallel transects			
BIBLIOGRAPHY				
Title	Geophysical surveys at Higham Ferrers Castle, Northamptonshire, July 2024 - April 2025			
Author(s)	Stephen Parry and John Walford			
Publisher, place and date	MOLA / Northampton / 2025			
Report number	25/071			
Report release delay?	6 months			
PEOPLE				
Organisation	MOLA & Finham Heritage			
Project manager	John Walford (MOLA)			
Project supervisor	Graham Arkley (MOLA)			
Funding body	Castle Studies Trust, East Northamptonshire Council, Higham Ferrers Town Council and Tony and Jennifer Norman			
KEYWORDS				
Monuments found/date	Castle - medieval Pond - medieval & post medieval Tenement - medieval		Garden - post medieval Building - post medieval Churchyard - post-medieval	

RESULTS	
Description of outcomes	The geophysical surveys have provided evidence for the curtain wall and buildings within the inner bailey of Higham Ferrers Castle, immediately north of St Mary the Virgin Church. The curtain wall may have been set on top of an earthen bank or ringwork rather than a motte. The surveys did not identify any continuation of the defensive ditch found in a trial trench evaluation in 1991. The possible foundations of four other buildings were identified within the outer bailey of the castle. The results appear to confirm that the castle and associated manorial buildings did not extend as far as Castle Field where, instead there is evidence for an infilled pond and for possible tenements fronting onto Kimbolton Road.
ARCHIVES	
Accession ID	N/A
Paper Archive repository	None
Digital Archive repository	Archaeology Data Service
No finds made during survey - no finds archive to be deposited	

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The GPR and magnetometer-surveys were undertaken by the MOLA Geophysical Survey Team including Graham Arkley, Chris Manktelow, Daniel Whatton and John Walford and the results of all of the surveys have been processed and interpreted by John Walford and Graham Arkley, with support from Adam Meadows.

Hayley James, Historic England, kindly supported the request for a Section 42 licence to carry out geophysical survey on the castle which is a Scheduled Monument. Staff at Northamptonshire Records Office, particularly Charlotte Walker, Historic Environment Record Officer were very helpful in providing a range of information used in this report.

The local landowners very kindly gave their consent and encouragement to undertake the surveys. The interest and support of the residents of John White Close, John Morten and staff of the Green Dragon Hotel, Chris Fidler of College House, Rev Louise Bishop, St Mary's Church, Rev Michelle Dalliston, Vicar of Peterborough and The Diocese of Peterborough, and Alicia Schofield and Emily Arrow, Higham Ferrers Town Council is also gratefully acknowledged.

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ABSTRACT

The geophysical surveys have provided evidence for the curtain wall and buildings within the inner bailey of Higham Ferrers Castle, immediately north of St Mary the Virgin Church. The curtain wall may have been set on top of an earthen bank or ringwork rather than a motte. The surveys did not identify any continuation of the defensive ditch found in a trial trench evaluation in 1991. The possible foundations of four other buildings were identified within the outer bailey of the castle. The results appear to confirm that the castle and associated manorial buildings did not extend as far as Castle Field where, instead there is evidence for an infilled pond and for possible tenements fronting onto Kimbolton Road.

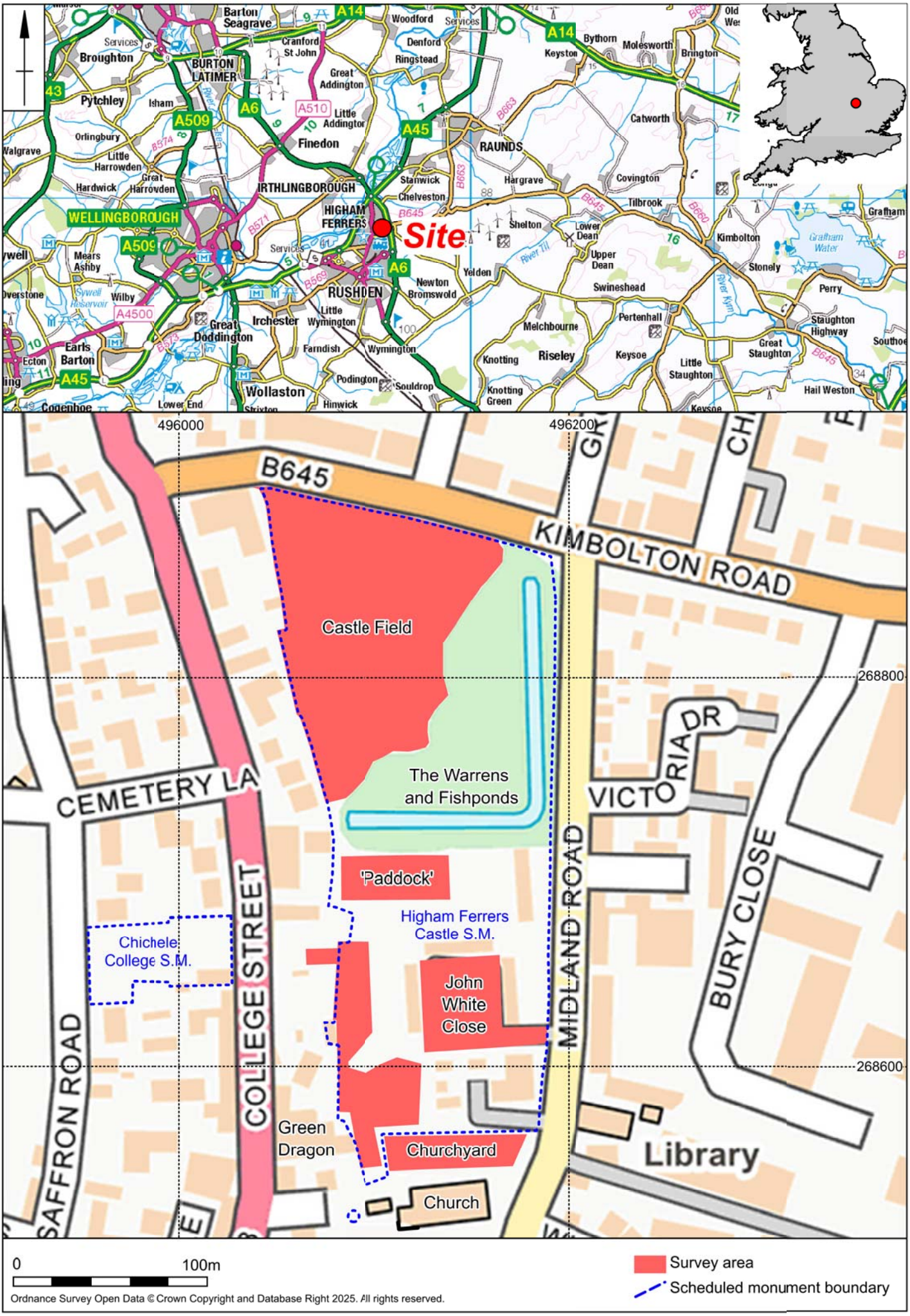
1 INTRODUCTION

Good survival of early fourteenth to early sixteenth century accounts show that Higham Ferrers Castle, Northamptonshire (NGR SP 961 687; Figs 1-2) was a substantial stone-built castle with two baileys. It served as the *caput* of the extensive Northamptonshire landholdings of the Duchy of Lancaster and from 1399 the Crown, until its demolition in the early sixteenth century. The demolition left few traces of the castle, and this has led later historians to speculate with only limited evidence. In particular, Bridges in his County History misinterpreted the remains of fishponds and associated earthworks to the north of the castle as being a moat and rampart (Bridges 1791). This interpretation was then followed by later historians including Cole and Kerr who amplified the error (Cole 1838, Kerr 1925).

In reality, little is known for certain about the origins, form or evolution of the castle and therefore this project sought to characterise surviving archaeological deposits by use of three geophysical techniques, namely ground penetrating radar (GPR), earth resistance survey and magnetometry.

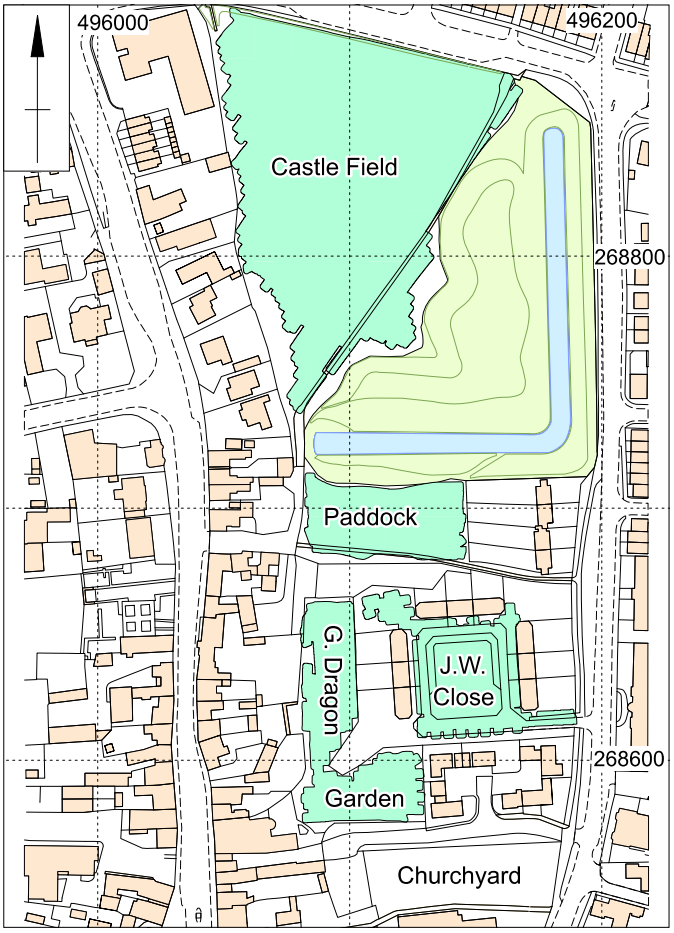
The site is a Scheduled Monument (1012113) and a Section 42 licence was granted to enable the work to take place (Case No SL00234620). The use of radar equipment was covered by Ofcom licences 1188053/1 (2024 survey) and 1384680/1 (2025 survey).

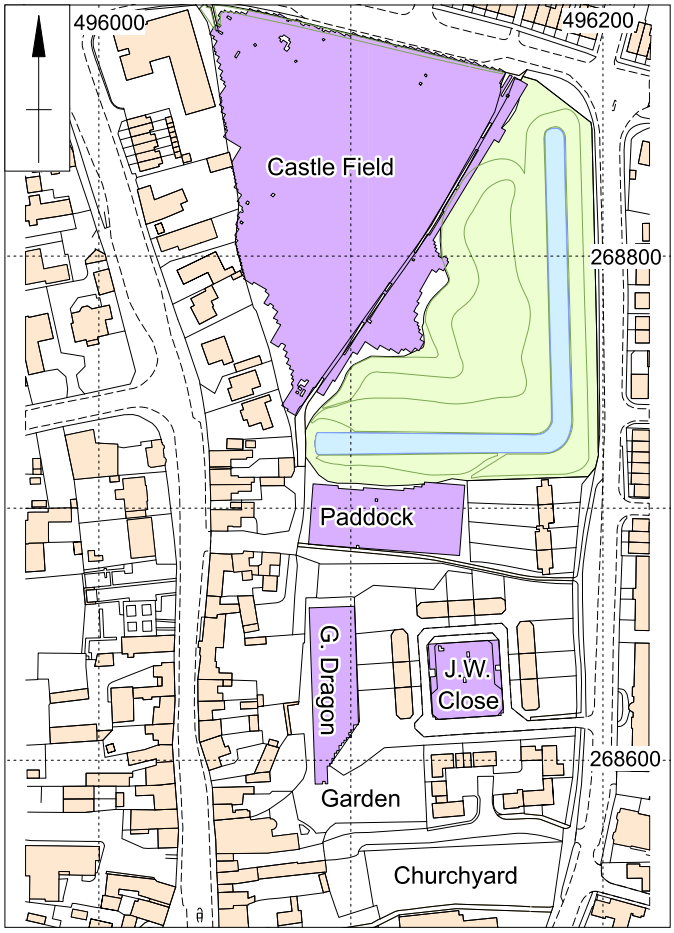
The survey covered a series of land parcels within the scheduled area to the north of St Mary the Virgin Church (Figs 1-2). These comprise, from south to north, the garden and car park to the rear of the Green Dragon Hotel, open areas in John White Close, a Paddock also known as Little Castle Field, and part of Castle Field public park. Two areas outside the scheduled area were also examined, comprising the northern part of the churchyard and the rear garden of College House. Survey coverage within the churchyard was piecemeal due to mature trees, gravestones and, during the summer months, a wildflower garden.

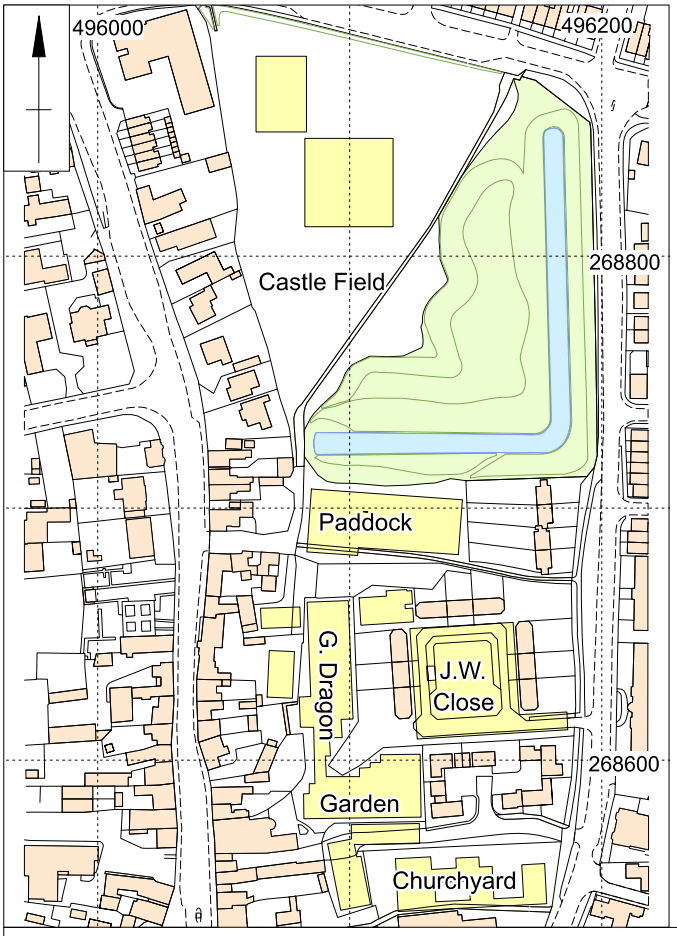


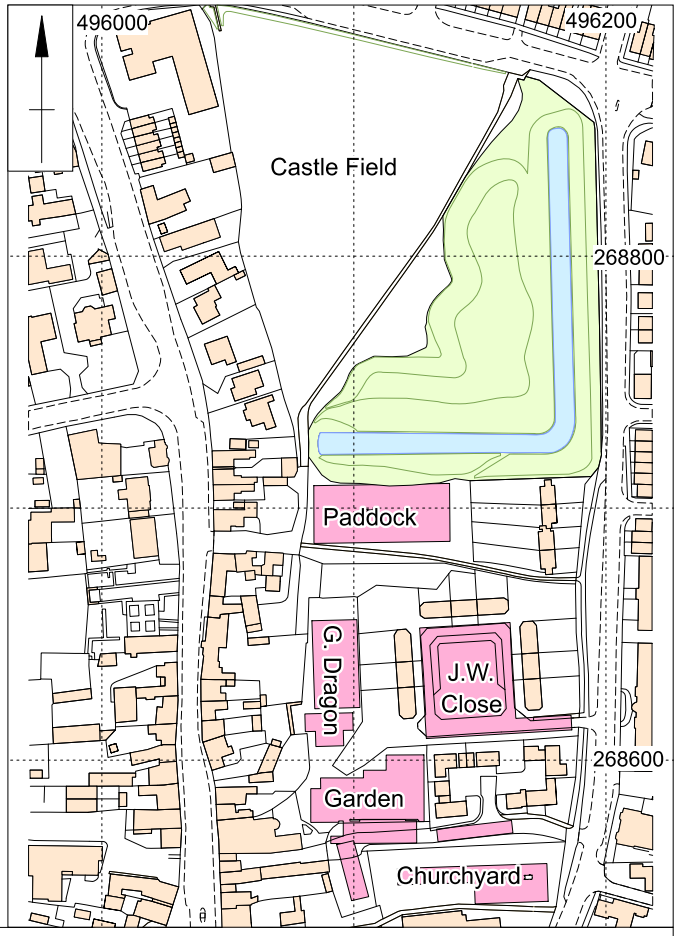
Scale 1:2500 (A4)

Site location Fig 1









0 100m

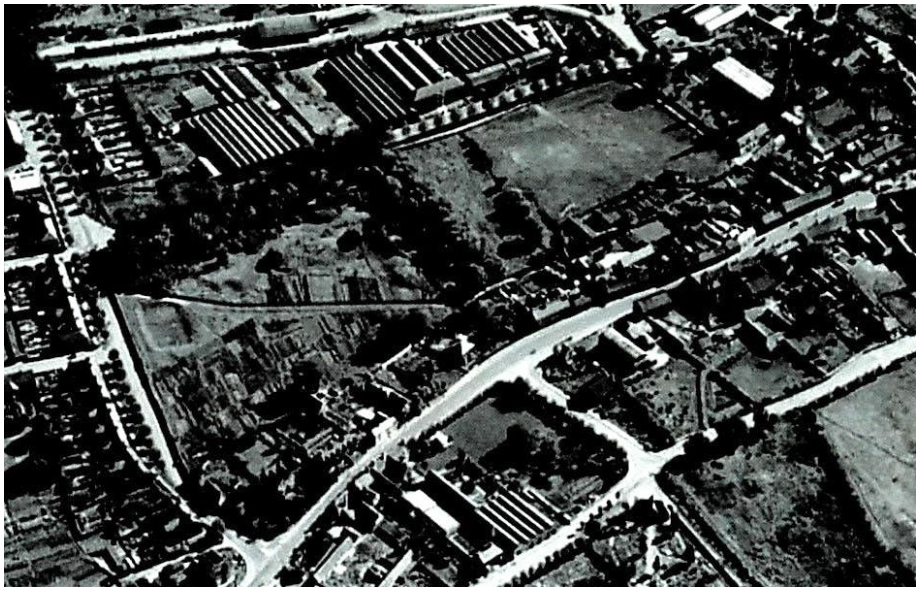
Magnetometry
Earth resistance
GPR (450MHz)
GPR (160MHz)

Scale 1:3000 (A4)

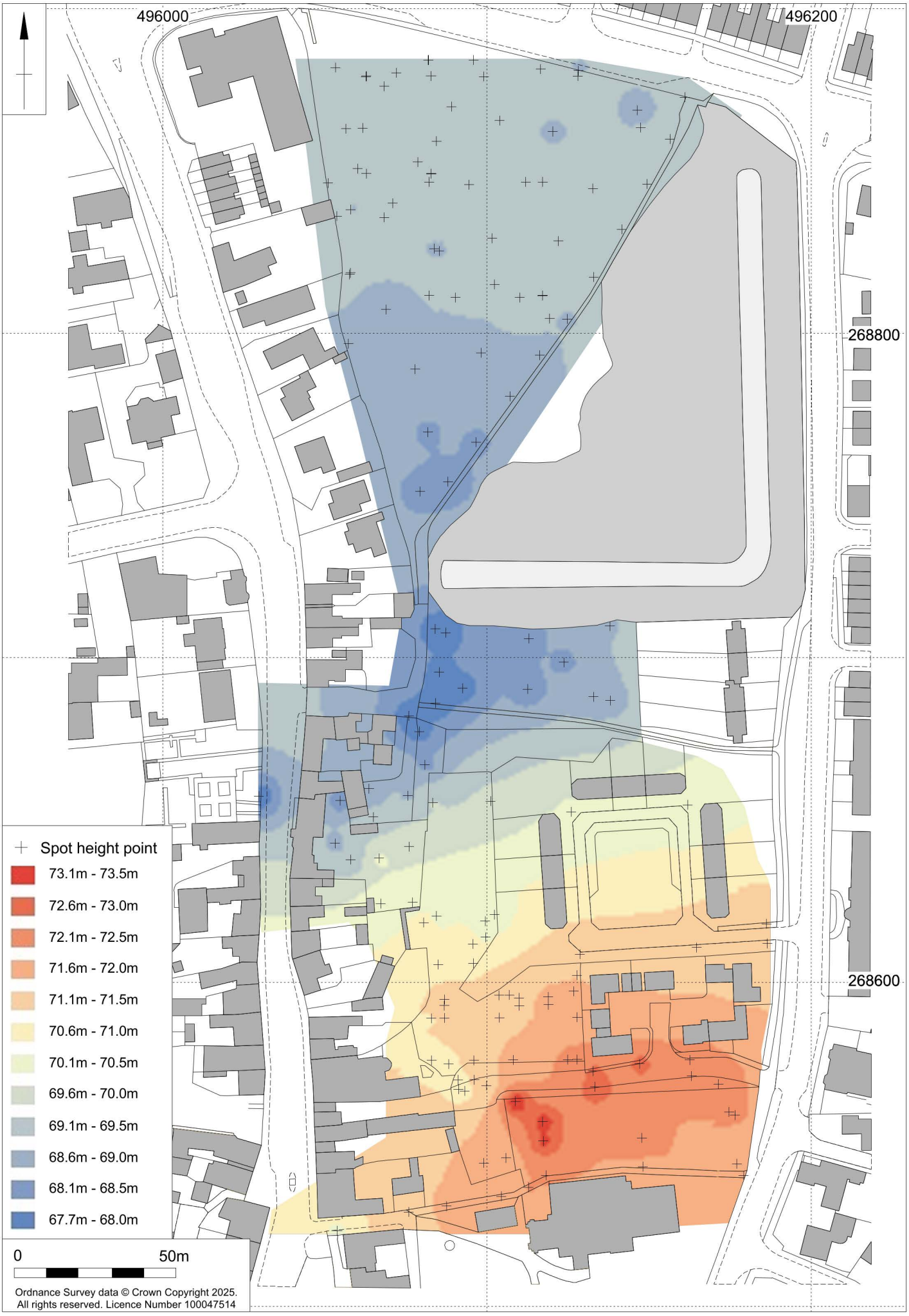
Survey extents Fig 2

The boundary between John White Close and the Paddock includes a low scarp 2m high and the remnants of a small pond which might be remnants of the castle defences (RCHME 1975, 55-56 and fig 67). Castle Field is bounded on two sides by a substantial L-shaped pond and contains irregular earthworks, presumably derived from the upcast from the pond which are heavily overgrown with trees and brambles making survey impossible. This area was less overgrown previously and the shape of the earthworks was recorded on the Ordnance Survey 6-inch map published in 1884 (Fig 12). Low earthworks within the flat part of the park are probably the remnants of allotments created during the Second World War as part of the Dig for Victory programme (Fig 4). A sunken rectangular earthwork of uncertain origin formerly lay against the northern edge of the field (Fig 4) but was filled level in the mid-twentieth century.

Aerial photograph of the castle site and St Mary's Church (May 1983) (Courtesy of Northamptonshire HER, Photo No 9668/004) Fig 3



Aerial photograph of the castle site and Castle Field allotments in 1951 (Courtesy of HiFARS) Fig 4



Scale 1:1500 (A4)

Topographic survey Fig 5

2 BACKGROUND

2.1 Location

The castle site is located on the upper part of the eastern side of the Nene valley, within 500m of the river. The site slopes northward down from the church, dropping from 74m to 67m Ordnance Datum close to the southern arm of the L-shaped pond, before rising slightly in Castle Field (Fig 5). This position would have enabled extensive views of the valley but was slightly overlooked from the east where the ground gently rises to 80m. Lowerre notes that the owner of the castle would be able to see 'an unusually extensive amount of his land' (Lowerre, 2005, 167). The castle would also have provided views of the local road system (see Section 3.2) and at a greater distance the River Nene, though whether the river was navigable prior to eighteenth century improvements is uncertain (Meadows et al 2009, 148-51).

The British Geological Survey mapping shows the castle to have been sited on permeable Blisworth Limestone (previously known as Great Oolite Limestone), close to its boundary with the impermeable Boulder Clay plateau to the east (BGS 2025).

2.2 Town topography

Higham Ferrers was located on an important road junction during the Middle Ages, at the crossing of routes from Bedford to Leicester and from Cambridge to Northampton (Foard and Ballinger 2000, 44-46). These roads were turnpiked in the 1750s and the subsequent expansion of the outbuildings of the Green Dragon Hotel on to the castle site was due to its role as a coaching inn.

The castle site and church are located to the east of College Street, the principal thoroughfare, but separated from it by a row of tenements which have had an almost continuous street frontage since at least the late sixteenth century (Fig 6). The Open Fields map dated to 1737 shows these tenements to be shorter than those elsewhere in the town, presumably accommodating the location of the castle, its lands and the churchyard (Fig 9).

2.3 History of the manor and castle

Higham Ferrers Castle forms part of an elite landscape which perhaps evolved from a seventh century demesne centre complementing a royal centre across the river Nene at Irthlingborough (Foard and Ballinger 2000, 14). This suggestion is supported by the excavation of a large mid Saxon oval enclosure, timber halls and barns 1km north of the castle, interpreted as a regional administrative centre used for the collection of rents in the form of cattle, sheep and pigs (Hardy *et al* 2007, 201-206). With the hundred replacing the royal vill as the main local unit for royal administration and taxation in the tenth century, the centre appears to have shifted to the present location where the hundredal manor, perhaps on the site of the later castle, and one of only four town markets in Northamptonshire were established (Foard and Ballinger 2000, 21).

In 1066 the manor of Higham was held by Gytha, countess of Hereford but in 1086 it was held by William Peverel. In addition, the manorial estate included subordinate elements within Rushden, Chelveston cum Caldecot, Knuston, and soke land in Irchester, Farndish, Poddington, Easton Maudit, Bozeat, Hargrave and Raunds (Lowerre, 2005, 70 and fig 3.15). This concentration of landholding within eastern Northamptonshire and north-western Bedfordshire provided a valuable resource to

Peverel and it is possible that he or his son, another William, built the castle, though documentary records are silent on the matter. William Peverel the younger was a supporter of King Stephen, and his lands were seized in 1155 by Henry II following his accession to the throne.

In 1157 the manor with its subordinate elements was granted, probably for life, to Robert de Ferrers, second Earl of Derby, who had married Margaret, daughter and heir of William Peverel. On his death in 1159 the manor reverted to the crown and was granted in 1161 to William FitzEmpress the king's brother and subsequently in 1189 by Richard I to his brother John. In 1199 William de Ferrers, fourth Earl of Derby and grandson of Robert, purchased for 2,000 marks from King John the manor, hundred and park of Higham Ferrers and certain other lands, at the same time relinquishing claim to the other lands of William Peverel (Lofthouse 2019, 6).

At this time Higham Ferrers must have been a major residence as demonstrated by regular visits by King John (Hardy 1835). These visits included:

- 23 July 1208 King's Cliffe, Higham, Northampton
- 29 October 1209 King's Cliffe, Higham
- 30 October 1209 Higham
- 11 November 1210 Higham
- 29 November 1212 Higham
- 30 November 1212 Higham
- 1 December 1212 Higham

It is uncertain whether King John stayed in a castle or manor house as the itinerary does not specifically describe his accommodation. Hardy in an earlier work indicates that Hehham (Higham) was a manor or demesne rather than a castle though he provides no explanation for this (Hardy 1829, 148).

William de Ferrers died in 1247 and was succeeded by his son William fifth Earl of Derby. As a favourite at the Court of Henry III he received many grants of privileges, including the right to free warren in Higham Ferrers in 1248, a yearly fair in the town in 1250 and confirmation of the charter by which the earl had created the town as a free borough in 1251 (Page 1930, 268, Lofthouse 2019, 9-13). He was succeeded in 1254 by his son Robert, sixth Earl of Derby who joined the Baronial party against Henry III. Following the Battle of Chesterfield in 1266, Henry III seized his lands and granted them to his son Edmund Earl of Chester who was created Earl of Lancaster in the following year. Under the Dictum of Kenilworth Robert de Ferrers could redeem his lands on payment of a heavy fine but neither he nor his son John de Ferrers first Baron Ferrers of Chartley were able to recover their patrimony (Somerville 1953, 3-8).

Both John Bridges and John Cole suggest that the castle was built by one of the de Ferrers family (1199 to 1266). Bridges does not provide a reason for this belief (Bridges 1791, 169), but Cole explains that because the castle was not mentioned in Domesday or in the grant of lands made by King John to William de Ferrers in 1199 that it was probably built thereafter, though he does recognise that 'At what period a castle was first erected here, we have no clue to determine' (Cole 1838, 2 and 28).

Edmund died in 1296 and in his Inquisition Post Mortem of 1298, the capital messuage of Higham Ferrers (i.e. the manor) is referred to, 'with garden, dovehouse and fish pond' (Foard and Ballinger 2000, 22). Edmund was succeeded by his son and heir Thomas Earl of Lancaster who also held four other earldoms, making him the richest man in

England after the King. It is clear that Higham Ferrers with its subordinate manors were part of extensive landholdings throughout England which were integrated and controlled by a sophisticated administration (Kerr 1925, 48-86, McKisack 1959, 67-8, Somerville 1953, 17-30). The accounts of financial year 1313-14 cover all Thomas' English possessions and include the first reference to the castle at Higham Ferrers when it appears that most of the stone buildings described in subsequent receivers' accounts had already been built. Kerr considers that this account shows that the earl was strengthening the defences of the castle in preparation for hostility against the crown (Kerr 1925, 49), but most of the entries appear to be related to maintenance and repair as well as improvements to the earl's chamber (Table 1). These works follow a wider pattern with the Lancastrian castles at Pickering, Kenilworth and Pontefract provided with new buildings at the same time (McKisack 1959, 67).

Thomas with other earls led the baronial opposition to Edward II and dominated political life in England after the defeat at Bannockburn, until he was captured after the battle of Boroughbridge and beheaded in 1322 (McKisack 1959, 47-70). His lands were seized by the Crown and granted to Aylmer de Valence Earl of Pembroke but his widow, Mary de St Pol subsequently exchanged her rights for other lands.

On the accession of Edward III in 1327 Henry, brother and heir of Thomas Earl of Lancaster, was reinstated in his inheritance (Somerville 1953, 31-33) and was in turn succeeded in 1345 by his son Henry who was created Duke of Lancaster in 1351. He died on 24 March 1360–61 and his daughter Blanche married John of Gaunt son of Edward III who was created Duke of Lancaster in 1362. It appears that the castle at Higham Ferrers was used as a stopping point between London and the duchy holdings in the north Midlands and northern England (Emery 2000, 405 and fig 98). This is illustrated in the accounts where for example minor repairs throughout the castle were made in 1375-76 in preparation for a visit by the lord and lady (Table 2, Kerr 1925, 114).

When John of Gaunt died in 1399, he was succeeded by Henry of Bolingbroke who later in that year ascended the throne as Henry IV. The lands of the Duchy of Lancaster, including Higham Ferrers, were held by the crown, though their administration was kept distinct from other royal possessions (Somerville 1953, 152-53).

2.4 Documented building phases of the castle

There are extensive documentary references to the castle, mostly from the Duchy of Lancaster account rolls. The surviving accounts start in 1313-14 and continue intermittently until well after the demise of the castle in the early sixteenth century. They provide information on payments for repair and building work within the castle and manor. Some of these documents have been described by Kerr (Kerr 1925, 98-123). In particular, he provided a complete translation of both the Account of the Bailiff and Reeve of Higham Ferrers and the Receiver's Account for 1313-14 (Kerr 1925, 48-62 and 87-94). Kerr was more selective in his choice of later documents which he used to illustrate the various parts of the castle, making it more difficult to assess their full extent. He notes, for example, that during the last decade of the fifteenth and early sixteenth centuries there was little expenditure on repairs to the castle apart from limited work on the manorial buildings but does not provide references to illustrate this point (Kerr 1925, 121).

A more fundamental problem with Kerr's interpretation is that he follows county historian John Bridges' suggestion that the castle extended into Castle Field, seeing the L-shaped pond as part of the moat and the irregular earthworks inside as a rampart. Bridges suggested that these remains may have been created after the castle near the church

had gone out of use, but Kerr thought that this third 'upper' ward was an earlier unfinished Norman 'stronghold' built by the Peverel family (Kerr 1925, 100-1 and plates 6 and 7). Kerr acknowledged that there were no documentary references to an upper ward but, based on his interpretation that there was a lower ward, he inferred that an upper ward also existed as a separate entity from the outer bailey. Indeed, he took the interpretation further by suggesting that an angular depression close to the western boundary of Castle Field (and subsequent filled in perhaps during the Second World War when the field was used as allotments) may represent the foundations of a 'massive round tower' that might 'rival' the keep at Pembroke Castle (Kerr 1925, 114-15).

Brown has convincingly shown that the castle probably consisted of two baileys and did not extend into Castle Field, that the large ponds were never intended to have been defensible and that the earthworks at least in their earliest form were perhaps used as part of the rabbit warren identified in the 1313-14 and subsequent accounts (Brown 1974).

Castle morphology

The castle, from the early fourteenth century at least, comprised two baileys, each defended by stone curtain walls. There is little doubt that the principal buildings were contained within the bailey immediately north of the church. The outer bailey was located further to the north and perhaps east. It contained at least some of the farm buildings related to the manor, since in 1313-14 there are references to the gate of the manor and to the field gate outside the manor, implying that it was a discrete part of the castle. In addition, the 1430-31 receiver's accounts refer to the repair of the Great Barn within the castle and in 1550-51 the accounts mention the 'horreum in le Castleyarde' (Foard and Ballinger, 2000, 24). In a Survey of 1591 the manor, was also described as having been within the castle, 'standing in a place called the Castell yard nere the church which hath bene of long time decaied' (PRO SC/12/13/33; Foard and Ballinger 2000, 21). The location of these buildings within the baileys is rarely described and then only by reference to each other or the castle gates.

Curtain wall and gates

The Bailiff's account of 1313-14 suggests that some walls were provided with a 'bretasche' and 'garrella' which Kerr translates as covered wooden gallery at wall-walk level and barricades respectively (Kerr 1925, 104). However, other interpretations are possible as Cathcart King defines a bretasche as 'a wooden structure of the nature of a tower or turret' or 'the term may mean no more than palisade' (Cathcart King 1971, 573). The castle had at least three gates and a postern. Two gates were located in the outer bailey and were called Town Gate or West Gate and Field Gate or East Gate. These appear to be gatehouses as in 1433 the West Gate was partly rebuilt and furnished with a stone roof and the description includes 'the new chamber called the gatehouse near the town'.

The Middle Gatehouse or Gate under the Steward's Chamber or Residence is also mentioned, probably giving access to the inner bailey. In 1431 this was almost entirely rebuilt with stone quarried from Weldon, timber from Higham Park and Castle Ashby, and Sclatstone (stone tiles) and shingles (wooden tiles) from Jerdale. A carpenter was paid to construct a portico over steps leading to the Steward's Chamber and Robert Smith provided two iron bars to support the mantels of two chimneys.

The House of the Drawbridge occurs in a number of accounts, but it is not clear to which of the three principal gatehouses this relates. It had two adjacent chambers and in Edward IV's reign the gatehouse was rebuilt including the construction of a new tower with great gate beneath, beside the drawbridge.

A Great Gate under the Lord's Chamber was recorded in 1375-76 when the lock was repaired. Another, or the same, Great Gate is mentioned under a Stone Tower of the Hall in the early fifteenth century. These were probably located within the domestic buildings of the castle. A Little Gate or Postern near the church is recorded in the Duchy Court in 1464.

Hall

The principal building of both the castle and manor was the hall, and its shingle roof was regularly repaired throughout the fourteenth century. It was destroyed in a fire which started in the Market Place in 1409-10. The building was rebuilt in the following three years with significant expenditure identified in the bailiff's accounts. This work included the construction of a Stone Tower over the Great Gate of the Hall. In 1431 two masons were paid for repairing stairs from the door of the Hall to the Chapel and 'plasteryng' and 'whitlymyng' the same two buildings. The roof and gutters of the hall were repaired a year later.

Chapel

Regular maintenance of the chapel was required throughout the later Middle Ages including replacing glass windows broken in the great wind of 1375 and relaying lead on the roof and replacing wooden floors in the early fifteenth century. In 1429 to 1432 there was a significant refurbishment when repairs were made to the stair, roof, two floors, and Tower at the end of the Chapel, as well as two new windows and lifting the altar slab and inserting an *almeria* probably to accommodate relics. In the reign of Edward IV payment was made for windows with the arms of the king and queen and the image of St Edmund.

Lord's Great Chamber and Lady's Chamber

The principal apartments of the castle comprised the Lord's Great Chamber and Lady's Chamber. Improvements to the Earl's Chamber form the greatest expenditure in the 1313-14 accounts with the addition of a winding stair. Also mentioned are Chambers for Lord Derby (later Henry IV) and Lady Philippa who were the son and daughter of John of Gaunt. These appear to have been separate rooms as in 1376 there is reference to the Young Lord's Chamber as distinct from the Lord's Chamber. At that time there were repairs to the chimneys of all three chambers. The Lord's Great Chamber was further repaired towards the end of the fourteenth century and again as the King's Chamber in 1430-31 including the provision of wall-plates and repair of the roof and gutters as well as replastering the walls.

Other Chambers and Houses

There are regular references to other rooms or buildings, variously described as houses or chambers. These include the Knight's Chamber and lodgings for the Steward, Receiver and Auditor. The stone roof of the Treasury Chamber was repaired in 1375 and its floors were renewed in 1424. A Friars' Chamber was located in the outer bailey and had a thatched roof which was renewed in 1353.

Service buildings

A range of service buildings are mentioned in the accounts including the Kitchen, Scullery, Saucery, Larder, Buttery, Pantry, Chaunderye, Ewery, Cellar, Wine-Cellar, Store-house and Bakehouse. The kitchen stone roof was repaired in 1372 and the whole building was partly rebuilt in 1462-63 in preparation for a visit of Edward IV (Brown and Colvin 1963, 681).

Manorial buildings

A large number of stables are found in the accounts including the Chargers' or Steed Stable, the Long Stable beside the East Gate, the Long Stable near the town, and stables for the Steward, Receiver, Auditor, and Friars. Various repairs suggest that at least some of these buildings were made of stone and had thatched roofs.

Other buildings, some of which may have been located in the outer bailey or to the east of the castle in Bury Close where the former John White's factory now stands, include the Great Barn, Granary, Hay House, Ox-house, Cattle-sheds, Sheep-house, Kiln-house, and stables for the cart and plough horses. The 1313-14 accounts include an item for the farm of two dovecotes in the courtyard for 6s 8d (Kerr 1925, 52). It is uncertain where they were located as the present-day ruins of the dovecote within the garden of the Green Dragon Hotel are likely to date to the sixteenth or seventeenth century (see Section 2.7).

A Conygarth or rabbit warren was located within the castle precincts from at least 1313-14 (Table 1). It must have been a substantial structure with accounts referring to the repair of its wall in 1362-63 and renewal of the gates to the enclosure a year later. The enclosure was intermittently repaired throughout the fifteenth century. The Bainbridge Map of 1789 shows Coney Garth within Castle Field, while the Inclosure Map of 1839 names this area as Great Coneygarth and the area south of the L-shaped pond as Little Coneygarth. This location was probably the site of the medieval warren and the irregular earthworks within the angle of the pond could have been originally used for that purpose, although their present form may include later remodelling using upcast when the ponds were extended to form the present L-shaped pond in the seventeenth century.

Table 1 Expenditure on the castle and manor from the 1313-14 Accounts

Value	Description
6s 8d	For the farm of 2 dovehouses within the courtyard this year.
22s 11½d	For thatching and repairing the ox-house, grange, stables and other houses of the manor.
5s 10d	For repairing the gate of the pinfold, the gate of the manor, the field gate outside the manor, the gate at the entrance of the coneygarth and the three gates beside the Steward's house, with nails, hooks and hinges bought for the same.
11s 11d	For a winnowing cloth, 2 sacks, repairing the mangers in the ox-house, draff for the pigs, repairing the cribs, a lock for the gates to the town and other small things bought.
32s 6d	For building a piece of stone wall from the end of the kiln towards the church by agreement, with the wages of the men taking down the old wall, digging stone and making mortar for the same.
31s 9d	For rebuilding by day-work a piece of stone wall, containing 8 perch, between the Steward's chamber and the small garden, with stone bought and wages of men digging stone and mortar for the same.
11s 7½d	For making two doors for the two gates there with nails and hinges bought for the same.
6s 9¾d	For two spars in the long chamber in the outer bailey, two spars for the garderobe of the same chamber, making two doors for the said garderobe with boards, nails and iron ties bought.
8s 6d	For making the floor of the Steward's chamber with sawing of planks, large nails bought, plastering the same floor, and making a small chamber of boards in the Steward's chamber, with nails bought for the same.
12s 11d	For the wages of carpenters making shingles and laying the same upon the Hall and the portico of the Hall and of a man cleaning the earl's chamber in part, making two doors in the house beside the plate-room, with nails hooks and hinges bought.

8s 2d	For making a barrier at the head of the bridge, and making and fixing stanchions there.
24s 10½d	For the wages of three masons breaking the stone wall near the chimney of the earl's chamber and building a winding stairs there with stone bought for the same.
74s 11d	In erecting a small bretache near the chimney of the earl's chamber with the wages of carpenters and sawyers sawing timber and the boards for the doors of the same, with nails, hooks and hinges for the doors and windows of the same.
£18 9s 1d	For 6¾ aquatic loads and 2½ pigs of lead bought at Derby for covering two hoards near the earl's chamber and the third part of a hoard beside the gate.
62s 6d	For hire of 15 carts hired to carry the said lead from Derby to Higham.
35s	For the wages of plumbers founding the said lead and roofing therewith the said hoards, with coal bought for founding the said lead.
2s 6d	For 2000 lead nails bought for the same.

Table 2 New building and repair works from documentary sources

Date	**Work described**
1298	Manor included a capital messuage with garden, dovehouse and fishpond worth 6/8d.
1313-14	See Table 1
1353	Repairs to knights' and friars' chambers (thatched house outer bailey)
1362-63	Repairs to Conygarth wall
1363	Carpenter repairs two chambers beside le Drawbrygge
1363	Repairs to gatehouse roof
1363-64	Renewal of gates to Conygarth
1372	Repair of kitchen roof
1373	Racks and managers for John of Gaunt's horses
1375	Repairs to chapel window glass
1375	Repairs to auditors chamber/treasury chamber/house
1375-76	Great gate under lord's tower
1375-76	Minor repairs to tower/towerhouse in preparation for visit of John of Gaunt and Constance
1376	Rebuild of chimney of Lady Philippa's chamber and Lord's chamber (Lord Derby)
1380-81	Conygarth and manor repaired and partly rebuilt with walls of the two enclosures extending to 88 perches
1409	Cleaning out the pond in conygarth and repairing the alleys
1409-10	Hall destroyed by fire
1410-12	Rebuild of hall including stone tower over gate of said hall
1414	New winnowing door for Great Barn
1424	Repairs to floor auditors chamber/treasury chamber/house
1429-32	Extensive repairs to chapel
1430-31	Extensive repairs of King's chamber
1430-31	New roof for great barn
1431	Middle gate under Steward's chamber rebuilt
1431	Repair of stairs from hall to chapel and plastering the two buildings
1432	Repair to hall roof and gutters
1433	West gatehouse partly rebuilt and new roof
1452	Default for not repairing a piece of wall at the Conygarth
1452	Offence of making a common road with a ladder over the wall of the lord king's Conygarth
1462-63	Partly rebuilt kitchen in preparation for visit by Edward IV
1464	No nuisance into castle ditch at the Little or Postern Gate near the church
1464-65	Repairs to roof of Queen's chamber
1469	West gate and garden wall are mentioned in property transaction
Edward IV	Gatehouse rebuilt, glazier 92ft pond glass, 3 windows in new tower beside le Drawebrygge and new iron bar for great gate beneath said tower

Edward IV	Windows with arms of King, Queen and St Edmund installed
1523	Grant to Sir Richard Wingfield 'being all Rased and in great ruin and decay as he shall think sufficient for rebuilding… Kimbolton'

2.5 Demolition of the castle

It seems probable, as noted above, that the castle was in decline in the late fifteenth and early sixteenth centuries. However, its almost complete destruction occurred in the years after 1523, when Henry VIII granted building materials from the site to Sir Richard Wingfield for the rebuilding of Kimbolton Castle. Kerr provides the full text of the king's warrant (Kerr 1925, 122-23). John Leland writing between 1532 and 1542 was the first antiquarian to mention the castle describing it as 'now of late clene faullen and taken downe' (Hearne 1710-14, v, 94).

2.6 Descriptions of the castle site and historic maps and views

Various short descriptions of the castle's ruins appear in national surveys and gazetteers between the sixteenth and eighteenth centuries, show that it was not fully demolished until the nineteenth century. They rarely provide further detail although William Camden in 1586 notes that the ruins were 'yet to be seen near the Church' (Camden 1607, 377).

Greater detail is provided by John Norden at the turn of the seventeenth century, John Bridges in his history of Northamptonshire compiled between 1719 and 1724 and John Cole in his book The History and Antiquities of Higham Ferrers published in 1838 (Norden 1610, Bridges 1791 and Cole 1838). Norden prepared a map showing the ruins to accompany his county history (Beresford 1957, 154-158), while two prospect views of Higham Ferrers town from the northeast were probably prepared to illustrate Bridges' work (Bailey 1996, vii-x).

Other maps created in the eighteenth and nineteenth centuries record estate and land ownership within the town and its open fields and subsequent inclosure. These maps provide considerable detail but as they were records of ownership rather than antiquities, they rarely depict the ruins of the castle. Combined with the estate maps, the various editions of the Ordnance Survey maps starting with the 6-inch map surveyed in 1884 chart the later history of the site including eighteenth and nineteenth century ranges of buildings and gardens which can be identified within the geophysical survey results.

John Norden (c. 1547 – 1625)

Norden in the Northamptonshire section of *Speculum Britanniae or a description of England and Wales* completed in manuscript in 1610 but not published until 1720 included a short description of the ruins of the castle which survives in two slightly different forms:

'Theare was sometime a very large castle belonging to the same duke, and his Mansion Howse borderinge upon the Churche yard of the same Towne. But it is now altogether ruynate, and the Foundations and ruyns doe declare, that it hath bin a place of some Accompt' (Norden 1720, 51-2).

'There was sometime a very fayre and lardge castle, a mansion house now raysed downe to the grounde whose rubble and olde foundations argur the same to have bene very great and stronge. About the same at this daye are very fayre fish pondes replenished in some measure with fishe' (Beresford 1957, 160).

Norden accompanied his description of Higham Ferrers with a map dated 1591 which shows the full extent of the town at that time and adjacent enclosed fields (Fig 6). It is clear that there is a considerable amount of distortion in the layout of the town as well as changes in scale of tenements making the map difficult to interpret. In particular, there appears to be no correlation between features on one side of the main street to those on the other, with major displacements in the location of for example Chichele College when compared the site of the castle (Fig 6; annotated '*e*' and '*b*' respectively).

Detail of John Norden's map of Higham Ferrers (1591) Fig 6
(Courtesy of Northamptonshire Record Office, NRO Map 4661 A & B)

Norden depicts the castle as an area of broken masonry and uneven ground close to the original boundary to the churchyard which was immediately adjacent to the church and schoolhouse ('*c*' and '*k*' respectively). However, he extends the 'scyte of ye olde castle' as annotated '*b*' as far as the Kimbolton Road. The boundary of the site of the castle with neighbouring properties and the forerunner of Midland Road is shown as a stone wall as far as the ponds while the remainder including the verge along Kimbolton Road is bordered by hedges; the significance of this change is uncertain.

In Castle Field, instead of the L-shaped pond which now exists he shows two rectangular ponds at right-angles to each other, connected only by a narrow channel. The easternmost pond does not extend so far to the north as the corresponding area of the present pond but stops at a field boundary. There is also a small square pond in the middle of the field in which the two larger ponds lie, linked to one of them by another narrow channel. How far the position of these ponds has been distorted is uncertain, but the probable re-discovery of the small pond during this project (Section 4.9, below) suggests that they may be depicted too far to the south. The map also shows a stream from the northwest corner of the pond, bisecting the northern field. Norden does not show any earthworks inside the two larger ponds and presence of both the stream and channel to the smaller pond in the area of the current earthworks suggest that these were not as extensive in the late sixteenth century.

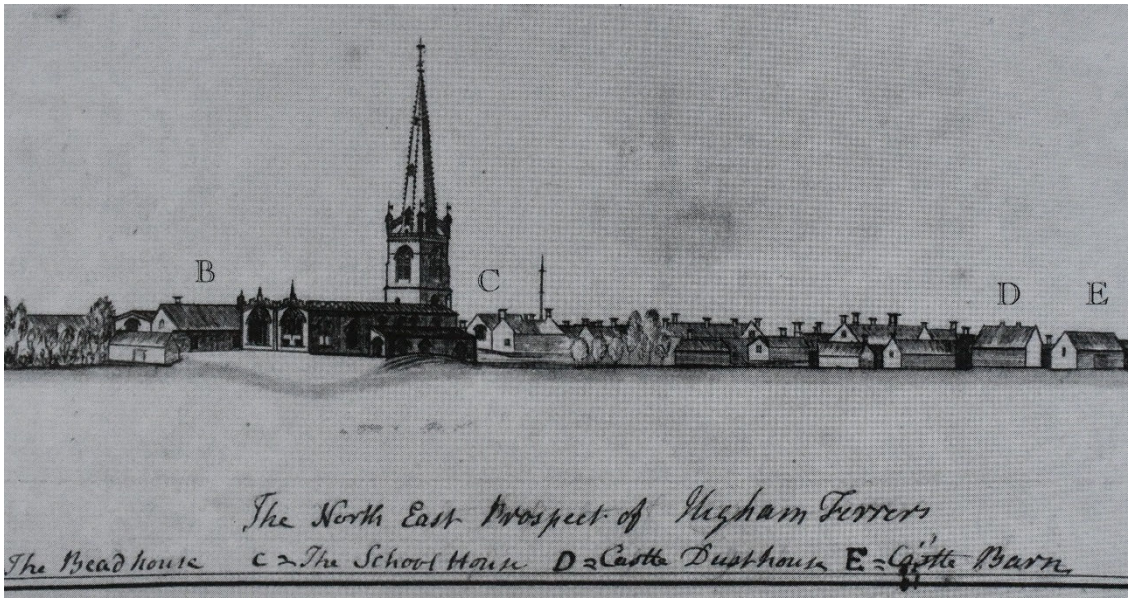
John Bridges (1666-1724)

In his history of Northamptonshire Bridges divides the castle into two areas, a smaller southern part near the church and Castle Field which he considered to have been the site of a subsequent phase of fortification. His description suggests that castle walls were still surviving on the west side of the smaller area. Bridges is the first person to describe the L-shaped pond and earthwork in Castle Field which suggests that the present arrangement was created in the seventeenth century. It is surprising that memory of the true purpose of this work had not lasted into the early eighteenth century to be recorded in his history, and it appears that Bridges was the first person to speculate that the remains were part of a moat and rampart. Bridges description of the site is as follows:

'The castle yard stands N. of the Church, where the castle was formerly situated. The ground is divided by a moat crossing from E. to W. The south part which is ye lesser & nearest ye church, with a part of ye walls still standing on ye W. side may be supposed to have been the site of ye old Castle by the remains of ye ffoundations of several Buildings & by heaps of ruins and various hollows. The northern part seems to have been more considerable for extent and strength; hit being about 4 acres & the former but Two: having a very deep moat on the E. side, about 50 feet broad & abot 500 feet long, & another on the S. side of the same dimensions. The Buildings seem to have been on the E. & S. sides as appears by the rising ground: and probably this part was fortified after the old Castle was pulled down as not being so tenable by reason of the neighbourhood of the Church which commanded and overlooked ye part' (Bridges 1791, 169-70).

The two prospect views of Higham Ferrers from the north-east which may have been prepared to accompany Bridges history in about 1719-21, show essentially the same scene with the church as the dominant feature (Figs 7-8). The two views show different details of the castle site though it is not possible to decide on which is more accurate.

Eayre's prospect provides a wide panorama of the town and identifies a number of other buildings including the Castle Dusthouse (perhaps, given its location, Dovehouse) and Castle Barn (Fig 7; D and E respectively). The foreground of the scene is stylised with limited detail but does include a low mound and wide ditch, perhaps representing the remains of the castle in front of the church (Bailey 1996, 90). The Peter Tillemans prospect focuses more closely upon the church, and this larger scale enables him to provide more detail with greater use of shading. The large ditch shown by Eayre is not shown but rather Tillemans depicts low earthworks dropping with a fairly steep gradient to the north (Bailey 1996, 91).



Detail of 'North East Prospect of Higham Ferrers' by Thomas Eayre, circa 1720 Fig 7
(Bailey 1996, 90)

Detail of an untitled prospect of Higham Ferrers by Peter Tillemans, circa 1719 Fig 8
(Bailey 1996, 91)

John Colbeck Map of 1737 showing Open Fields (NRO Map 1004)

The map shows the site of the castle as two fields both described as Castle Yard but without showing any detail, such as the L-shaped pond (Fig 9). The importance of the map is that it accurately depicts the layout of the town including tenements arranged either side of the main street. Those tenements between College Street and Castle Yard are shorter than elsewhere in the town perhaps indicating the extent of the former castle behind them. The map also shows an opening within the row of tenements just to the south of plot 55 allowing access to the Castle Yards via the present-day Paddock.

Detail of Colbeck Map of 1737 Fig 9
(Courtesy of Northamptonshire Record Office, NRO Map 1004)

Thomas Bainbridge Map of the Estate of Earl FitzWilliam in 1789 (NRO Map 1000)
The map shows the parish of Higham Ferrers belonging to Earl FitzWilliam (Figs 10-11). This map also divides the area into two fields with one adjacent to the church described as Castle Yard (335) and the other to the north as Coney Garth (334). Entry to the fields from the town was made by a gate leading from College Street to the Paddock (adjacent to 323). The gate appears to have had two openings, the smaller one perhaps for pedestrians. Kerr suggests that the original town gate of the castle was close to this location and supports this interpretation by citing measurements relating to the creation of a tenement from vacant land in 1469 (Kerr 1925, 105-6 and plate VII). This analysis is dependent on correctly matching fifteenth century tenements with existing properties and assuming that the current stone wall boundary of the Green Dragon Hotel garden is the same as north wall of the castle garden; the former is uncertain and the latter unlikely.

Detail of Bainbridge Map of 1789 showing Castle Yard and Coney Garth (Courtesy of Northamptonshire Record Office, NRO Map 1000) Fig 10

Within Castle Yard the map shows faint markings perhaps depicting earthwork remnants of the castle including a ditch or bank close to its north boundary and a bank or mound and curving ditch adjacent to the church (Fig 11). A series of lines of dots drawn across the field, perhaps denoting pasture distracts the eye, making interpretation more difficult. The northern feature appears to show a corner cut by the southernmost pond in the Paddock and its alignment is slightly askew to the rectangular field. The map does not show any continuation of the feature to the south so that if it does represent part of the defences to the outer bailey its shape is uncertain. The southern features near the church describe roughly concentric arcs, but again are incomplete. They appear to fill the central part of the southern half of Castle Yard so that their continuation would extend almost to the boundaries of the field. In particular, it appears that any extension to the bank or mound would be tight against the original churchyard boundary.

The map also shows for the first time the location of the present-day 'dove-house' along the western boundary of Castle Yard (316) though it is possible that it was included in Eayre's prospect of *c*1720 (Fig 7). Also, for the first time the map shows the encroachment of the sheds and yard of the Green Dragon Hotel (311) into Castle Yard. The sheds which were greatly enlarged in the nineteenth century (Figs 12-13) have been partly identified in the geophysical survey results (Section 4.3, below).

To the north of the dovecote a narrow rectangular plot divided by paths into four compartments and described in pencil as 'garden' appears to be an eighteenth-century detached garden. The present-day stone walls forming the boundary between the Hotel garden and other properties enclose a wider area and the west side is set at a slight angle. This suggests that this wall may have been rebuilt sometime after 1789 and is not a remnant of the castle as described by Bridges. Examination of all three walls of the Hotel garden, albeit partially obscured by ivy, does not indicate a history of rebuilding. Some of the internal elements of the detached garden may have been identified in the current geophysical survey but as a similar arrangement of paths and cultivation beds can be seen in post-World War II aerial photographs (Historic England photo refs. EAW043272 to EAW043232) it is probable that some of these features are of more recent date.

Detail of Bainbridge Map of 1789 showing faint depiction of earthworks (Courtesy of Northamptonshire Record Office, NRO Map 1000) Fig 11

In Coney Garth (334) the map depicts for the first time the present-day arrangement of L-shaped pond, described as Moat, though this must have been in existence by the 1720s as described by John Bridges. It contains traces of the irregular earthworks presumably created from its upcast. Three small ponds are also shown to the south of the main pond, within the Paddock. Norden does not however show any small ponds

within the Paddock, and it appears that the southern pond cut into the possible castle defences (Fig 11). Alternatively, it has been suggested that the southernmost pond may represent the remnants of the castle moat (RCHME 1975, 56).

John Cole (1792-1848)

Cole in his in his book on the history and antiquities of Higham Ferrers follows Bridges in dividing the area into two parts with the 'old' castle close to the church and larger 'northern division' in Castle Field (Cole 1838, 26-28). The most important part of his narrative describes an elevated mound and surrounding moat near the church which had been largely levelled in recent times. This description perhaps matches the faint sketches shown on the Bainbridge map (Fig 11) and may suggest that the castle had its origins as some form of ringwork or raised inner bailey.

Cole also reported the discovery of 'Roman' remains in excavations in Castle Yard to the rear of the Green Dragon Hotel though these may actually have been remains of castle buildings. His text is as follows:

'The south part, near the church, containing about two acres, has of late years been considerably levelled; as previously to the excavations being made an elevated mound was conspicuous, encompassed by a deep moat, but completely dry, which is now filled up. This is supposed to be the site of the old castle. This mound, although very much lowered, is yet, to a small extent, plainly acclivous. Here, perhaps, a majestic keep may once have stood. The northern division has been more important in regard to extent, as it comprises about four acres. Its strength also has been considerable, having on the east and south sides a moat of great depth, now remaining, full of water, of about 500 feet in length, and in Bridges's time it was 50 feet broad, but the earth has probably encroached upon its margin, as it does not now appear to be so great a width'.

'Higham… and we have intimations that it was a Roman station, as, a few years ago, in making some excavations in that portion of the castle-yard, which is contiguous to the church, and at the back of the Green Dragon, what were considered Thermae, or hot baths of Roman construction, were disclosed' (Cole 1838, 2).

Inclosure Map of 1839 (NRO V2793)

The Inclosure Map shows a similar arrangement to the Bainbridge Map with Castle yard (96) adjacent to the church and the area to the north split into Great Coneygarth (116) within the angle of the L-shaped pond or The Moat (114) and Little Coneygarth (113) in the Paddock to the south, though only one of the three small ponds is shown (Fig 12). There has been further encroachment in Castle yard with a range of buildings (95) extending north from the churchyard and some of their foundations have been identified in the current geophysical survey (Section 4.3, below). The garden adjacent to the dovecote has been extended south where it ends in a pathway curving towards the rear of the Green Dragon Hotel. The dovecote is shown as a complete building. Another detached garden (115) has been added to the northern side of the east-west arm of the L-shaped pond.

Detail of Inclosure Map of 1839 Fig 12
(Courtesy of Northamptonshire Record Office, NRO Map V2793)

Ordnance Survey 6-inch map surveyed and published in 1884

The first edition Ordnance Survey 6-inch map shows that by 1884 the churchyard had been extended northwards over the remains of the castle (Fig 13). This extension must have occurred at some point after 1846 when a plan of the church still shows the boundary close to the north aisle (plan of the church of Higham Ferrers published by John H Parker 1846, courtesy of HiFARS).

Another range of buildings aligned east-west had been constructed beyond those which the Inclosure Map showed encroaching into Castle Yard. This range appears to have been located within the southern verge of the access road to John White Close. Later Ordnance Survey maps show piecemeal clearance of these building ranges from 1901 to 1967.

To the north the earthworks within the angle of the L-shaped pond have been more carefully drawn, showing their irregular form. A small rectangular enclosure is shown close to the Kimbolton Road and was also depicted on Christopher Greenwood's map of the County of Northampton 1826 where it surrounded a detached house. On other maps including the Ordnance Survey Old Series of 1835 and the Ordnance Survey second edition 6-inch map published 1901 this feature is simply shown as an enclosure without buildings. Subsequent Ordnance Survey maps to 1951 record it as a sunken earthwork and it may be seen as such on the 1951 aerial photograph shown in Figure 4. Its subsequent infilling must account for the strong series of anomalies within the

Scale 1:1500 (A4) 1884 6" Ordnance Survey map, overlaid with modern mapping Fig 13

magnetic survey data at this point (Section 4.9, below). Kerr suggested that this sunken feature might have formed a continuation of the L-shaped pond which he interpreted as the castle moat but there is no evidence that it ever extended further than depicted on the Ordnance Survey maps (Kerr 1925, 103 and plate 7).

A small building is shown in the Paddock adjacent to the southern edge of the L-shaped pond, approximately where foundations were noted by Parsons and Brown (Fig 19; Parsons and Brown 1967, 25).

2.7 Previous investigations

Earthworks

The scarp described by the Royal Commission has been preserved in undergrowth between John White Close and the Paddock, though the pond to the north has been filled in (RCHME 1975, 55-56 and fig 67). The scarp is 2m high but now has an uneven gradient perhaps due to erosion, or it may have been raked off and the resulting material used to fill the pond. It is possible that the scarp is a remnant of the castle defences as it roughly aligns with the earthworks sketched on the Bainbridge map of 1789 (Fig 11).

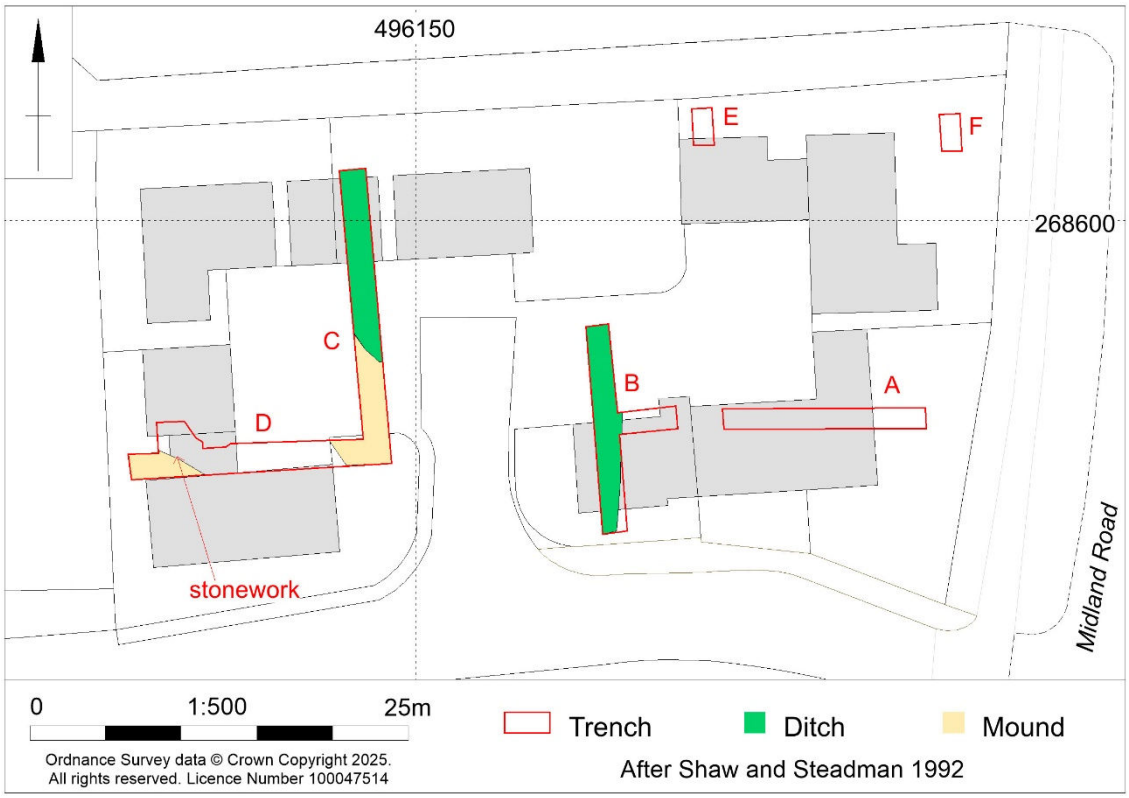
The irregular earthwork located in the angle of the L-shaped pond has variously been described as a rampart - with Bridges even suggesting that this area contained buildings - or as a rabbit warren (see section 2.6). However, in its current form the earthwork was probably created in the seventeenth century from the upcast of the L-shaped pond at a time when, despite the continuance of the name coneygarth, the warren had fallen out of use (Foard and Ballinger 2000, 27-28). Norden does not provide any indication of previous structures within Castle Field and shows that it was enclosed by a hedge, rather than a wall as described in the accounts.

The earthwork is contained within the full length of both arms of the pond, a distance of 128.4m and 106.6m. It rises to a maximum of 4m above the flat area of the park to the west; this is much higher than a typical pillow mound or other form of warren which would rarely exceed 1.5m in height (Williamson 2007, 32).

Trial excavation of castle ditch, 1991

Trial excavation comprising four trenches (A to D) and two test pits (E and F) was carried out in November 1991 within the car park of the former John White Factory ahead of the construction of four houses (Fig 14; Shaw and Steadman 1992). The development area was bounded by the churchyard, the garden of the Green Dragon Hotel, John White Close and Midland Road. The extent of the excavation was limited as its principal purpose was to assess the depth of modern disturbance to inform decisions on type and depth of foundations for the new houses. This was necessary in order to restrict damage to the scheduled monument, but this limitation makes interpretation of the results difficult. A watching brief carried out during the construction of the houses in 2001 confirmed that their raft foundations did not impinge upon significant archaeological deposits (Morris 2003).

Trenches C and D were joined to form a continuous L-shaped trench within the western part of the site while to the east the original intention was to also join Trenches A and B to form a T-shape, but this was precluded by modern services (Fig 14). However, a short annex to Trench B was added.



1991 trench location plan showing ditch and mounds (after Shaw & Steadman 1992, fig 2) Fig 14

The excavation encountered a considerable depth of archaeological and more recent deposits, and each trench was stepped at about 0.8m to 1m depth to allow for safe working. The total depth of the excavations was between 1.3m and 2m from ground surface and it was only in Trench A that natural Great Oolite limestone was exposed. Deeper excavation within the three other trenches may have provided more information but would have been beyond the brief for the work. The test pits were excavated to a depth of 0.5m and only encountered modern disturbed ground.

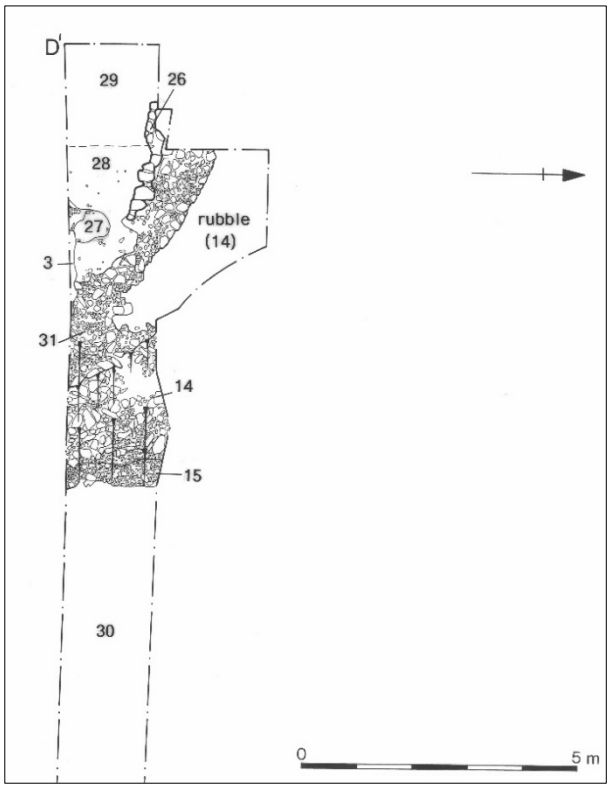
The early stratigraphy was consistent across the trenches and comprised a yellowish-red subsoil underlying a dark greyish-brown loam interpreted as a pre-castle ground surface (Fig 20 and Table 3; A(11), B(70), C(35) and D(30)). This layer contained nine sherds of pottery comprising one early-middle Saxon (Fabric 2), two St Neots Ware T1 (1) T1 (4) (Fabric 100), five medieval shelly coarseware (Fabric 330), and one Stamford Ware (Fabric 205). This small assemblage may date to after 1100 (Shaw and Steadman 1992, 16).

No features were identified in Trench A but a part of a post-in-trench structure containing a small sherd of St Neots Ware T1 (1) T1 (4) (Fabric 100) and an unexcavated linear feature were found in Trench B, as well as a short length of stone wall foundation. This suggests that there was pre-castle occupation on the site.

Trench B annex: castle ditch to foreground and post-in-trench feature centre Fig 15

Trenches B and C identified a large ditch which must have formed part of the castle defences (Figs 14, 18 and 19). It cut the earlier ground surface and so, based on the limited pottery evidence (see above), must date from the twelfth century or later. The position of the trenches meant that the ditch was exposed obliquely so that only short lengths of its inner and outer sides were visible, making its alignment and even its width difficult to assess. However, it is likely that the ditch is part of the eastern side of the inner bailey of the castle and was at least 12m wide.

On the inside of the ditch were two low banks between 1m and 1.2m high which were spaced 9m apart (Fig 14; Mounds 1 and 2). These and the infilling between them may have been intended to create a raised area between the ditch and presumed curtain wall of the inner bailey. Fragments of limestone wall foundations D(26) may suggest that there were buildings inserted into the top of this platform (Figs 16-17).



Plan of Trench D showing possible structure (Shaw and Steadman 1992, fig 6) Fig 16

Trench D: Mound 2 with foundations of limestone structure Fig 17

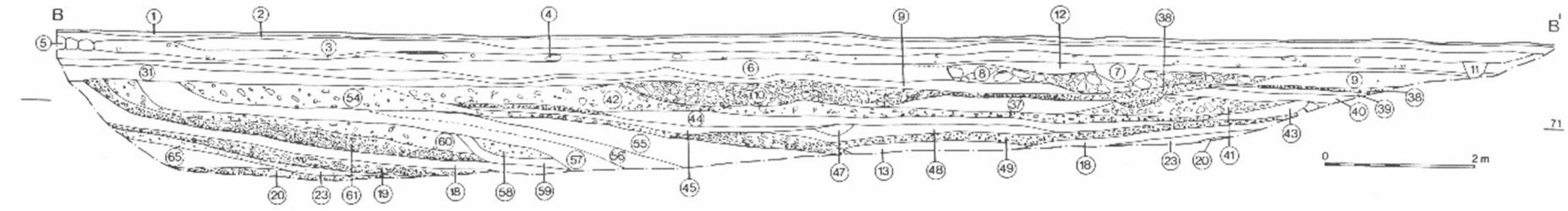
Trench C: layers of Mound 1 with ditch to right Fig 18

The ditch appeared to have been infilled in three stages, with a primary deposition being followed by two episodes of gradual silting over many years (Table 3). The early fills contained one sherd of Potterspury Ware (Fabric 329) and seven sherds of Lyveden roof tile suggesting a late medieval date for their deposition. The first period of gradual silting included a Nuremberg jetton of Hans Krauwinkel (active 1580-1610; Barnard 1916, 70) and the final infill was dated to the seventeenth to nineteenth centuries (Shaw and Steadman 1992, 17), perhaps encompassing the levelling of the site described by Cole (see Section 3.6). Layers of modern infill were subsequently added to provide a level base for a tarmac car park associated with the nearby John White factory.

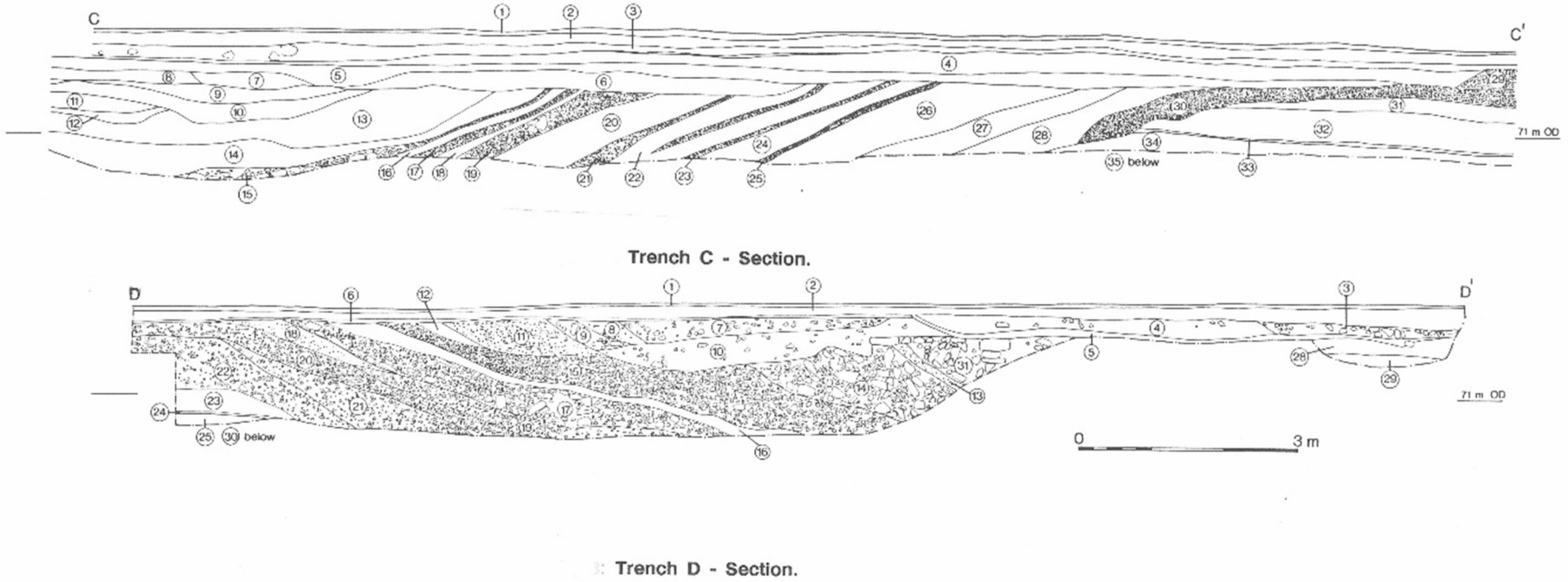
Table 3 List of selected contexts identified in the 1991 trial excavation

	Trench A	Trench B	Trench C	Trench D
Pre castle ditch	Red loam (12) Layer (11) TPQ 1100	Red loam (30) Wall foundation (24) Gully (28) with posthole (26)/(25) Linear feature (19) Layer (70)	Layer (35)	Layer (30) TPQ 1100
Mounds 1 & 2 and stone structure	None	None	Layers (29) to (34)	Layers (25) to (22) & (29) to (27)
Infill between mounds	None	None	None	(21) to (13) & (31)
Primary ditch fill	None	(20), (65)/(68) & (23)	(28) to 26)	None
Early ditch fill	None	(19), (18)/(62)	(25) to (16)	None
Late ditch fill	None	(61), (60), (59)/(58), (57)/(56)/(55) & (54) (49) to (47), (45) to (38) & (10)	(15) to (5)	(12) to (7)
Modern levelling	(1) to (10), (14) & (16)	(34), (31), (9), (6), (8), (12), (5) to (1)	(4) to (1)	(6) to (1)

(Note that context numbers form a separate continuous sequence within each trench.)



Section of Trench B (Shaw and Steadman 1992, fig 4) Fig 19



Sections of Trenches C and D (Shaw and Steadman 1992 figs 7 and 8) Fig 20

Trial excavation of dovecote 2007

The ruins of a rectangular dovecote, measuring 11.6m by 4.5m internally, stand within the rear garden of the Green Dragon Hotel (Fig 21). Although often linked to the medieval castle and manor (Kerr 1925, 52), excavation ahead of repair work suggests a construction date no earlier than the sixteenth century (Patenall and Soden, 2007, 5). The building is shown on the Bainbridge Map of 1789 (316) and the Inclosure Map of 1839 but not the Ordnance Survey map of 1884, so must have been partly dismantled in the nineteenth century.

The present structure comprises the lower part of three walls, originally containing nesting boxes and the southern side formed by a later rebuild. The eastern side has been removed to ground level (Fig 22). The surviving walls were presumably retained as they form boundaries with the adjacent properties fronting on to College Street.

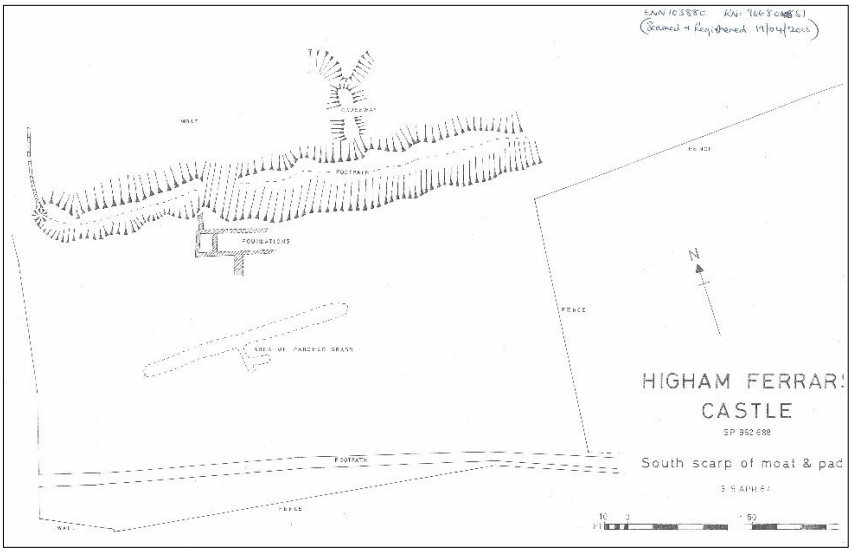
Dovecote from the south-east Fig 21

Three test pits measuring 1.5m by 1.5m were hand-excavated. Two were positioned in the corners of the surviving structure and the third across the eastern wall foundation. The stratigraphic sequence was consistent in all three pits and comprised a clearly defined trench into which the wall foundations were set, a clay floor and subsequent infilling of the space with Victorian and later refuse (Patenall and Soden 2007, 3-4). The foundation trench contained the base from a small jug or tankard in a late medieval redware fabric with speckled brown/orange glaze which has been dated to the sixteenth century (Patenall and Soden 2007, 5).

Test Pit 1 wall foundations and clay floor over offset Fig 22

Foundations of building in the Paddock 1967

Students from a Leicester University field school course led by David Parsons and Tony Brown recorded the limestone foundations of a small rectangular chamber measuring 10m by 3.5m aligned along the southern lip of the L-shaped pond within the Paddock (Parsons and Brown 1967, 25). The building was subdivided with a possible buttress to the north. The eastern end wall was not found, and further foundations extended to the south suggest that the building could have once been more extensive. An area of parched grass within the centre of the paddock may denote further foundations. The foundations were undated, but a small building is shown in this location on the Ordnance Survey 6-inch map surveyed published 1884 suggesting a nineteenth century origin.



Survey of foundations and parch marks in the Paddock Fig 23
(Parsons and Brown unpub. Courtesy of Northamptonshire HER, ENN103880)

3 SURVEY RESULTS

The following overview of archaeological remains discovered brings together the results from the GPR, magnetometer and earth resistance surveys. The radar data is the result of two different surveys conducted with a 450MHz and a 160MHz antenna. The results are presented area by area, from the Churchyard in the south to Castle Field in the north. The text should be read in conjunction with the data plots (Figs 29, 31 and 33-52) and interpretation drawings (Fig 30, 32 and 54-55) presented at the end of this report.

The methodological details of the individual surveys are provided in Appendices 1 to 3. The varying extents of coverage (Fig 2) were dictated by a variety of practical considerations, including time constraints and the presence of several temporary obstructions.

3.1 Technical comments on the datasets

GPR data

The two sets of GPR data provide the most informative results but are also the most difficult to interpret due to the abundance of nebulous, undiagnostic reflections and the unavoidable presence of data artifacts including 'air-waves' and 'multiple reflections' (see technical information in Appendix 2). This report takes a deliberately selective approach, describing and illustrating only those reflections which it is possible to interpret in a meaningful way, and omitting a large number of others. Whilst this does run the risk of overlooking some relevant information, it avoids the opposite and greater risk of cluttering the report with vague generalities and ill-founded speculation.

There are obvious differences between the 160MHz and 450MHz datasets, largely due to the different performance of the two antennae. The 160MHz antenna was able to penetrate more deeply than the 450MHz but was less sensitive to small details and more prone to 'air wave' reflections.

The discussion of the GPR results refers frequently to the depths of features, but it is important to note that these are only indicative. The conversion of reflection times to depths requires the assumption of a uniform velocity for the pulse energy, when in fact the velocity will vary somewhat as it passes through different materials. At best, only a representative average velocity can be estimated.

Earth resistance survey

Because the electric resistance of soil is dependent on its moisture content, earth resistance survey data collected on different occasions can vary in character and in the clarity of what it reveals. This is evident in the present sets of results, with those from the southern areas surveyed in July 2024 having lower values and being smoother in appearance that those from Castle Field, surveyed in August of that year.

Magnetometer survey

Magnetometer survey is not always effective when performed in urban and semi-urban settings. Magnetic halos arise from upstanding ironwork, such as railings and lamp posts, and smaller pieces of buried metal rubbish add noise to the data, tending to obscure any weaker anomalies of archaeological origin. In this case, the results Castle Field provide useful archaeological information but the data from the other survey areas is dominated by ferrous clutter and shows virtually nothing of significance.

3.2 Survey results from the churchyard

The radar data from the churchyard is dominated by the effects of Victorian grave-digging, which has disturbed the ground to a depth of *c*1.5m below the modern surface. The 450MHz pulses failed even to penetrate as far as the graves and so that dataset is of little value. The 160MHz data is more informative, showing clear evidence for the graves and suggesting the presence of a few small features at greater depth.

Both radar datasets contain some superficial linear reflections (not illustrated) which relate to modern wildflower beds.

Churchyard features (nineteenth to twentieth century)

Some small but strong reflections at superficial depth can be attributed to recumbent gravestones and one slightly larger reflection, lying at 0.2 to 0.5m deep in the north-east of the survey area (Figs 33-34, annotated on Fig 54), may relate to the footings of a chest tomb or other monument. These must all post-date the northward extension of the churchyard in the mid nineteenth-century (see Section 3.6, above).

The 160MHz data shows a widespread pattern of north - south stripes, spaced at approximately 2m intervals and lying at around 1.5m deep (Fig 34, bottom). A conspicuous band of strong reflections can be seen at the same depth in the radargrams (Fig 52). The uniform depth and regular arrangement of the stripes implies that they represent rows of graves. Their appearance as semi-continuous stripes rather than rows of discrete east-west aligned features is due to the relatively poor spatial resolution of the 160MHz antenna.

Three broadly rectilinear sets of reflections in the 160MHz data are tentatively interpreted as small structures, each around 2-3m across. One has a slightly waisted 'H' shape and is located near the northern edge of the data at around 1.2m deep (Fig 24 A and Fig 34, centre). Another, of slightly skewed rectangular form, lies towards the centre of the area at around 1.5m deep (Fig 24 B and Fig 35, top). The third is more neatly rectangular and lies on the southern edge of the data at around 2.7m deep (Fig 24 C and Fig 35, bottom). Their dates and functions are uncertain; they are too slight to be confidently associated with the castle but show no evidence of the roofs and voids which would be diagnostic of more recent burial vaults.

A B C

Thumbnail plots of possible small structures in churchyard Fig 24
(Not to scale)

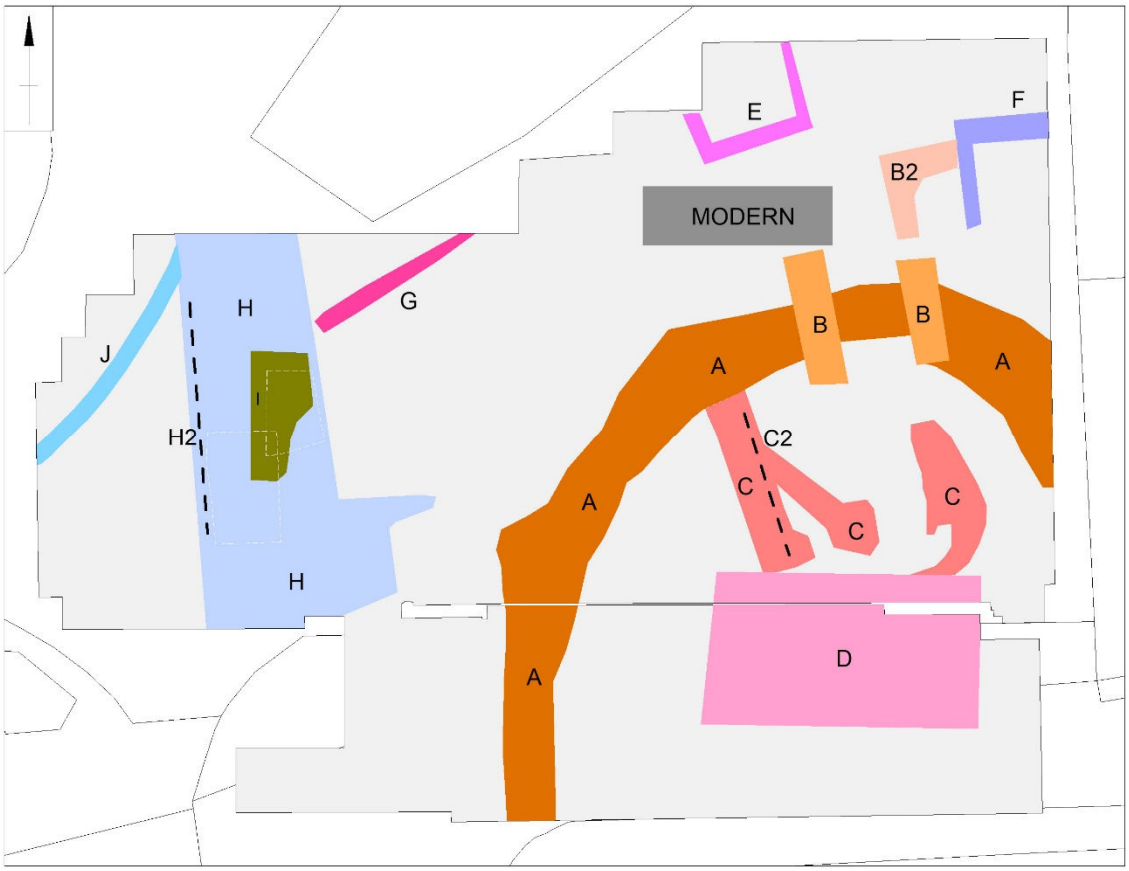
Other

The 160MHz data shows various reflections between 2 to 4m deep which are not necessarily archaeological. Some are data artifacts; these include an airwave dipping northwards from the church (annotated on Fig 35), and several instances of 'multiple reflections' propagating down from superficial modern features. The remainder are too vague and incoherent to be meaningfully interpreted.

3.3 Survey results from the Green Dragon (southern arm of garden)

This area lies within the inner bailey of the castle, in an area where several phases of medieval and post-medieval buildings are believed to have stood. The radar results broadly confirm this, with a variety of overlapping building remains and other features being in evidence. The 450MHz dataset provides the clearest depiction of the shallower walls, whereas the 160MHz data shows the shallow features less distinctly but provides more information on those lying at greater depth.

The figure below is a schematic representation of the main features apparent in the radar data (Figs 36-40), with the letters being cross-references to the following table of results (Table 4). Features 'A' and 'B' are perhaps the most significant, being thought to represent a broad, curving section of curtain wall and the foundations of a gatehouse. Some of the features within the curve may also be elements of the castle, those outside of it probably comprise a mixture of medieval and post-medieval structures.

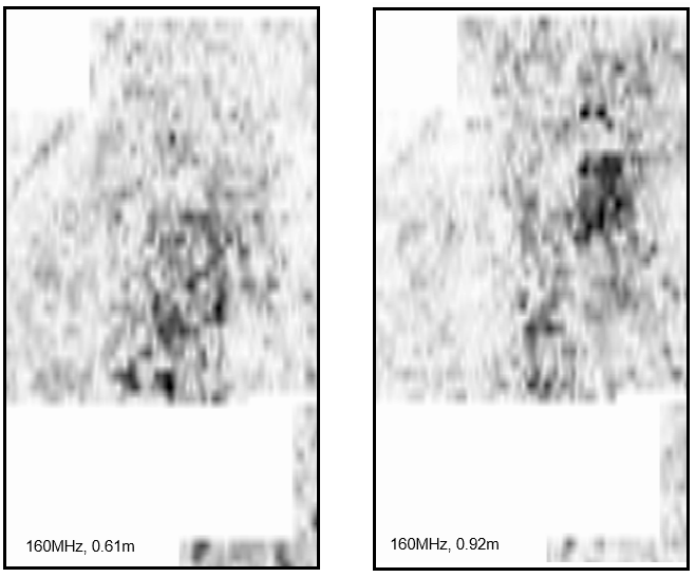


Main features in GPR data from southern arm of Green Dragon garden (Not to scale) Fig 25

Table 4 Main features in radar data from southern arm of Green Dragon garden

		Depth	Data	Fig(s)
A	Part of a broad wall foundation, around 3m wide, with an internal diameter in excess of 20m. This is probably the foundation of a curtain wall belonging to the castle. The western section is clearly defined but the eastern section is less distinct.	0.7m to 1.7m	160	39-40
B	Two short parallel walls, each around 1.5m wide, with a spacing of roughly 3m between their inner faces. These are positioned across Wall A and seem likely to be the foundations of a gatehouse.	0.45m to 1.4m	450	37

B2	A right-angled piece of wall which, given its position and alignment, may be an outlying element of the putative gatehouse.	0.8m to 1.2m	450	37
C	One wall, *circa* 1.5m wide, projecting inwards from Wall A, and two less regular features which may be curving sections of internal wall.	0.5m to 1.2m	450	37
C2	A narrow (<0.5m) but very distinct linear reflector associated with one of the internal walls. Its significance is uncertain.	0.7m to 0.9m	160 & 450	37
D	A rectangular feature which measures at least 12m x 7m across and is perhaps the footprint of a building. Linear reflections along its northern and southern sides may represent narrow (<0.5m) walls. It is most apparent below 1m in the 160MHz data. Some reflections occur above this in both datasets but it is unclear whether those relate to the same feature or a more modern deposit of material under the driveway of the hotel.	0.9m to 1.7m	160	37-40
E	A rectangular arrangement of wall foundations, each around 0.6m broad, probably forming one end of a 5m wide building. The southern wall is the most clearly resolved. The eastern and western walls are less distinct and appear at slightly different depths from each other, but both connect plausibly to the southern wall.	0.8m to 1.3m	450	37
F	A right-angled piece of wall in the eastern end of the garden. This is probably the end of a nineteenth-century building shown on the 1884 edition of the 6" Ordnance Survey map (Fig 13).	0.55m to 0.9m	450	37
G	A probable length of wall foundation, aligned roughly north-east to south-west and measuring approximately 1m wide.	1.0m to 1.15m	160 & 450	39
H	A complex of remains stretching north to south across the western side of the garden, covering a swathe of land circa 6m wide. These probably relate to the range of buildings shown here (in various iterations) on the eighteenth and nineteenth century maps of the area (Figs 12-13). The 450MHz data shows only a broad zone of weak reflection with little internal detail, whereas the 160MHz data shows greater detail which may correspond to two individual rooms within the complex (Fig 26, below).	0.4m to 1.5m	160 & 450	36-40
H2	A strong linear reflection occurs along the western edge of feature H in the 160MHz data at around 0.4m deep. A 'ringing' response from the same feature becomes apparent at a depth of 1.45m and persists as a strong reflection through the rest of the data. This suggests the cause of the reflection is a metal pipe rather than a stone wall foundation.	0.4m	160	40
I	A sub rectangular feature, measuring circa 3m x 6m, which overlies feature H. Whilst it could relate to archaeological remains, its shallow depth suggests a more recent origin, perhaps, the remains of a small area of garden paving.	0.1m to 0.25m	450	None
J	A section of wall footing, circa 0.8m wide, curving across the north-western corner of the survey area. It matches with a boundary depicted on the 1839 inclosure map (Fig 12).	0.45m to 0.75m	160 & 450	37-38
Modern	Both radar datasets show multiple reflections propagating down from a modern boules pitch in the north of the garden. The pitch is rectangular, measuring 8m long by 2m wide. Its reflections must not be mistaken as evidence of building remains.	0.0m	160 & 450	36-38



Rectilinear reflections within the 160MHz data from Feature J (Not to scale) Fig 26

3.4 Survey results from the Green Dragon (car park and driveway)

Both radar datasets show a rectangular set of wall foundations, around 0.5 to 1m wide, which lie beneath the eastern side of the car park at a depth of 0.5 to 1.2m (most easily seen in Fig 39). They would have supported a building approximately 14m long. Their positioning corresponds with part of the range of buildings which appear on the 1884 Ordnance Survey map (Fig 13) and stood here until their demolition in the mid-twentieth century.

Although no other foundations can be identified, the pattern of reflections from the car park does correspond in a broad way to the layout of the former range of buildings (Figs 36-38). The strongest reflections are concentrated around the edges of the car park, and probably represent a mixture of demolition debris and fragmentary floor surfaces. Fewer reflections occur in the central area where no buildings were present.

Nothing of interest was recognised in the data from the driveway leading between the Green Dragon Hotel and Midland Road.

3.5 Survey results from the Green Dragon (northern arm of garden)

Probable building remains at northern end of garden

The northernmost part of the 450MHz radar data contains a set of reflections at approximately 0.9 to 1.2m deep (Figs 42-43 and 54), underlying some shallower reflections from a recent garden path (Fig 41). They appear to represent a twin-celled feature, approximately 7m long by 2.5m wide, which merges at around 1.2m deep with a pair of linear features extending north-westwards to the edge of the survey data. All of these features could reasonably be interpreted as wall foundations, and it is possible that they relate to part of a medieval building with the outer bailey of the castle (Fig 28). Unfortunately, no 160MHz data could be collected here as the area was obstructed on the day of survey

The earth resistance data (Fig 31) shows slightly elevated resistance over the site of the probable building, as might be expected in an area where rubble or stonework was present, but provides no meaningful information beyond that. It also shows a weak right-angled feature in the south of the garden, the significance of which is hard to establish in the absence of a corroborating radar reflection.

Post-medieval and modern features

The 450MHz data shows no other archaeology apart from a short piece of a post-medieval boundary wall foundation crossing the southern tip of the area (a continuation of Feature J in the southern arm of the garden) and a slight suggestion of a wall foundation where the south-western corner of the survey area extends over the eastern side of the ruined dovecote (Figs 42-43 and Fig 54).

The 160MHz data shows a narrow linear reflection in the northern part of the garden at around 0.58m deep (Fig 44). This is roughly 8m long and oriented east to west. Two weaker reflections occupy parallel alignments to the south. It is possible that all three relate to the internal paths or walls of the small detached garden shown here on the Bainbridge map of 1789 (Figs 10-11). There is a less convincing suggestion of a north-south aligned reflection which may relate to the eastern boundary wall of the same garden. The location of these features is indicated on Fig 54.

All four datasets show evidence of a linear feature running around the perimeter of the present garden (Fig 54). This is most clear in the resistance data (Figs 31-32) and least clear in the magnetic data where it appears only as a few fragmentary negative anomalies (Figs 29-30). It almost certainly represents the remains of the recent garden path which is evident on a set of aerial photographs taken in 1952 (Historic England photo refs. EAW043272 to EAW043232).

Non-archaeological anomalies

The deeper part of the 160MHz radar data (below 2.5m) contains two reflections dipping from the eastern and western sides of the garden and converging towards its central axis, creating the false impression of a large ditch (Fig 53). These are, however, merely a pair of air waves reflected off the garden walls. This is demonstrated by their constant gradients and their continuation downwards beyond their crossing point.

3.6 Survey results from John White Close

Possible archaeology

The survey results from this area are inconclusive, revealing a few questionable archaeological features under the southern edge of the central grass square and nothing of interest elsewhere around the Close.

Both the 450MHz and 160MHz datasets show a rectilinear pattern of weak reflections in the south-western corner of the grassed area (most easily seen in Fig 42). It is possible that these represent building foundations, though they could also be a coincidental arrangement of drains and pipes. Assuming the former suggestion to be correct, then the combined radar evidence would imply a central room approximately 5m square, with incompletely resolved rooms to the north and south (Fig 54). The wall foundations would typically be around 0.5m wide, though the eastern seems be narrower than this and also lies at a slight angle to the others (as is particularly evident in the 450MHz data).

The two datasets disagree about the depth of the possible building. The 450MHz data shows it at roughly 0.6 to 0.9m deep, whereas the 160MHz data shows it at 1.2m deep. This not easily explained, as such a large discrepancy is far beyond what might be expected had there been some small error in estimating the pulse velocities.

The two other features of interest lie east of the possible building and appear in both the resistance data and the 450MHz radar data. Their resistance anomalies are sub-rectangular and each measure 4m x 6m across. One is oriented east-west and the other north-south (Figs 31 and 54). The corresponding radar reflections, of similar size and form, lie at around 0.6 to 0.8m deep (Figs 42 and 54). It is conceivable that they are the

remains of structures, though perhaps more likely that they are patches of modern hardstanding or other disturbed ground relating to the construction of John White Close.

Non-archaeological features

The detached piece of 450MHz radar data from between No.3 and No.4 John White Close contains a strong band of reflection at around 0.35m to 0.5m deep (Fig 41). This corresponds with a recent hardstanding which Google Earth aerial imagery shows to have existed until at least 2021.

The roads and parking bays within the close have produced unmistakable radar and resistance anomalies. The radar datasets also contain some narrow linear reflections which are likely to relate to modern drains or non-metallic pipes. These are marked on the interpretation figure (Fig 54) but not otherwise illustrated.

3.7 Survey results from the Paddock

Probable trackway

The two radar datasets and the earth resistance data, show a large zone of complex anomalies in the western half of the field (Figs 47 and 54). The most readily identified element of this is a 4m wide linear feature with a north-easterly alignment. The radar data indicates that its surface is tilted down towards the south-east, with the highest point at around 0.2m and the lowest at 0.4m below ground level, and that its base extends down to around 0.8 - 0.9m (its apparent recurrence at greater depths must be due to 'multiple reflections' - see Appendix 2). The 160MHz data provides the clearest impression of its plan form, including the presence of strong reflections along its edges and an abruptly squared terminal at its northern end (Fig 47, top).

The most credible interpretation of this feature is a buried metalled track, perhaps edged by kerbstones. This may have been an extension of the passageway from College Street, perhaps leading to the small building which stood on the northern edge of this area in the nineteenth century (Sections 3.6 and 3.7, Figs 13 and 23).

The 160MHz data shows a broad band of amorphous reflections extending south-eastwards from north-eastern end of the trackway at around 0.5 to 0.6m deep (Fig 47, bottom). These are much less substantive than the trackway reflections and, their significance (if any) is uncertain.

Possible ponds

The rest of the data from the western area contains a seemingly disorganised mass of formless anomalies. However, a partial interpretation is suggested by the depiction of two small ponds on the 1789 Bainbridge map (Fig 10). The northern pond could match with an ill-defined patch of low resistance (Fig 31) and low reflectance (Figs 48-49 and 54) in the north-western corner of the field, both of those responses being consistent with a relatively clean and uniform fill of silt. The southern pond might be represented by a large crescentic reflector, which the 160MHz radar data shows dipping southwards from 1.1 to 1.7m (Figs 48-49 and 54), this perhaps being consistent with an abrupt change of sediment type on the sloping base of a pond.

Linear features in the east of the field

The 450MHz radar data shows two ill-defined linear reflectors lying at right angles to each other in the eastern half of the field, at an apparent depth of 0.4 to 0.6m (Fig 46). Although disjointed, they are similar in character and both have similar widths of around

0.5 to 1m, which suggests they may represent parts of a single feature. Both radar datasets also show other, less extensive reflectors on broadly similar alignments. Considered as a whole, these results suggest the presence of a fragmentary set of archaeological features, most probably boundary wall foundations or paths.

Miscellaneous and non-archaeological features

Both radar datasets show a large reflection, of loosely elliptical form, lying north of the middle of the field at a depth of around 0.4 to 0.55m (Figs 46, bottom and 47, top). It measures up to 11m by 6m across and seems to dip slightly towards the east. It is unclear whether it has a natural origin or represents an artificial layer of material.

A strong reflection occurs on the southern edge of the 450MHz dataset (Fig 46, top), where a high resistance anomaly has also been recorded (Fig 31). The reflection is thin and shallow, lying at around 0.2m deep, and seems more likely to arise from a patch of modern material (perhaps gravel or tarmac) rather than anything of archaeological interest.

The 450MHz data also contains a narrow linear reflection which curves north-eastwards across the field. It occurs first at very shallow depth, with multiple reflections appearing several times at greater depths. It probably relates to a modern feature such as a trampled and compacted footpath surface. Although not apparent on any of the illustrated radar timeslices, its position is marked on the interpretation drawing (Fig 55) for the sake of record.

A small oval-shaped area of elevated resistance in the west of the field, and a broader band of elevated resistance in the east (Fig 31) probably indicate areas where tree roots have dried out areas of the soil.

3.8 Survey results from the rear of College House

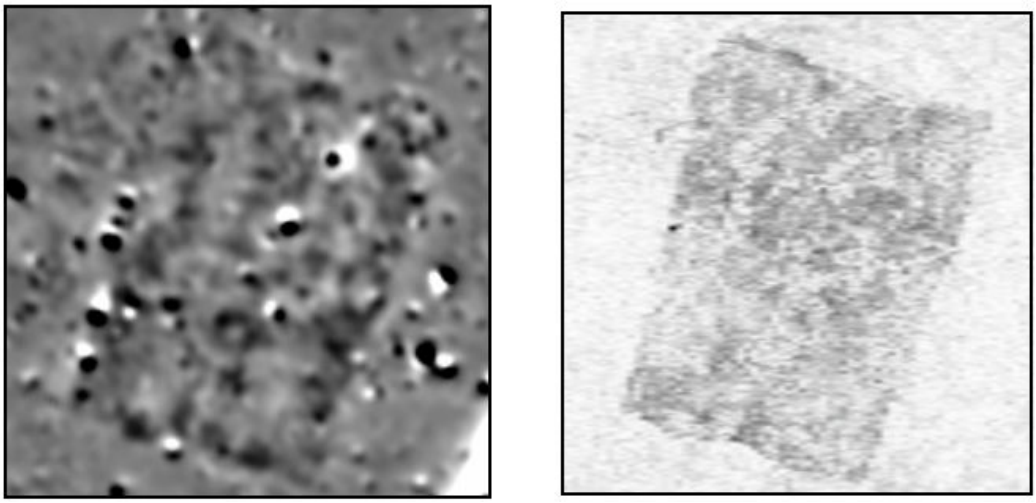
The radar data from the rear garden and parking area of College House (Figs 41-43) shows nothing intelligible apart from a narrow linear reflector (not illustrated) which lies immediately beneath the ground surface. This may be a small drain or other trivial modern feature.

3.9 Survey results from Castle Field

The central pond

At the centre of the field there is a large trapezoidal feature, measuring 28m long by up to 21m wide and oriented north-east to south-west. It is obvious in both the magnetometer and 450MHz radar datasets (Fig 27), though scarcely recognisable in the resistance data. It almost certainly comprises the infilled remains of one of the three ponds recorded on Norden's map of 1591 (Fig 6).

The radar data provides the most detailed information about this feature, showing that its uppermost remains lie slightly less than 0.2m deep, that its sides tend towards the vertical, and that its fill is not homogenous (Figs 50, 51 and 53). A discontinuous circuit of strong reflections around its edge might represent the remains of a stone lining wall. The total depth of the feature is hard to determine, as there is no reflection indicative of a base, but the deepest credible reflections from the fill occur at around 0.75m below the modern ground surface.



Side-by-side comparison of magnetic and radar data from pond (Not to scale) Fig 27

The radar data also shows a linear feature to the north of the pond and a herringbone patten of narrow linear features to its north-west (Figs 50 and 55). Neither can be confidently interpreted, though the arrangement of the latter is reminiscent of a network of land drains.

The magnetic data (Fig 29) confirms the overall shape of the pond and implies that it has a non-homogenous fill. The apparent concentration of magnetically enhanced sediment around the edges should, however, be treated with caution as there is a natural effect whereby magnetic anomaly strength is increased at the edges of a wide body of material (Clark 1996, 101-2). The row of ferrous dipoles on the western edge of the feature (Highlighted with red dots on Fig 30) may be more significant, perhaps relating to masonry ties or other small pieces of in-situ ironwork.

Channels / drains extending from the pond

The resistance data (Figs 31-32) and, to a lesser extent, the magnetic data (Figs 29-30), show three linear features extending westwards, southwards and eastwards from the central pond. The southern and western features produced simple low resistance anomalies, consistent with backfilled channels. The eastern anomaly was more complex and could be interpreted as two narrow channels side-by-side (as shown on Fig 32), or else as one large channel with a drain running down its centre line.

The magnetic data broadly corroborates the resistance data. The western and southern features produced positive anomalies typical of channels, although the southern one is very slight. The eastern feature, however, produced a thin negative anomaly which might be more consistent with a drain than a backfilled ditch.

None of the three linear features appear as recognisable reflections in the radar data. The absence of the probable channels is unproblematic, as ditches are sometimes difficult targets for GPR survey (Schmidt et al. 2015, 76), but no plausible explanation can be given for the absence of the putative eastern drain.

Possible tenement plots

The magnetic data contains a rectilinear arrangement of anomalies across the north-western part of the field (Figs 29-30). Two types are present, some are thin positive linear anomalies which probably represent small ditches and the others broader 'blobs'

which are more suggestive of large pits or spreads of magnetically enriched soil. These could be remains associated with tenement plots fronting on to Kimbolton Road; if so, they would probably be medieval as there is no map evidence for plot boundaries here in the post-medieval period.

The GPR results from the same area reveal some broadly rectangular patterning between 0.25m and 0.40m deep (Fig 50, bottom, and 55). This is suggestive of archaeological remains, although too nebulous to permit the identification of individual features. One of the areas of low reflectance broadly corresponds with the row of large magnetic anomalies and also with an area of low resistance in the earth resistance data (Figs 31-32).

The resistance data also shows two slight linear features lying parallel to Kimbolton Road (Figs 31-32), though it is uncertain whether these might be related to the proposed tenements.

Rectangular sunken earthwork and surrounding features

In the north-eastern corner of the field the magnetometer survey has identified an intense and noisy rectangular magnetic anomaly typical of modern spoil containing abundant pieces of scrap metal (Figs 29-30). The anomaly evidently relates to the backfill of the rectangular sunken earthwork shown in this location on a range of nineteenth century maps and the aerial photograph of 1951 (Section 3.6 and Figs 4 and 13).

The same feature appears in the resistance data as a rectangular gap in a zone of high resistance readings (Figs 31-32). It is possible that the high readings relate to a halo of upcast from the excavation of the feature. Alternatively, it may be that there was a pre-existing spread of rubble or other high resistance material which was cut through by chance when the feature was created.

A low resistance linear anomaly suggestive of a trench (perhaps a robbed-out wall foundation) cuts through, and therefore post-dates, the high resistance material south of the enclosure (Figs 31-32). Its western end appears to have a hooked terminal, and this is confirmed by a corresponding C-shaped anomaly in the magnetic data (Figs 29-30).

Modern features

A curving row of large magnetic dipoles extends through the eastern side of the data, following the line of a former footpath (Figs 29-30). The dipoles are ferrous in origin and would be most easily explained as the remains of a buried pipeline alongside the path.

The earth resistance data (Fig 31) shows a narrow, discontinuous line of high resistance along its western edge, and this probably relates to part of an informal footpath around the field. Higher resistance has also been recorded intermittently alongside the modern tarmac footpath on the eastern side of field.

4 DISCUSSION

4.1 Inner bailey

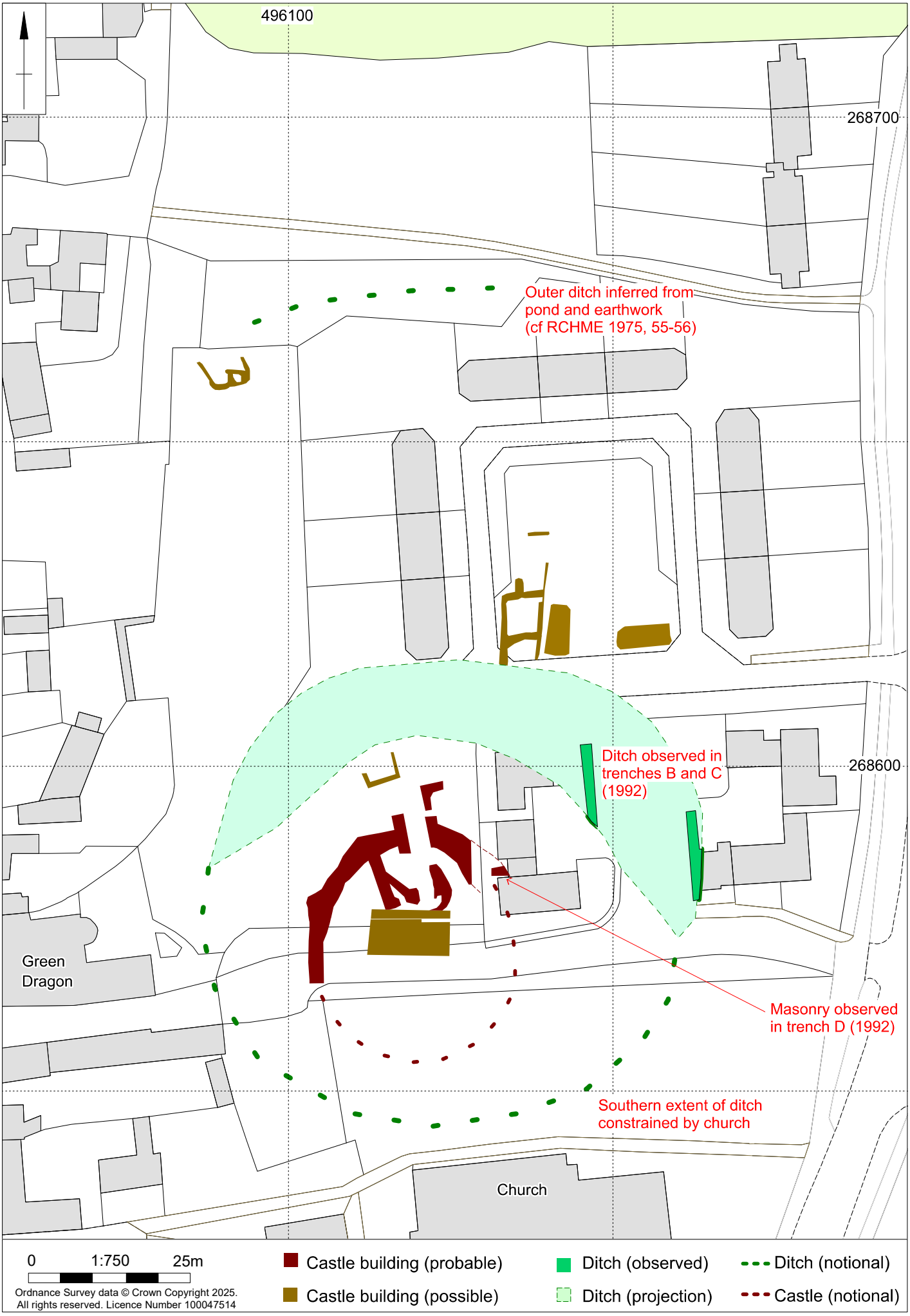
The GPR surveys have provided possible evidence for a curtain wall and buildings within the putative inner bailey of Higham Ferrers Castle, located immediately north of St Mary the Virgin Church (Fig 28). There is, however, no evidence for the defensive ditch which was found in the trial trench evaluation in 1991 and must have extended into the survey area. Ditches are recognised as challenging targets for GPR (Schmidt et al 2015, 76) and it may be that the antennae were unable to differentiate the layers of gravel and limestone rubble filling the ditch from the surrounding natural bedrock. Although building remains were found under the Green Dragon Hotel garden and car park, no continuation could be traced into the adjoining churchyard. This is probably due to landscaping and grave-digging following the extension of the churchyard into this area in the mid-nineteenth century, resulting in a considerable depth of modern overburden.

With these limitations in mind, the following analysis must be treated as conjecture, recognising that other interpretations are also possible.

The principal feature identified in the GPR survey is a broad wall foundation (structure A), some 3m wide which is oval in shape enclosing, if symmetrical, an area roughly 29m by 25m (Figs 25 and 28, Table 4). The continuation of the foundation within the later churchyard to the south could not be traced. The foundation, where identified, is made up of short straight lengths with a thickening of the foundation or slight projections at the angles. There is a gap of 15m between the wall foundation and the ditch identified in the 1991 excavation and such a wide berm would be unusual perhaps implying that the structure was placed on an earthen bank or ringwork with its sloping sides taking up the intervening space. This earthwork cannot have been a high motte because, if so, the foundations of interior features would not have been dug to below the original ground level. This earthwork might be the inner concentric ring shown on the Bainbridge map of 1789 while the outer ring may denote the ditch (Fig 11). The destruction of the mound described by Cole in the nineteenth century suggests that only the deepest foundations will have survived (see Section 3.6). The foundations found at the west end of Trench D in the 1991 excavation and structure E could represent later insertion into the side of the earthwork if space for the provision of buildings was limited (Figs 16, 25 and 28).

The foundations of a square tower (structure B) measuring approximately 6m by 6m appear to have been included in the north side so that it projects both sides of the wall foundation (structure A). The finer detail of the 450MHz survey suggests that the tower may have functioned as a gatehouse with wall foundations 1.5m thick and defining an entrance passage 3m wide. Further reflections to the north of the tower (structure B2) may represent foundations of a wall which may have retained the earthworks or even have acted as a barbican (Figs 25 and 28 Table 4).

The construction date of these structures is uncertain, but the 1991 excavation identified a small quantity of pottery from the earlier ground surface which was cut by the bailey ditch and was dated to after 1100. This limited evidence suggests that the castle was not built by the elder William Peveril as part of the initial occupation after the Norman Conquest but could have been constructed either by his son as a response to the civil war during the reign of Stephen or later as part of the de Ferrers possessions.



Scale 1:750 (A4)

Overview of suggested castle ground-plan Fig 28

Northamptonshire has a concentration of ringworks comparable to the suggested form of Higham Ferrers castle (Cathcart King and Alcock 1969, fig 2), though it appears that these were not all constructed at the same time. At Sulgrave excavation shows that a late Saxon elite centre was replaced by a ringwork following the Norman Conquest (Davison 1977, 109-113). The adjacent ringworks at Culworth and Weedon Lois were also part of the Barony of Weedon Pinkney and due to this association a similar eleventh century date has been suggested for their construction (Lowerre 2005, 243 and 254). However, small scale excavation at Long Buckby and Alderton show that those ringworks were both constructed perhaps at the same time as Higham Ferrers in the mid twelfth century (Thompson 1956, 55-66 and Upson Smith 2011, 17).

The dimensions of the wall foundation at Higham Ferrers are reminiscent of Tamworth Castle, Staffordshire where the walls of the shell-keep are also an irregular polygon with at least twelve faces and define a slightly smaller internal area of 27.5m by 23m (Higham 2018, 104-106 and fig 7). It is thought that the shell-keep wall dates from the late twelfth century, perhaps *circa* 1180 (Higham and Guy 2018, 104). The shell-keep at Tretower Castle, Powys, although smaller with an internal diameter of 15.3m, also has a square gatehouse of similar size to that suggested at Higham Ferrers (Higham 2018, 146-148). The date of the construction of this shell-keep is uncertain but again could be around 1160-1180 (Higham 2018, 148).

A large rectangular building measuring 12m by 7m (structure D) appears to have been built within the centre of the area enclosed by the wall foundation at Higham Ferrers (Figs 25 and 28, Table 4). Its size and central position suggests that the building was of some importance perhaps the great hall, though the narrow foundations of less than 0.5m indicates that the superstructure was lightly built possibly of timber. If so, the foundations may denote the early fifteenth century rebuilding of the hall after the fire of 1409-10 as described in the account rolls (Table 2). At Tamworth the fifteenth century great hall measuring at least 11m by 8m but possibly truncated by the seventeenth century south wing, occupies a similar position within the shell-keep and was originally a wholly timber structure with wattle and daub panels; it is uncertain if there was an earlier hall in the same location (Meeson 1983, 331-35 and fig 1, Higham and Guy 2018, 106). In contrast the twelfth century hall at Tretower Castle is located against the inside of the shell-keep wall.

If the analogy with Tamworth Castle is continued then there would have been a small courtyard between the gatehouse and hall at Higham Ferrers (Higham and Guy 2018, fig 7). The reflections within this area suggest substantial wall foundations of uncertain purpose, though they could relate to earlier buildings predating the fire of 1409-10. It may be expected that the other main castle buildings including king and queen's chambers, chapel and kitchen would have been arranged to follow the inside line of curtain wall, but no structures have been identified in the surveys.

The proximity of the ringwork to St Mary's Church suggests a close relationship between the two. This connection of elite centres of lordship and estate churches has been noted from the mid tenth century, both locally at Furnells, Raunds (Audouy and Chapman 2009, 34-43) and across England (Gould *et al* 2024, 74-80). The fabric of the church is thirteenth century and later, but an earlier phase possibly dating from the twelfth century has been suggested by the Royal Commission (Richmond 1988: Higham Ferrers St Mary, 2). The plan of the early church comprised nave, chancel and possibly south aisle, but it was only in the thirteenth and fourteenth centuries that the church was extended towards the castle with the construction of a north aisle which was to become a second nave and then a further aisle was added.

While earlier phases of a lordly centre may be hypothesised based on the importance of the Higham Ferrers estate the only pre-castle occupation comprises a post-in-trench structure and a short length of stone wall foundation found in Trench B of the 1991 excavation and this evidence is insufficient to demonstrate the remains of an earlier manor house (Foard and Ballenger 2000, 21). Likewise, a pre-twelfth century church may also be suggested but the first documentary reference is when William Peverel the Elder apparently gave the church of Higham to his Cluniac foundation of Lenton Priory sometime between 1102 and 1108 (Knowles and Hadcock 1971, 100).

4.2 Outer bailey

None of the geophysical surveys identified the curtain wall or ditch of the outer bailey and it is possible that they both may lie outside and between the areas surveyed. To the north the defences were probably located within the undergrowth between John White Close and the Paddock as suggested by the Royal Commission (RCHME 1975, 56 and fig 67) or further to the north, while to the east they may have extended below the eastern terrace of houses (Nos 7-9) in the Close. To the west the curtain wall may have been sited along the line of the current boundary wall with the ditch further to west within the back gardens of properties fronting onto College Street. If so, then there must have been encroachment into this area between the demolition of the castle in 1523 and Norden's map of 1591. There is, however, no evidence for the ditch in the 450MHz GPR survey in the garden of College House.

The GPR survey identified four possible buildings within the presumed location of the outer bailey, none of which correspond to anything depicted on historic maps of the area (Fig 28). The purpose of these buildings and their date are uncertain.

In the northern part of the Green Dragon Hotel garden is a twin-celled feature, approximately 7m long by 2.5m wide which may have formed the southern end of a building which extends to the north-west (Figs 28 and 54). The earth resistance data shows slightly elevated resistance over the site suggesting the presence of rubble or stonework.

The other possible buildings are located in the southwest part of John White Close (Fig 28), although they could simply represent twentieth century builders' rubble and modern services and drains. If they do represent earlier buildings, one may have comprised two rooms 5m wide, with a narrower annex to the north. The gable-ends of the building were not found but it may be at least 13m long. The wall foundations are narrow, about 0.5m wide, perhaps suggesting a wooden superstructure. The other two buildings are denoted by sub-rectangular high resistance anomalies and GPR reflections, each measuring 6m by 4m across, one oriented east-west and the other north-south (Figs 31, 42 and 54).

4.3 Castle Field

The rectangular anomaly identified in the centre of Castle Field is probably one of the three ponds shown on John Norden's map of 1591. The surveys suggests that the pond which measures 28m by 21m and at least 0.5m deep, is vertically sided with a stone lining perhaps containing metal masonry ties but has an unlined base (Figs 27, 29-30 50-51, 53 and 55). Narrow channels also identified as part of the survey may have connected the pond to the other ponds and acted as a drain to the west. The fishponds may have been those referred to in the Inquisition Post Mortem of 1298 (Table 2) although there are other fishponds within the parish so their identification is uncertain.

The survey results also suggest the possibility of tenements extending from the Kimbolton Road into Castle Field, though the anomalies/reflections are not clear enough to define actual property boundaries (Figs 29-32 and 55). If so, it follows that medieval street frontage along College Street would have continued around the corner into Kimbolton Road. It is probable that any buildings would have been located within the verge of the current road and therefore outside of the survey areas.

Further to the east, close to the Kimbolton Road, it is tempting to suggest that the possible robbed-out wall foundation might form part of the boundary to the medieval warren with hooked terminal at its western end forming an entrance (Figs 29-32). Equally, unsupported by corroborative evidence is the possibility that the nearby sunken rectangular earthwork could have been the pinfold or pound mentioned in the accounts of 1313-14 (Table 1), though if so, it is not described as such on any map.

4.4 Later remains

The GPR surveys in the churchyard have identified rows of graves and the probable remains of a chest tomb or other funerary monument (Figs 24, 33-40, 52 and 54). None of these are likely to pre-date the northward extension of the churchyard in the mid nineteenth century. Three possible small structures have also been identified; these are hard to interpret but might relate to vaults or other churchyard features.

The range of eighteenth and nineteenth outbuildings immediately behind the Green Dragon Hotel are clearly identifiable within the radar data and have perhaps destroyed or obscured earlier remains related to the castle (Figs 25, 36-45, 54). The second range of similar buildings shown on the 1884 Ordnance Survey map was not identified in the southern verge of the access road to John White Close. This may suggest that damage caused by the construction of the Close was extensive and would have removed any shallow features related to the castle other than the possible buildings noted above.

The GPR surveys may have identified a few internal elements of the small, detached garden which the Bainbridge Map of 1789 shows to the north of the dovecote in the area of the present Green Dragon Hotel garden (Figs 41-45 and 54). Otherwise, this area which appears to have been little altered in recent times, has few reflections/anomalies despite being located within the western part of the outer bailey and this lacuna is difficult to explain.

The most likely interpretation for the anomalies and reflections within the Paddock is that they relate to nineteenth century use of the area, with a metalled track leading to the small building shown on the 1884 Ordnance Survey map. The remains of this building are perhaps those identified by David Parsons and Tony Brown in 1967 (Sections 3.6 and 3.7, Figs 46-49 and 55). However, there is an outside possibility that the feature identified here as a track actually forms part of the foundations of the curtain wall of the outer bailey, if the latter ever extended this far north. The impact of the two square ponds shown on the Bainbridge map of 1789 on earlier archaeological remains in this area is uncertain.

The response to the different survey techniques within Castle Field shows that the flat area of the park has been little disturbed in recent times despite its use as an allotment during and after the Second World War and therefore the absence of reflections/anomalies may suggest that buildings related to the medieval castle or manor were not located there.

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MOLA
December 2025

APPENDIX 1: MAGNETOMETER SURVEY

Fieldwork methodology

The magnetometer survey was undertaken by MOLA staff and HiFARS assistants operating a Bartington magnetometer cart. This is a two-wheeled, lightweight sensor platform incorporating a bank of six vertically-mounted Bartington Grad-01-1000L magnetic sensor tubes spaced at 0.8m intervals along a bar aligned crossways to the direction of travel. These sensors were calibrated ('zeroed') at the start of each day's survey to minimise heading errors and offsets in their zero values.

The cart was also equipped with a Leica Geosystems Viva GNSS antenna mounted on the central axis, 1.02m astern of the sensors. The magnetic sensors output data at a rate of eight readings per second and the GNSS antenna output NMEA format data (GGA messages) at a rate of one per second. These data streams were compiled into a single raw data file by MLGrad601 logging software.

The cart was propelled along straight and parallel traverses across each survey area, with data logging being manually 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 displayed by the MLGrad601 logging software. The typical speed of coverage was under 1.8m/s, with an effective data resolution thus approximating to better than 0.225m x 0.80m.

The survey was successfully conducted in all intended areas of the site (Fig 2). The churchyard had been excluded in advance, as it was foreseen that the tree canopies, would prevent the GNSS antenna obtaining sufficiently precise positional information.

Data processing and visualisation

The raw survey data was initially processed with MultiLGrad601 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 projected 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 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 Ordnance Survey base mapping (Fig 29). A greyscale range of -/+10nT has been chosen due to the presence of many strong ferrous anomalies and magnetic halos.

The interpretation of the data has been undertaken in a qualitative manner, based on the recognition of distinctive anomaly types and patterns. The interpretation drawing (Fig 30) shows the main anomalies but, to avoid needless clutter, omits the magnetic halos, the majority of small ferrous dipoles and various minor anomalies of indeterminate origin.

APPENDIX 2: GPR SURVEY

Fieldwork methodology

The survey was undertaken by MOLA staff with MALÅ GX450 and GX160 radar units mounted on a MALÅ "RTC Mini" rough-terrain wheeled cart with an odometer fitted to the rear-left wheel. The antennae transmitted radar pulses at central frequencies of 450MHz and 160MHz respectively, measured the reflected pulses and logged them digitally in the control unit as RD3 and RD7 files.

In the field the 450MHz unit was configured to collect data within a time window of 200ns (a notional maximum penetration of 7m) and the 160MHz unit configured to a time window of 180ns (a notional maximum penetration of 6m). The datasets were cropped during processing at the point where strength of signal had attenuated and further responses in each trace became uninformative (see below).

Data was collected within rectangular grid units of various sizes and orientations. The grid corners were positioned with a Leica Viva RTK GNSS, to an accuracy of +/- 0.03m, and tape measures were used to locate the traverse positions within each grid.

The traverses were spaced at 0.5m intervals within each grid and were walked in a zig-zag pattern. The odometer wheel was calibrated to trigger readings at 0.05m intervals along each traverse. The full details of the traverse patterns, along with the names of the individual traverse files in the data archive, can be found in Figures 56 - 57.

Data processing and visualisation

The raw survey data, in the RD3 file format, was processed with ReflexW, a standard software package for the task. The initial data handling comprised the attribution of nominal grid co-ordinates to each survey traverse (or 'profile'), enabling them to be assembled in order, the cropping or stretching of each profile ('rubber-banding') to correct minor variations in length, and the resampling of each traverse to a precise trace interval of 0.05m to correct any irregularities introduced by the rubber-banding.

The individual profiles were further processed by use of the time shift function (typical correction circa -5.8ns) to remove the direct wave response from the ground surface and then by applying a time cut to remove the lower parts of the profiles beyond which the reflections were too weak and noisy to be useful (120ns for the 450MHz, 160ns for the 160MHz).

Other processing steps comprised the use of a bandpass filter to remove high and low frequency noise, a manually-defined gain curve to amplify the deeper part of the profiles and ReflexW's 'background removal' function to minimise horizontal banding across the profiles.

After processing, the individual data profiles were assembled into 3D data blocks and these were resampled in the horizontal plane and enveloped to produce 'timeslices' (plan views of reflections with a common pulse return time). Notional "depths" of the responses, arising from interfaces between media of differing dielectric permittivity, were inferred by assuming a pulse velocity of 0.09m/ns but these are approximations as the exact pulse velocities through the different parts of the non-uniform soil matrix cannot be known.

A selection of timeslices are presented in this report as greyscale raster images which have been rotated and scaled to fit against Ordnance Survey base-mapping (Figs 33–51) and representative radargrams are presented in Figures 52-53. An annotated

interpretation drawing, synthesising the most notable reflections from all depths, is presented as Figures 54 and 55.

Technical note - common data artifacts

The following types of data artifact are present in the datasets. For more technical information about these, see Conyers 2013 and Guideline Geo 2025.

Air-waves (or Air reflections)

Although most ground-coupled GPR antenna are shielded to direct the signal wave directly into the ground, a very small portion of this wave can escape laterally through the air. If this wave then reflects from above-ground structures (buildings, trees, cars, etc) and returns to the receiver, those reflections can appear as extremely wide hyperbolas or dipping reflectors in the data set, and can potentially be mistaken for, or obscure the results of, buried objects. However, these can be tested as the velocity of these air waves will be constant and much faster than through the soil, in the order of 0.3 m/ns.

Multiple reflections

In some instances, an interface can reflect sufficient energy that some partially reflect from the underside of the GPR antenna back down to the interface and back up to the antenna again. This can generate additional responses that echo the pattern and profile of the first response at multiples of the same depth (i.e. the first at 8ns then 16ns and 24ns). This can happen across voids such as non-metal pipes and over thick clay-mineral deposits.

Ringing

'Ringing' appears as a localised “stack” of multiple responses arising when the radar pulses reverberate from metal objects. In such cases the entirety of the pulse energy will be reflected, preventing deeper penetration.

APPENDIX 3: EARTH RESISTANCE SURVEY

Fieldwork methodology

The earth resistance survey was conducted by HiFARS members after an initial training session by MOLA. Data was collected with a Geoscan Research RM15 resistance meter deployed in twin probe configuration with a mobile probe spacing of 0.5m and the remote probes spaced a similar distance apart. The circuit was re-balanced when moving the remote probes.

Each survey area was divided into a network of contiguous 20m survey grids which formed the basic unit of survey. Key grid corners were positioned with a Leica Viva RTK GNSS to an accuracy of 0.03m, and survey lines were then used to guide the positioning of each measurement point within each grid to an accuracy of c0.1m.

Measurements of earth resistance were recorded to a precision of 0.1Ω and at a spatial resolution of 1m in each axis.

The data presented in this report was successfully surveyed in July and August 2024. Further survey of the churchyard will be undertaken in late 2025 or 2026 and the results will be presented in a separate report.

Data processing and visualisation

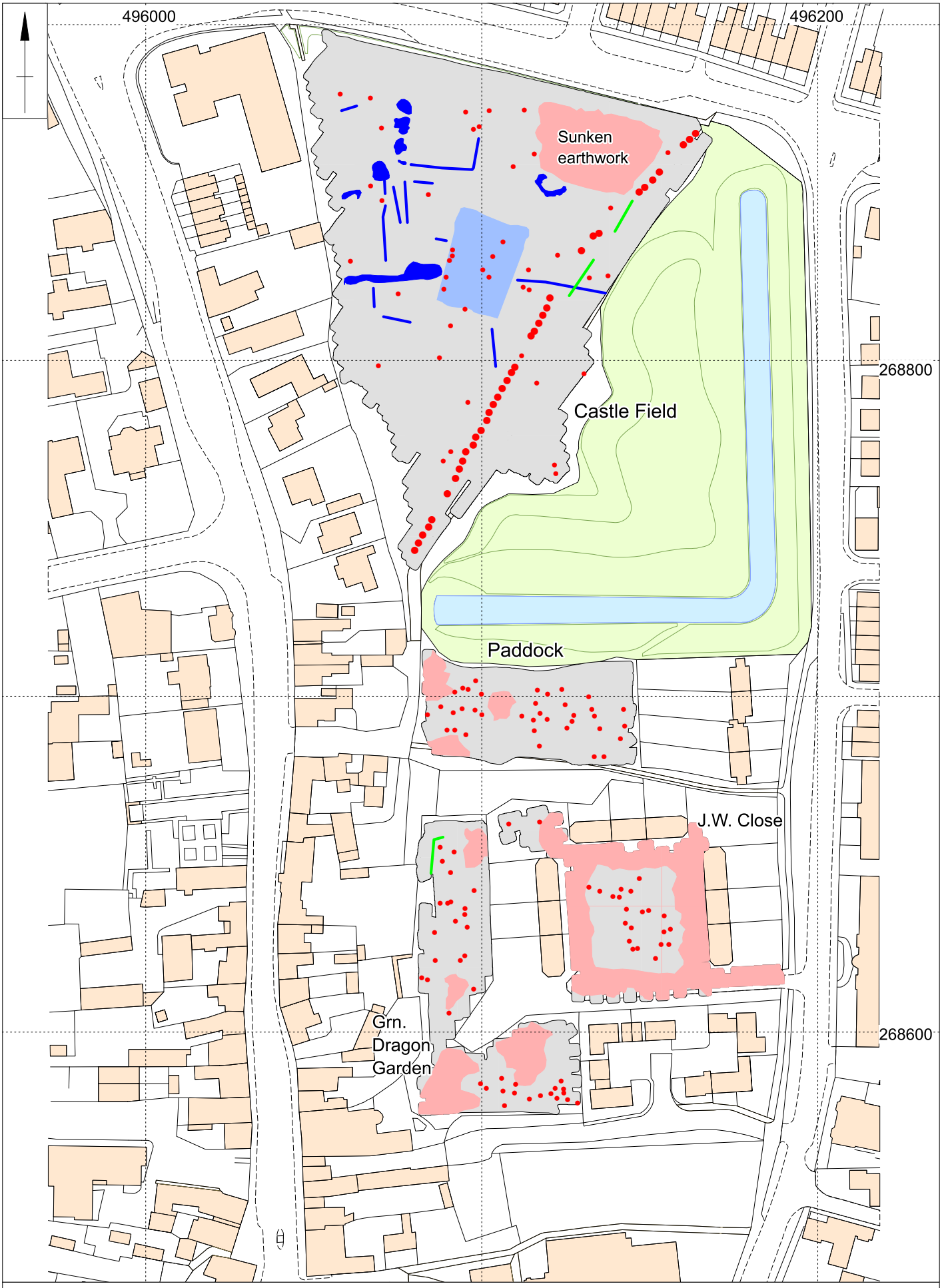
The earth resistance data was visualised and processed using Geoplot 3.00v software. The only processing required was the edge matching of grids and the use of the 'despike' function to remove a few bad readings caused by tussocks or other obstructions preventing the probes from making good contact with the ground.

A high-pass filter was applied to copies of the resistance datasets. The filtered plots were considered alongside the unfiltered ones whilst interpreting the data, but they were not informative enough to merit presenting as additional illustrations in this report.

The processed data was output as greyscale raster images, at appropriate ranges for each data set, and these have been rotated and scaled for presentation against Ordnance Survey base-mapping in Figure 31. A drawn interpretation of the data is presented in Figure 32.

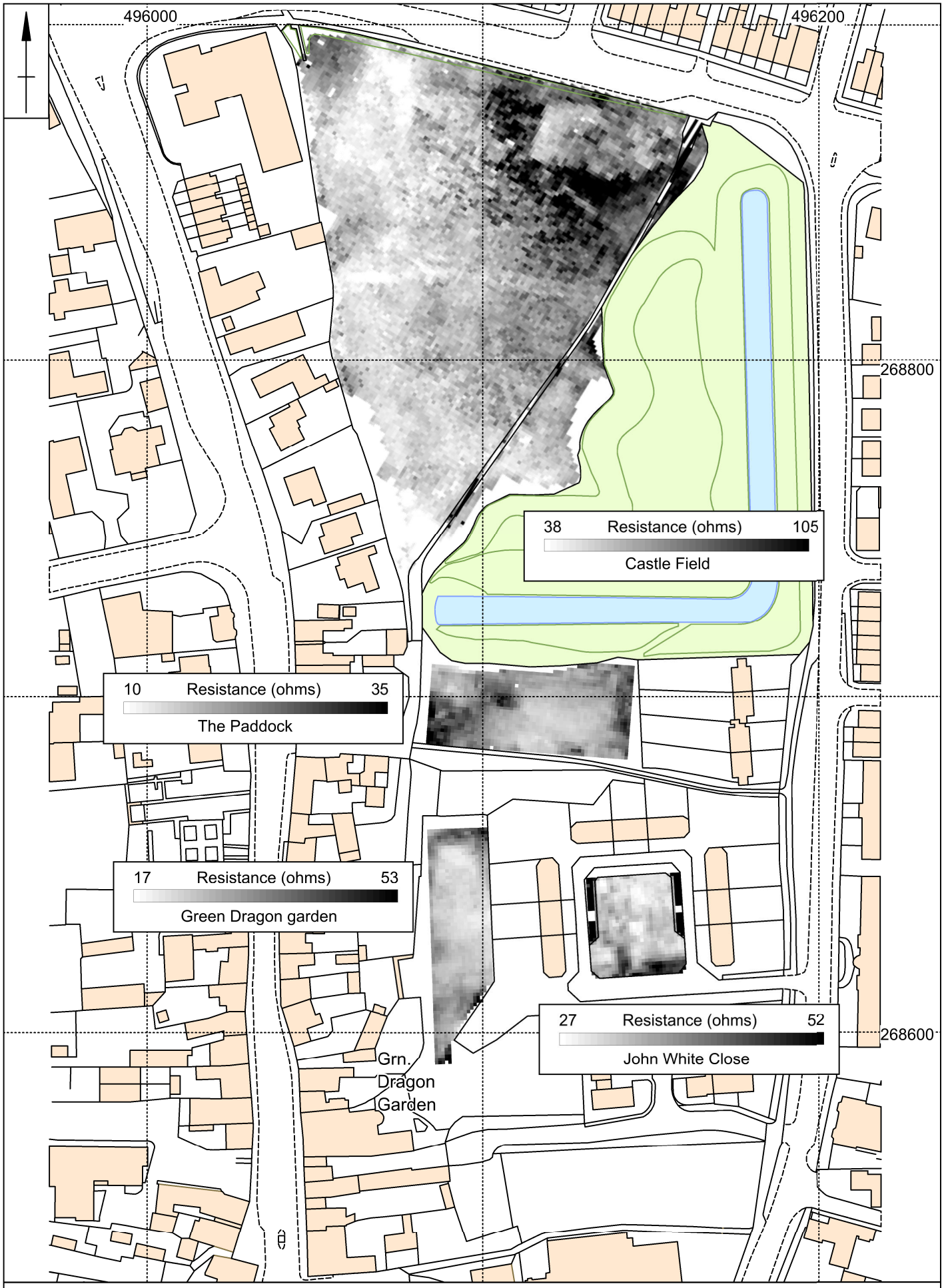
Scale 1:1500 (A4)

Magnetometer survey results Fig 29



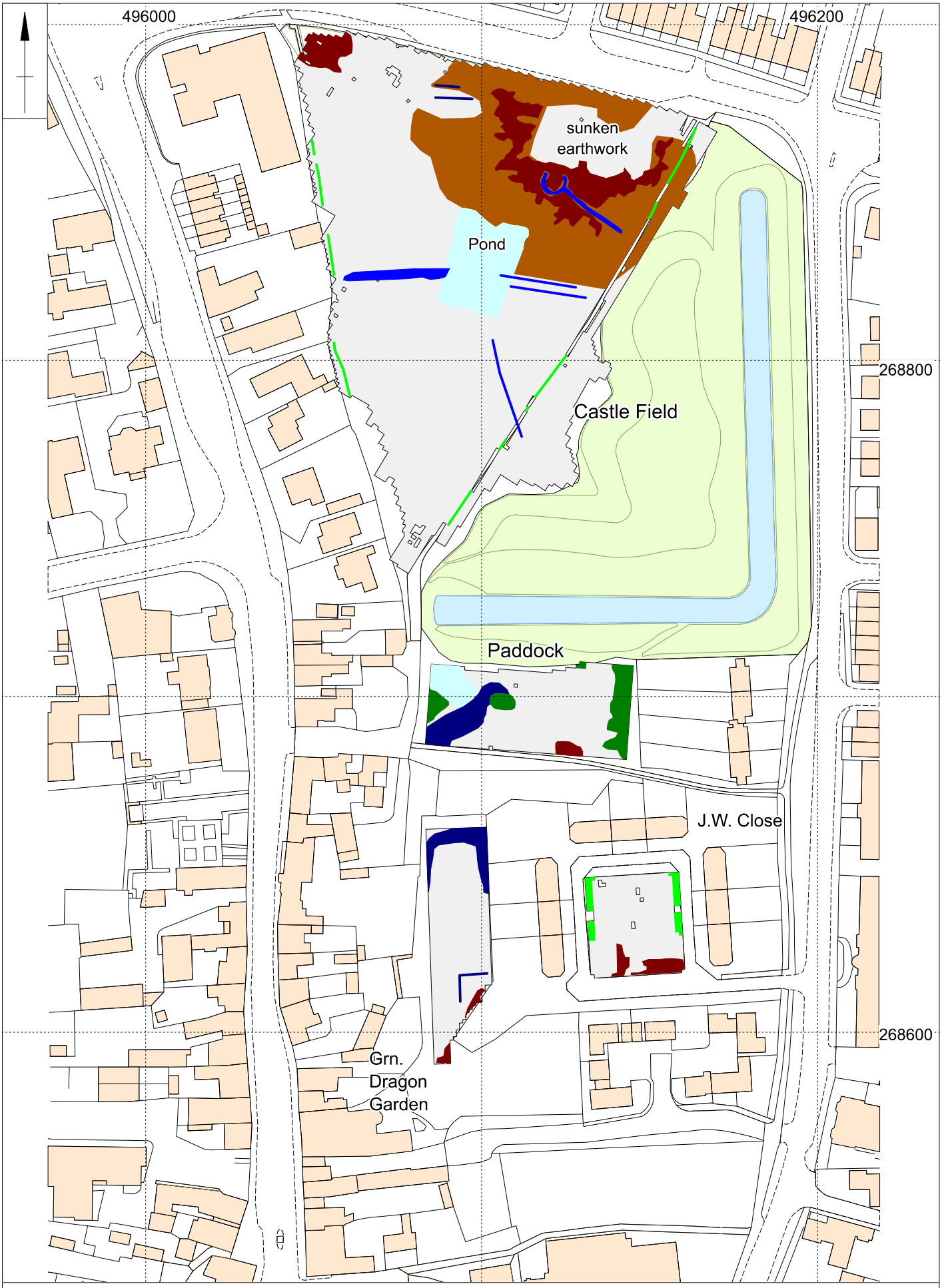
Scale 1:1500 (A4)

Magnetometer survey interpretation Fig 30



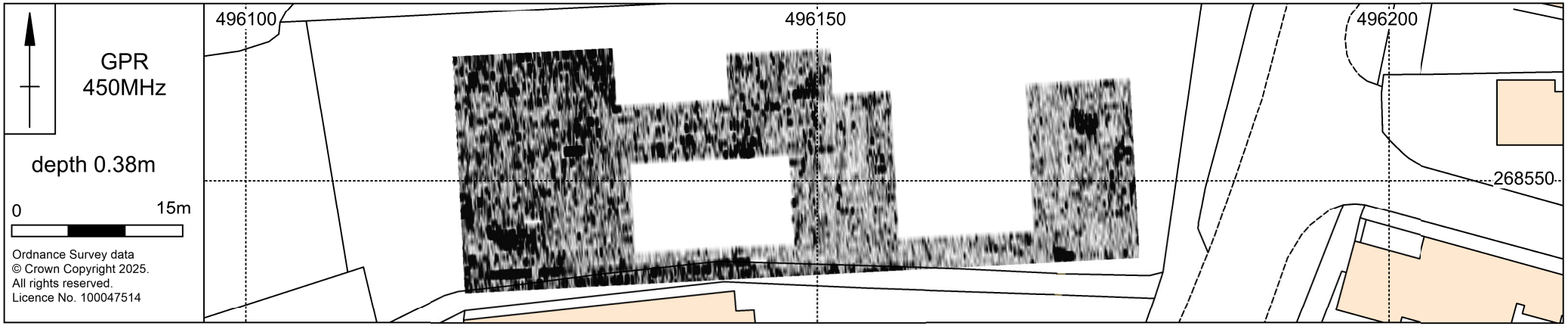
Scale 1:1500 (A4)

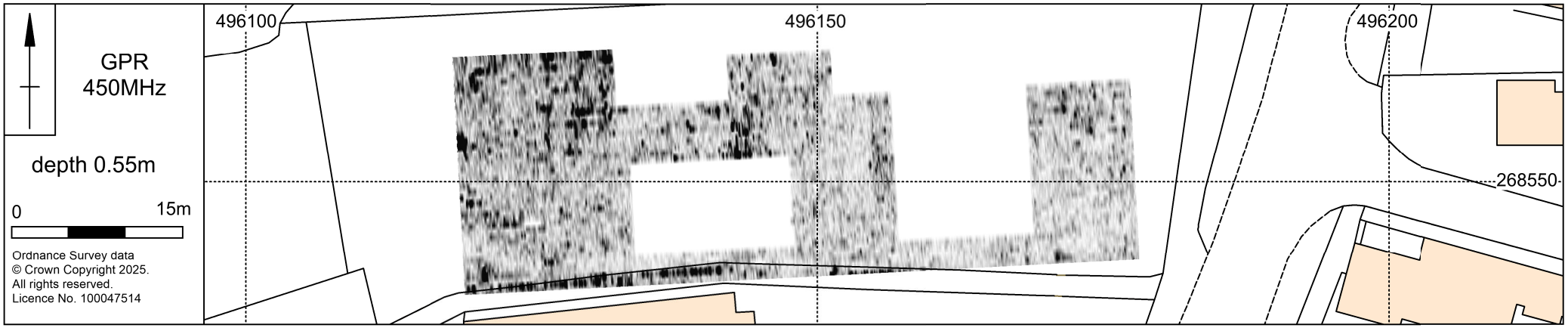
Earth resistance survey results Fig 31

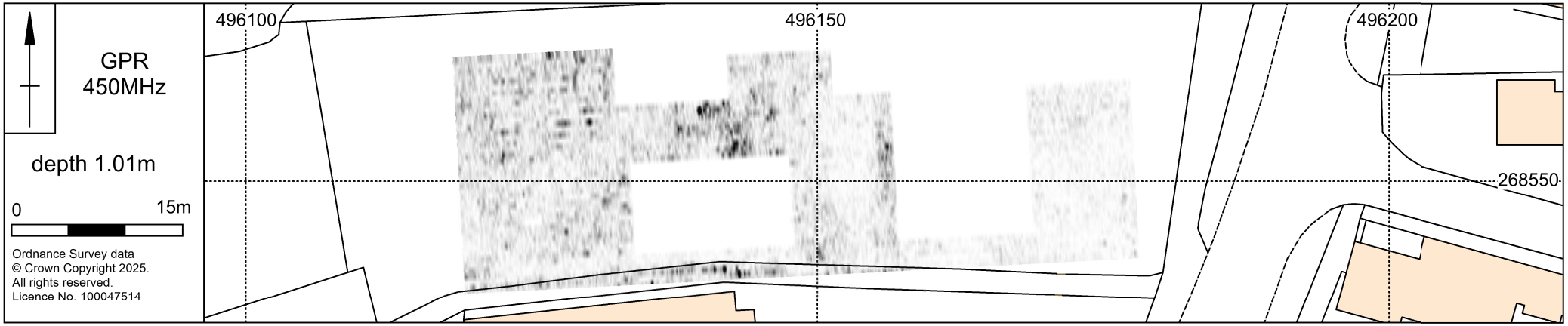


Scale 1:1500 (A4)

Earth resistance survey interpretation Fig 32

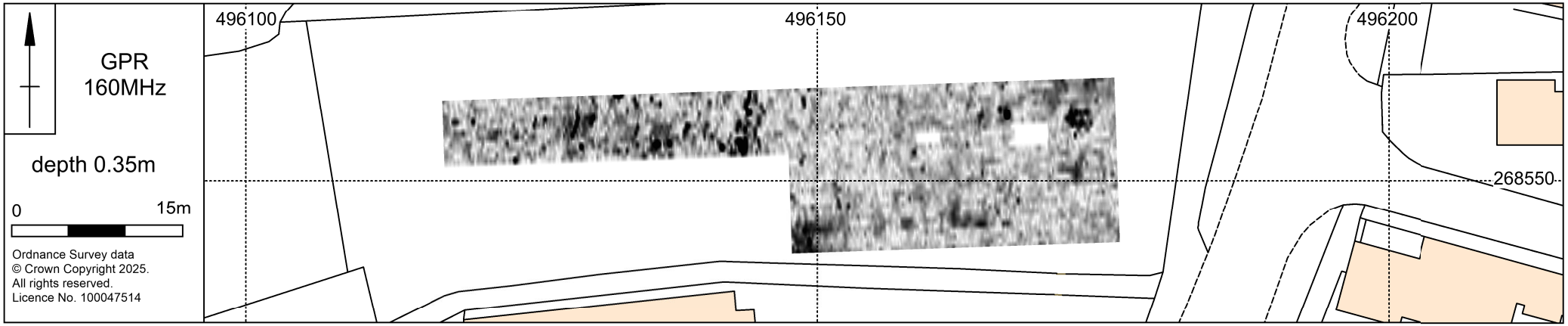


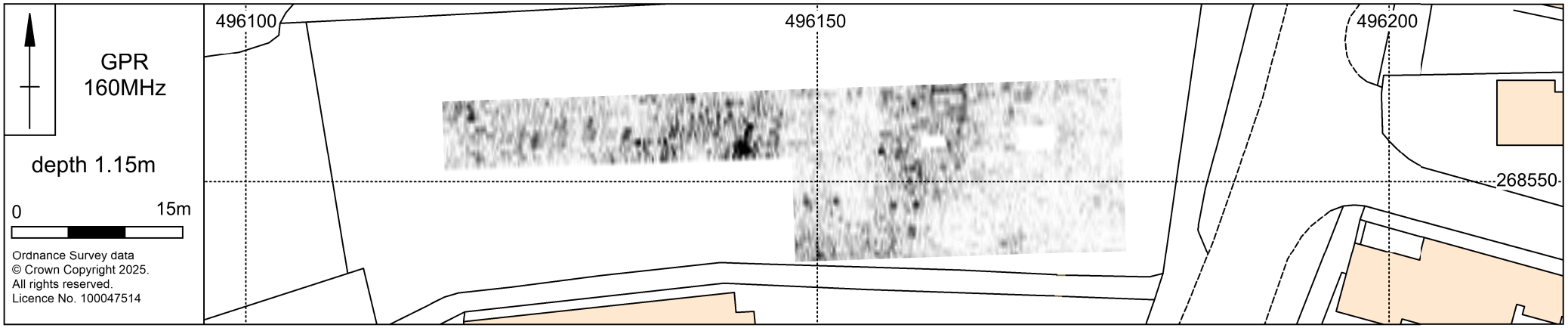


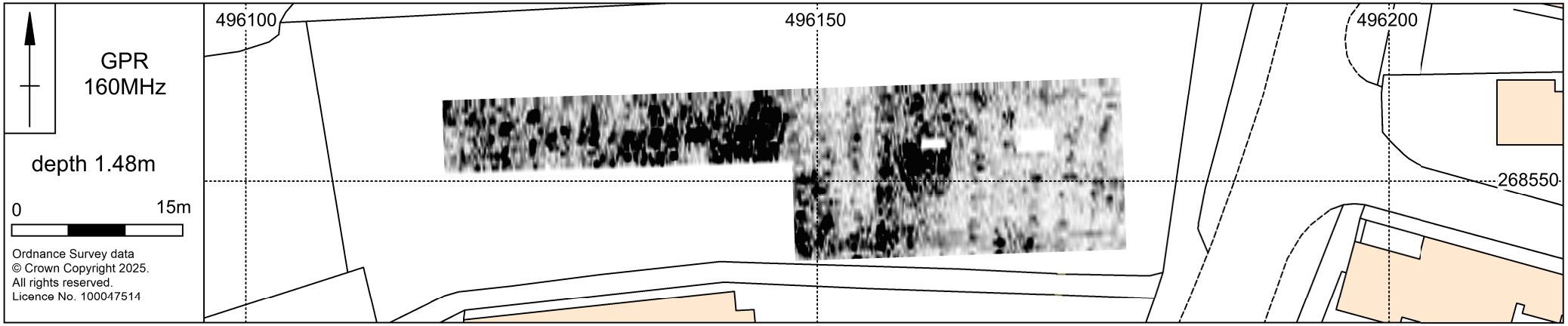


Scale 1:500 (A4)

450MHz GPR timeslices - Churchyard Fig 33

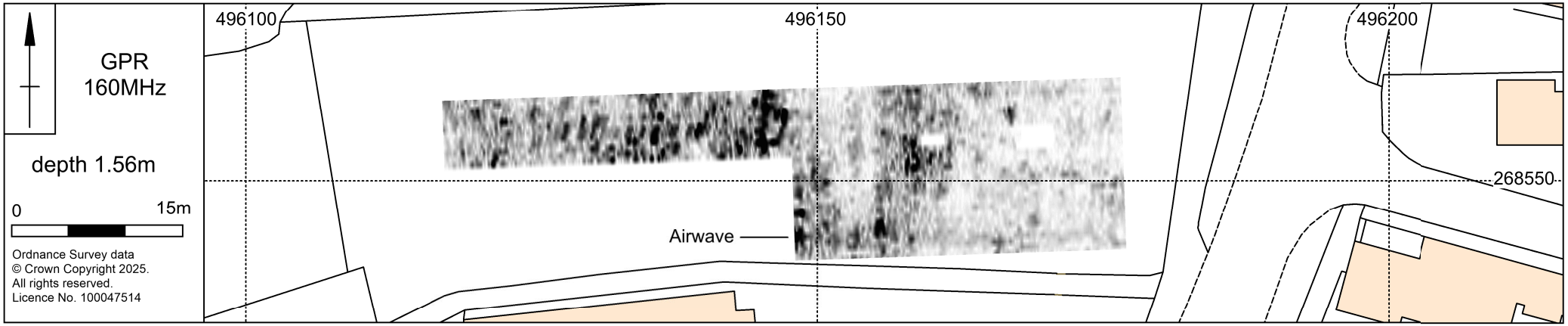


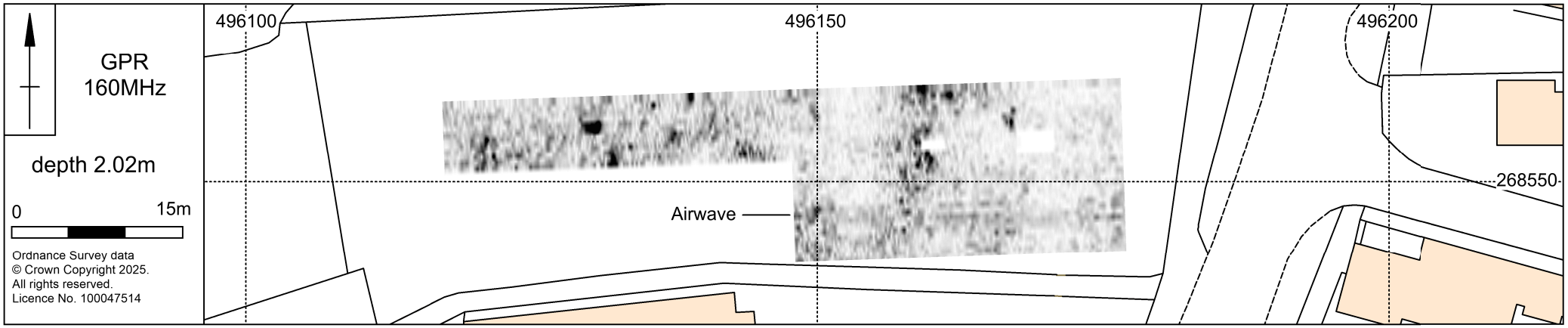


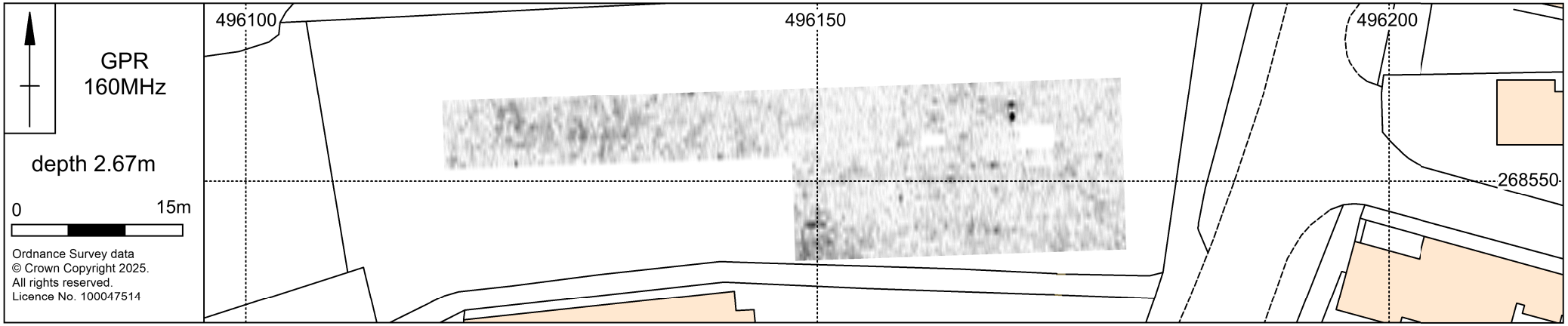


Scale 1:500 (A4)

160MHz GPR timeslices - Churchyard (1) Fig 34

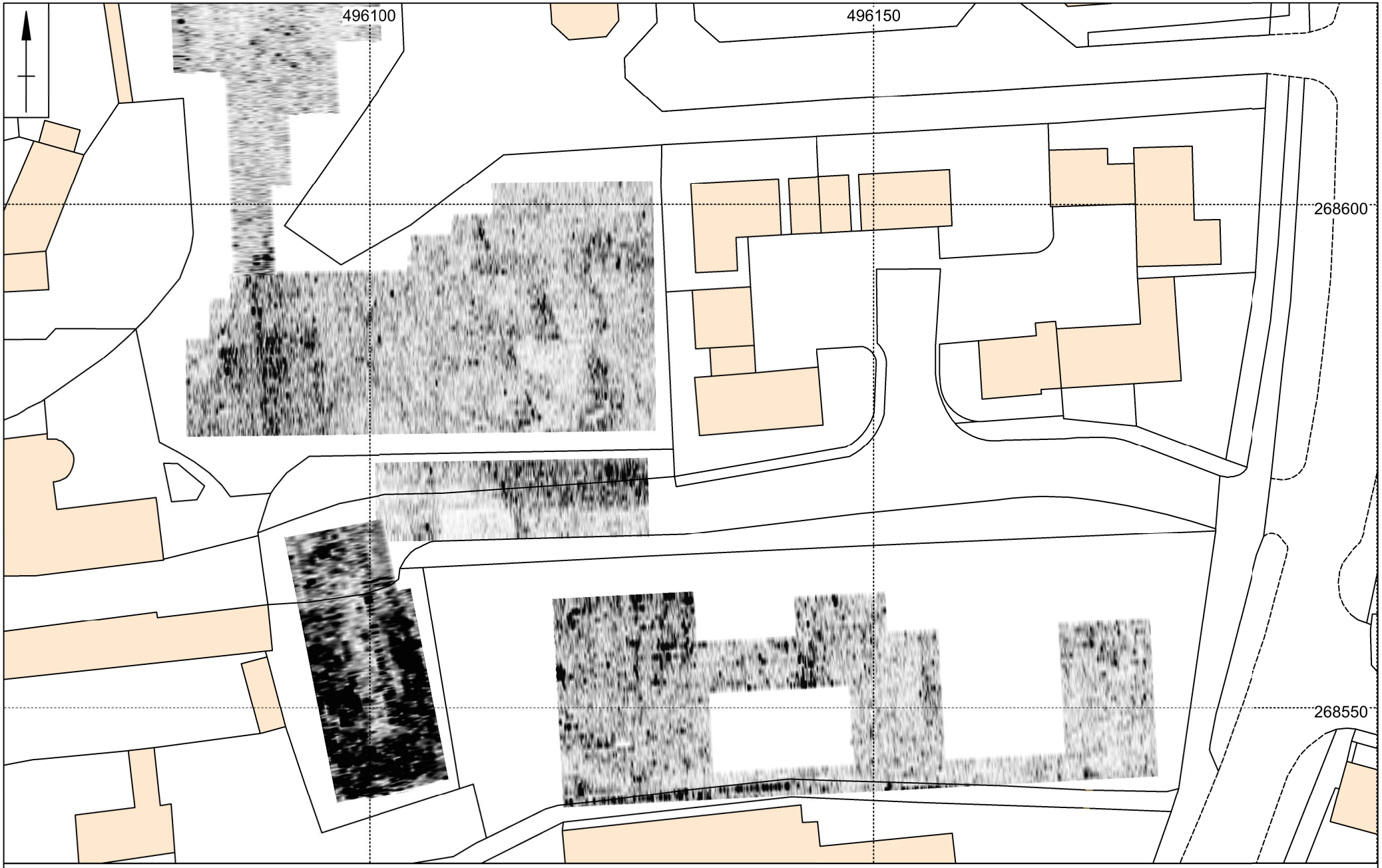






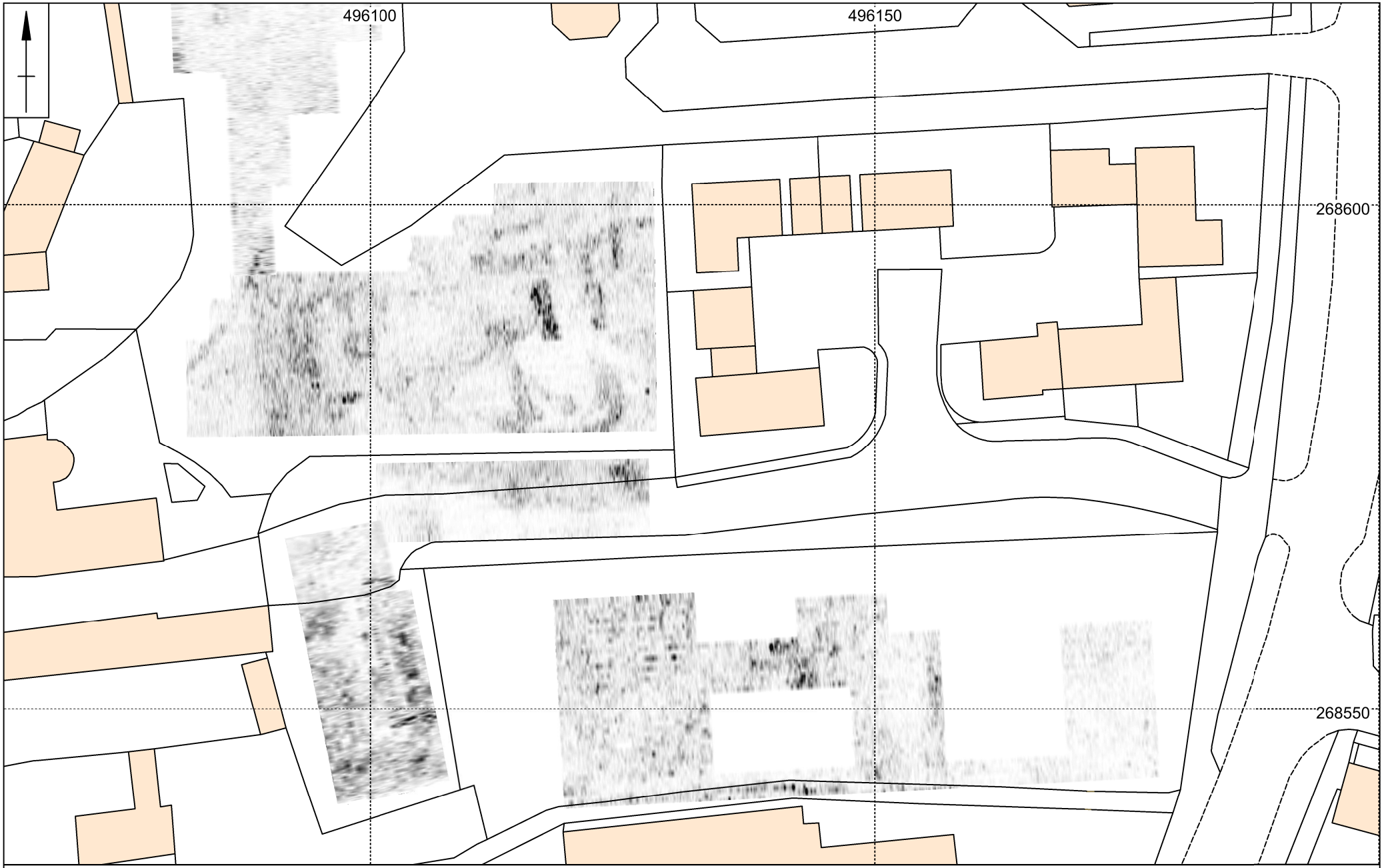
Scale 1:500 (A4)

160MHz GPR timeslices - Churchyard (2) Fig 35



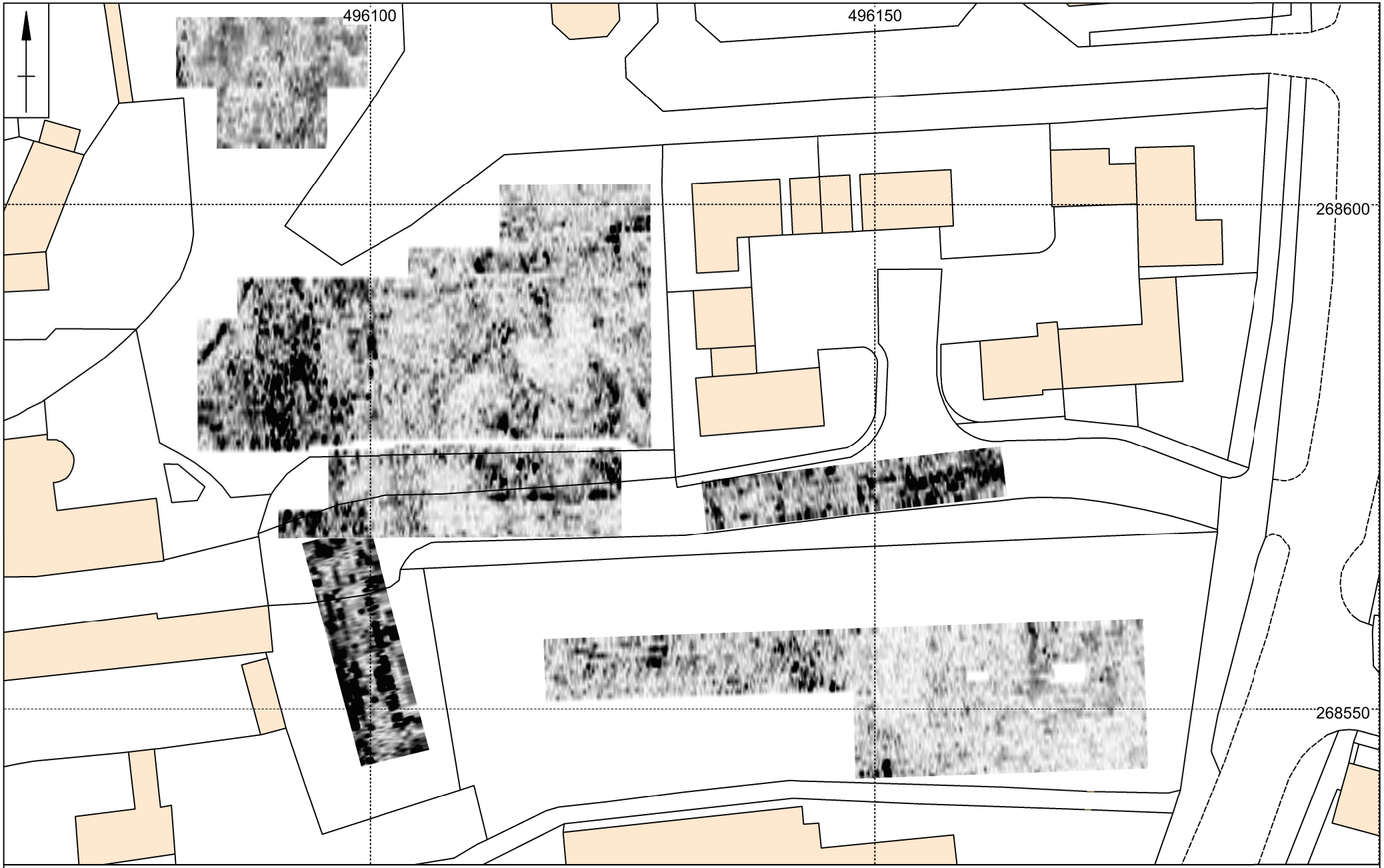
Scale 1:500 (A4)

450MHz timeslices - Green Dragon (south) (1) Fig 36



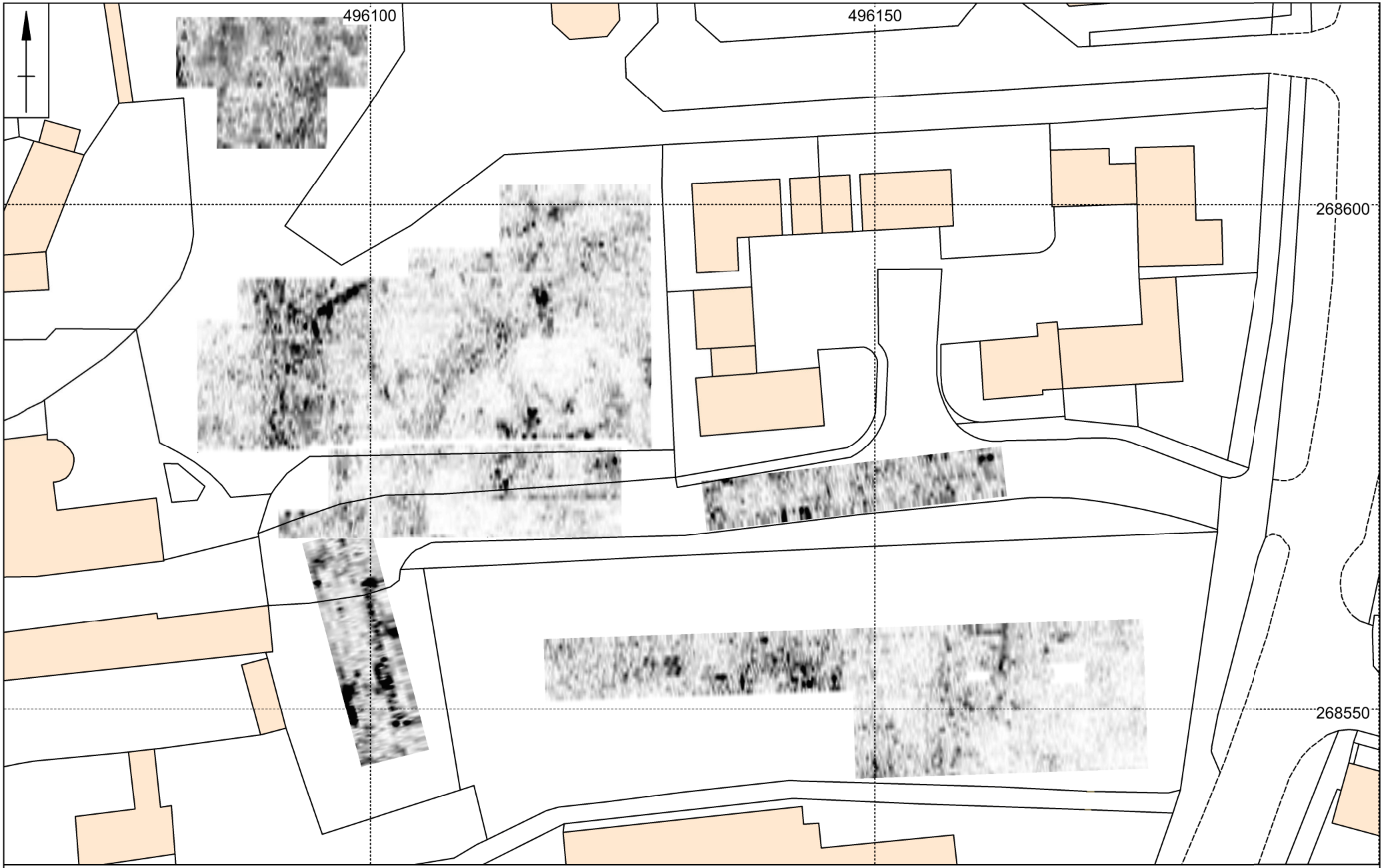
Scale 1:500 (A4)

450MHz timeslices - Green Dragon (south) (2) Fig 37



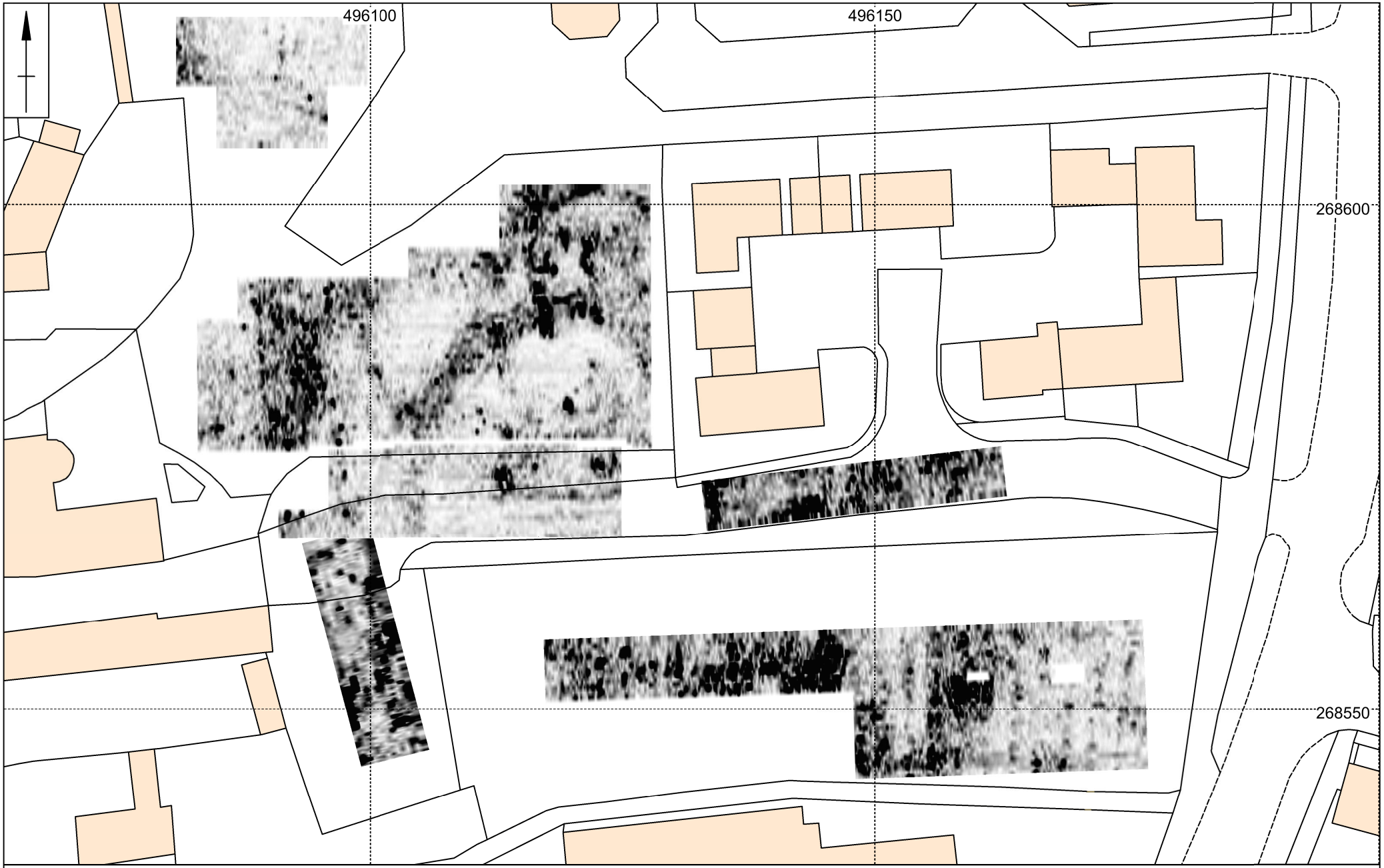
Scale 1:500 (A4)

160MHz timeslices - Green Dragon (south) (1) Fig 38



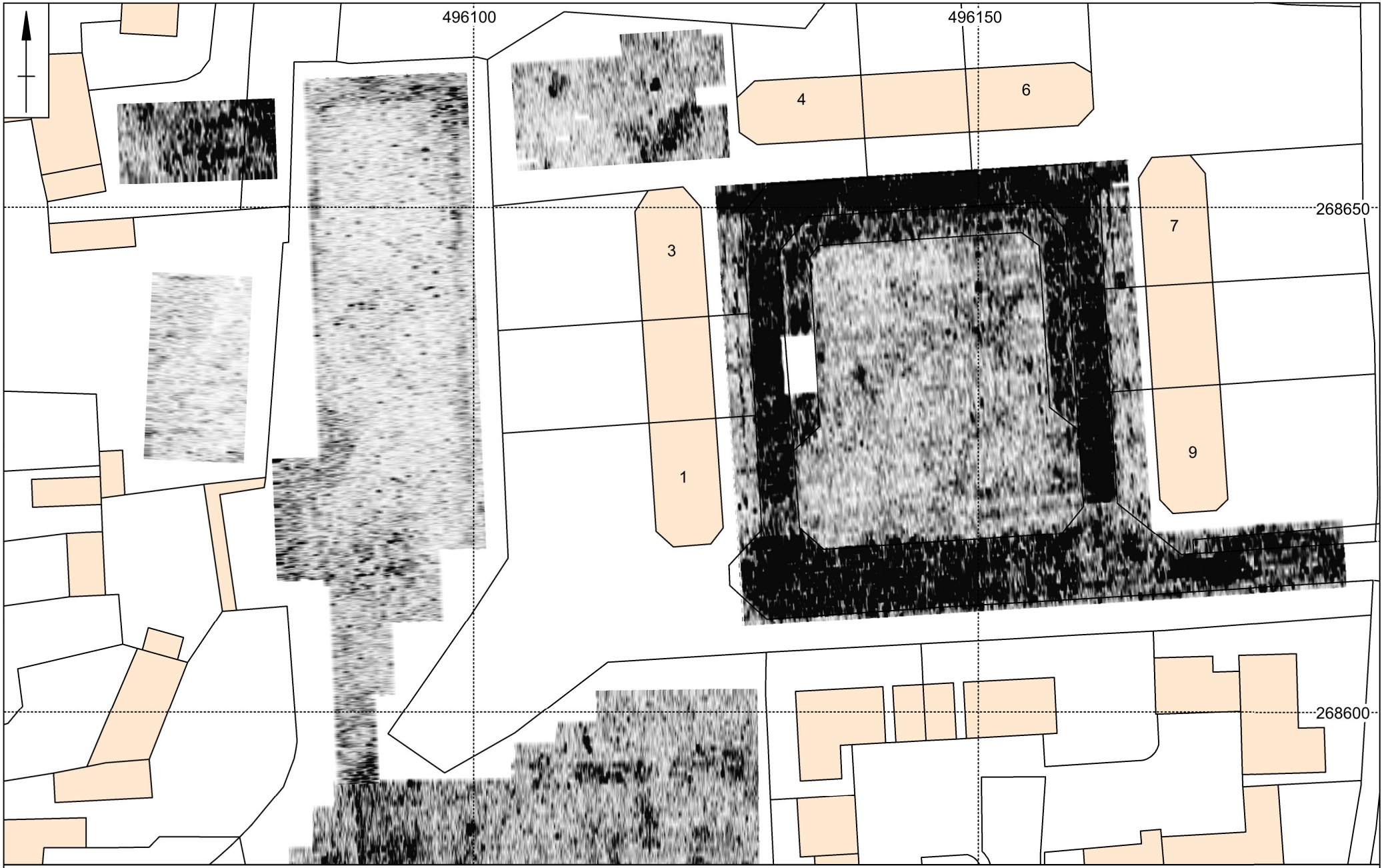
Scale 1:500 (A4)

160MHz timeslices - Green Dragon (south) (1) Fig 39



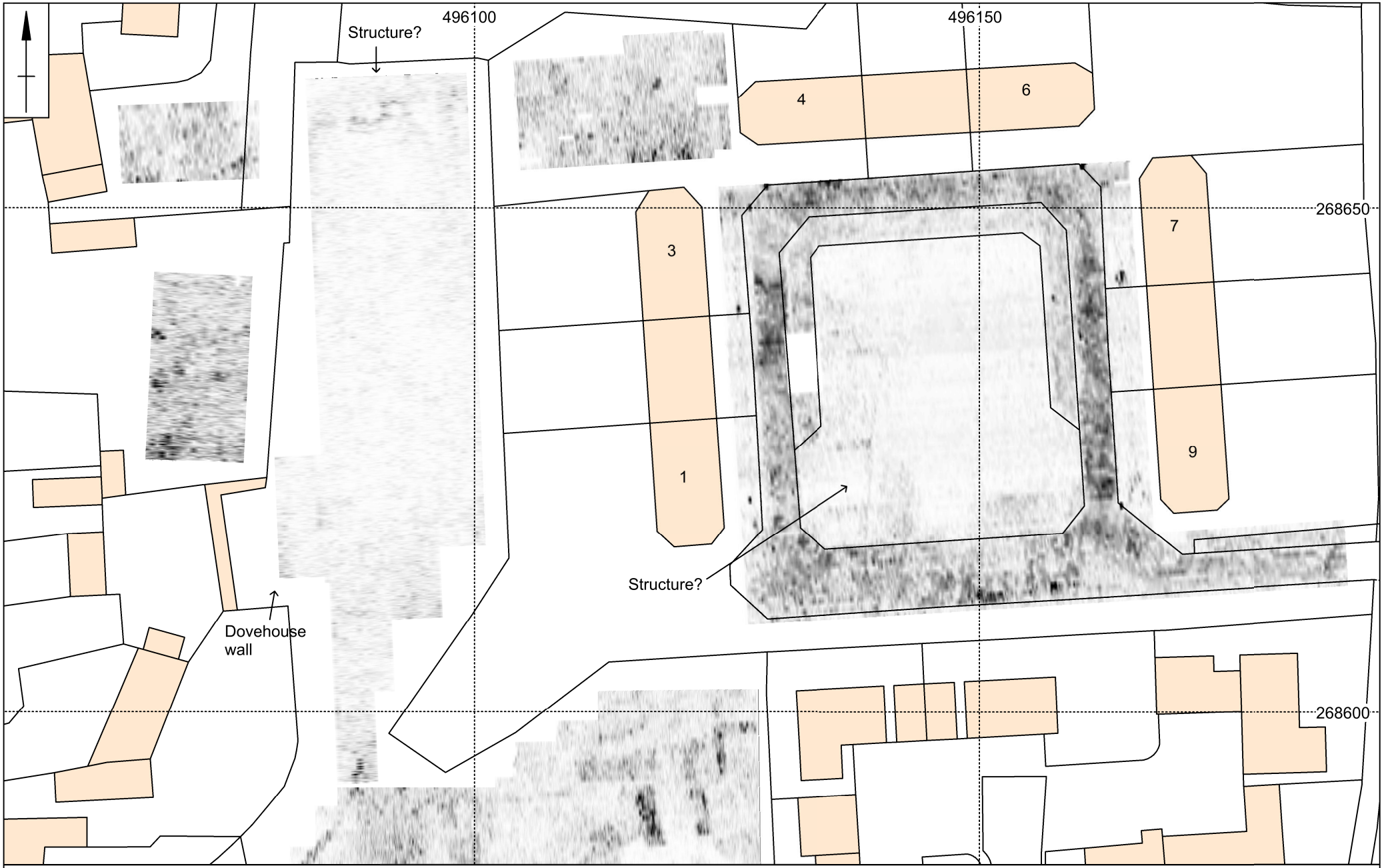
Scale 1:500 (A4)

160MHz timeslices - Green Dragon (south) (3) Fig 40



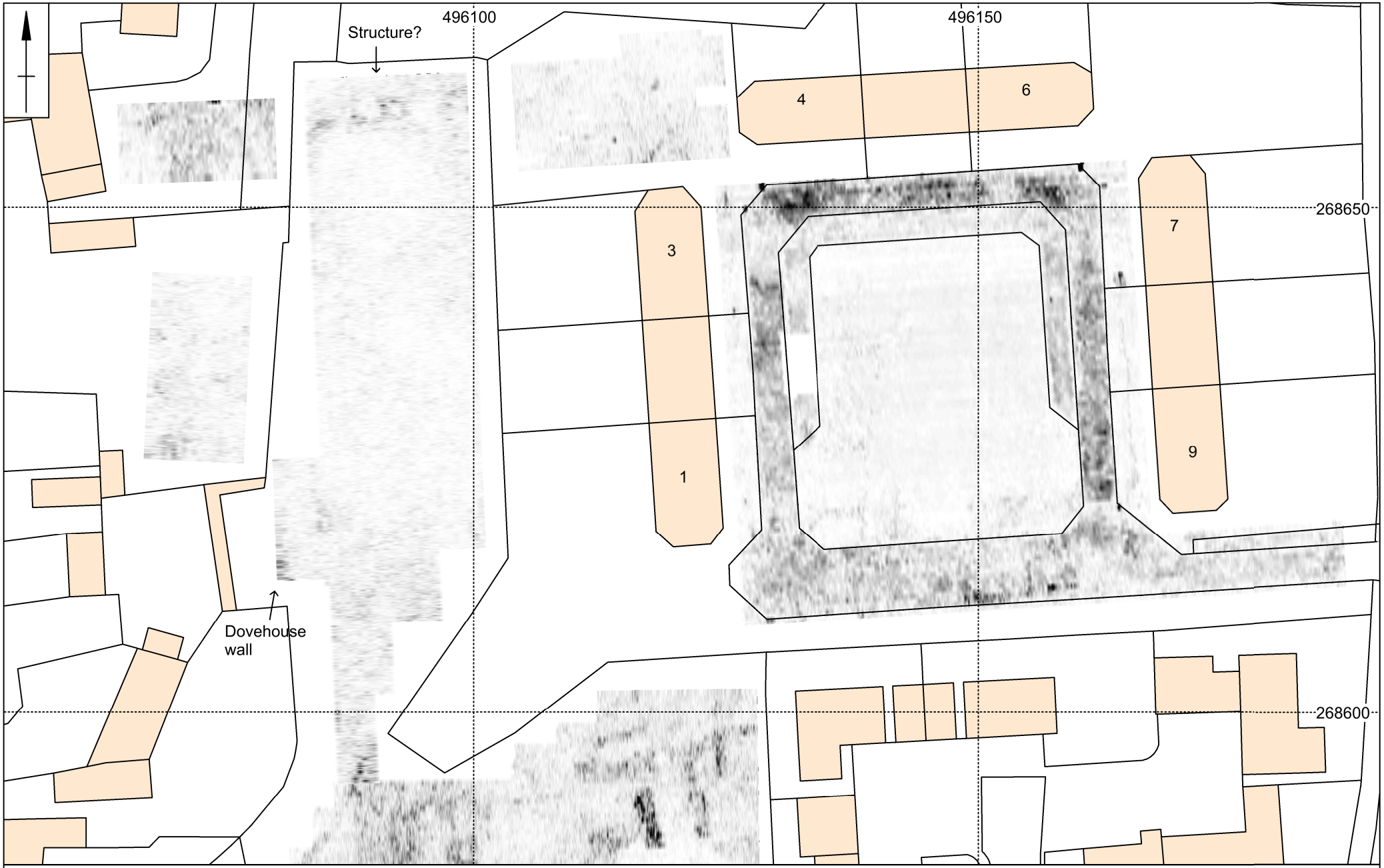
Scale 1:500 (A4)

450Hz timeslices - Green Dragon (north) and John White Close (1) Fig 41



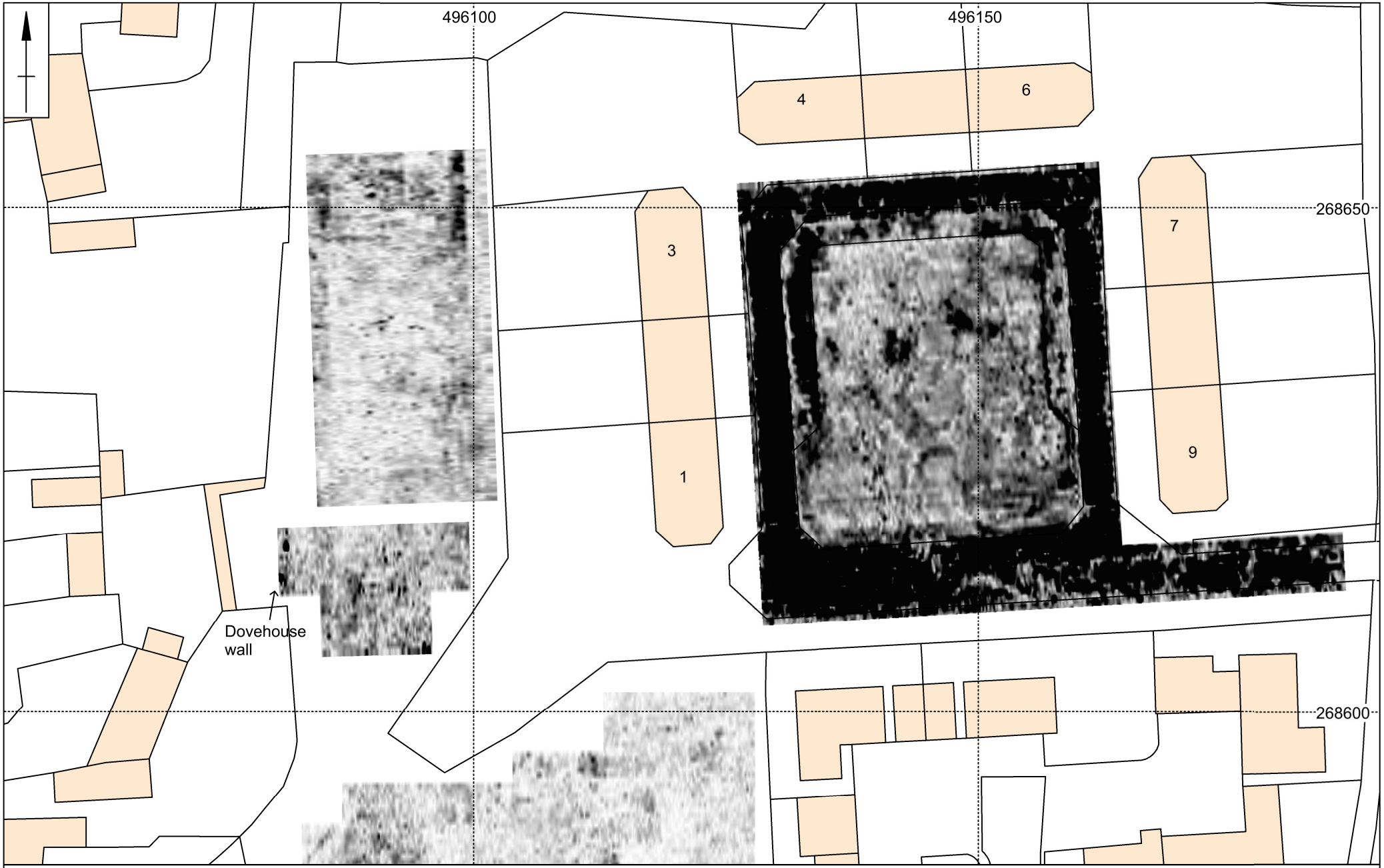
Scale 1:500 (A4)

450Hz timeslices - Green Dragon (north) and John White Close (2) Fig 42



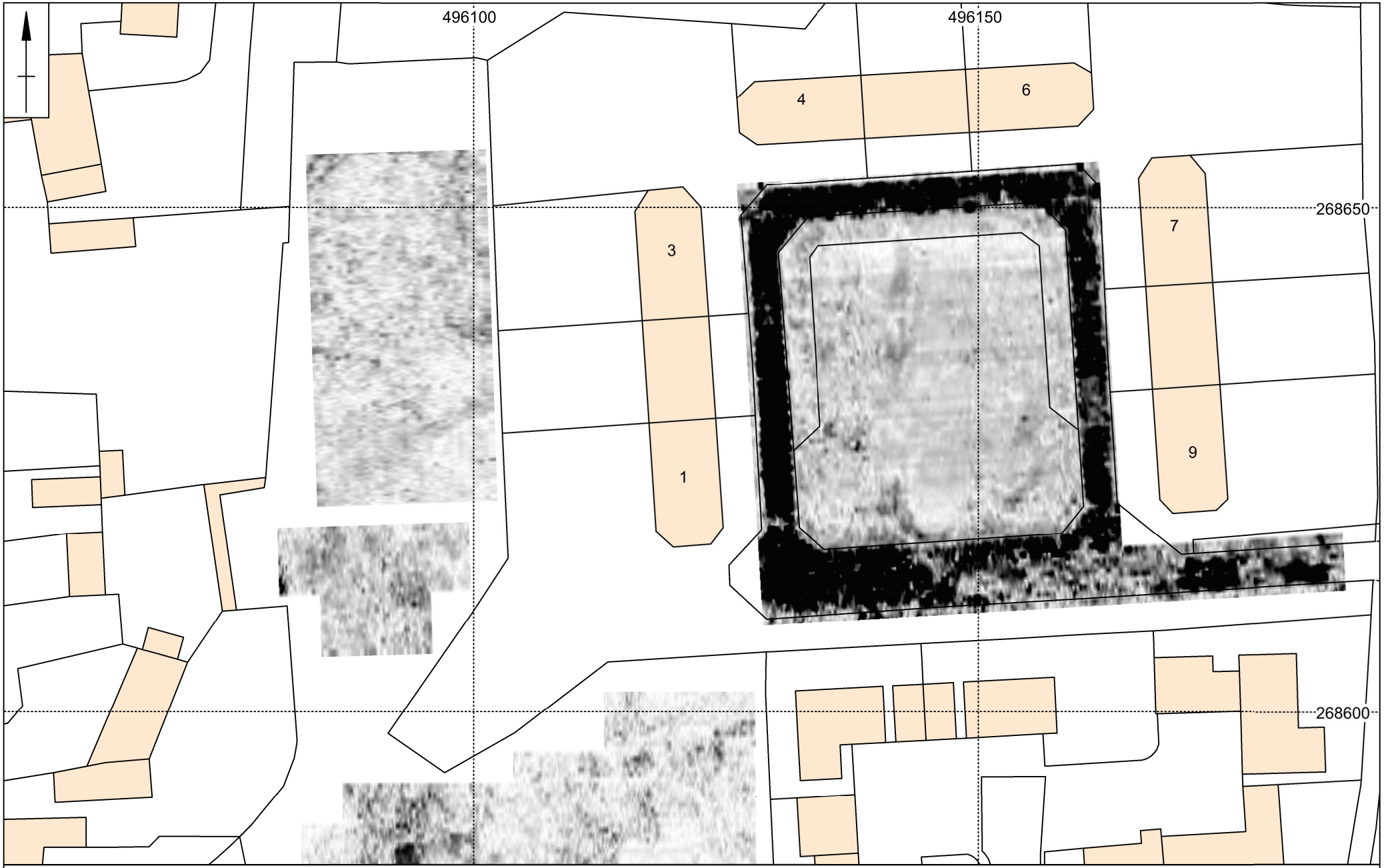
Scale 1:500 (A4)

450Hz timeslices - Green Dragon (north) and John White Close (3) Fig 43



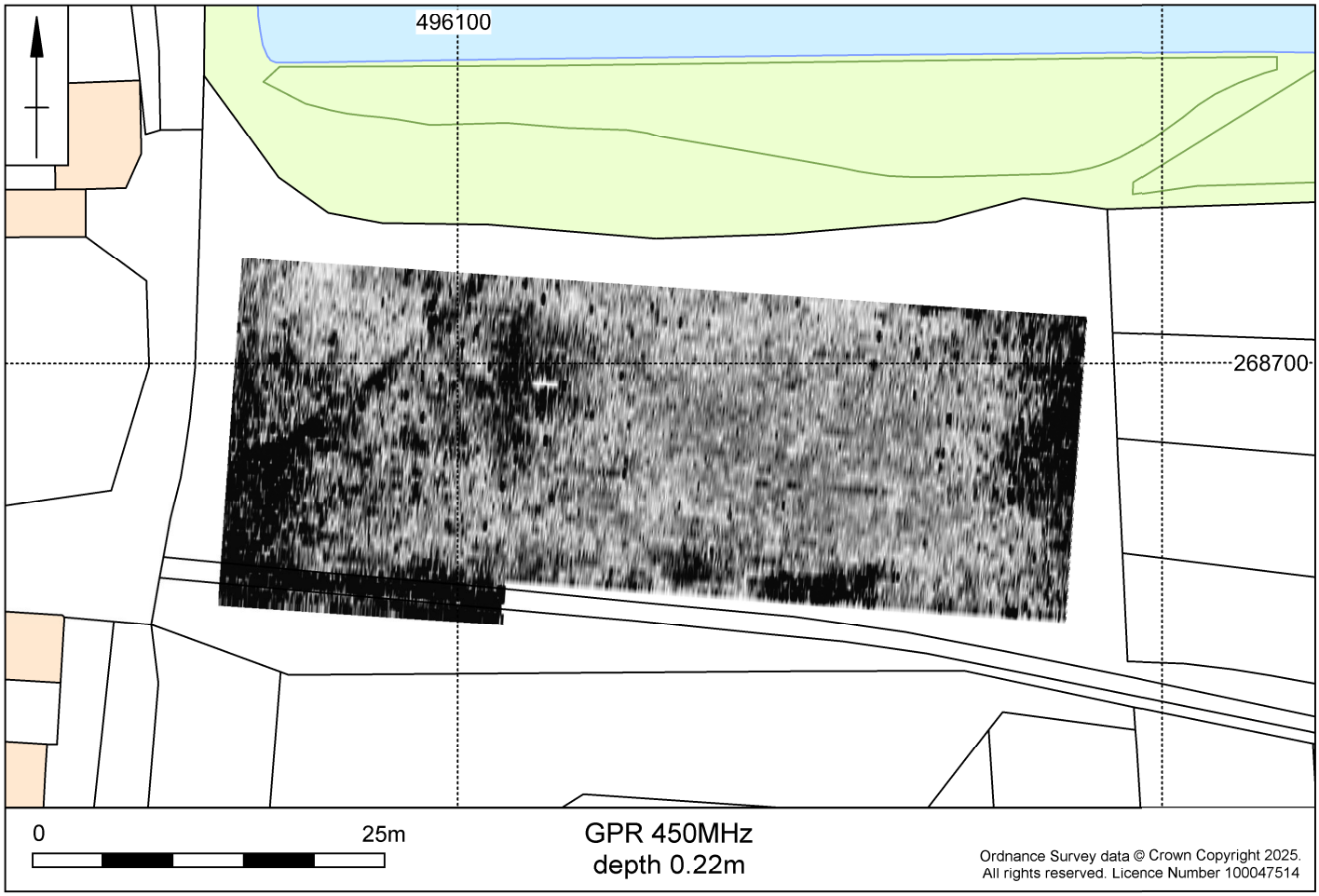
Scale 1:500 (A4)

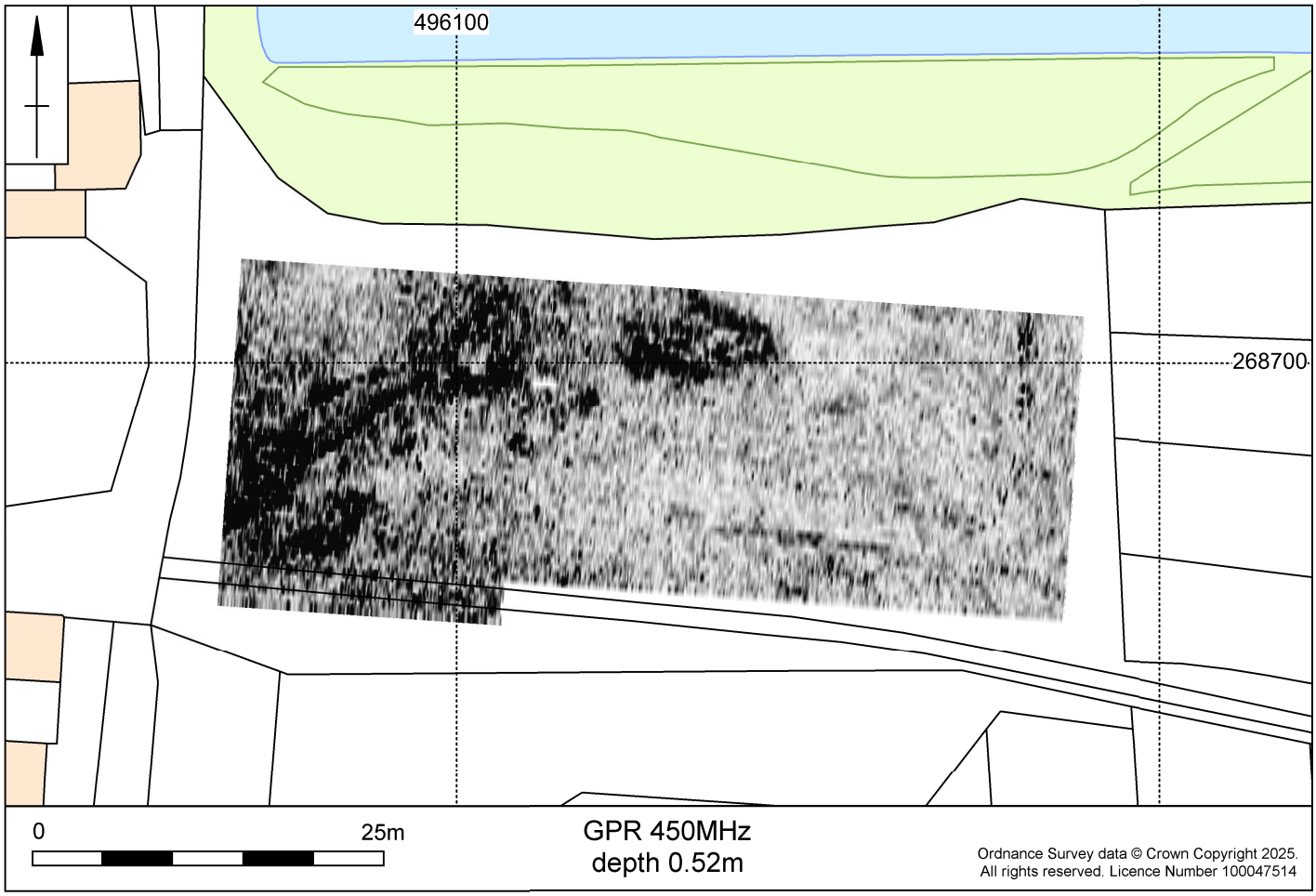
160Hz timeslices - Green Dragon (north) and John White Close (1) Fig 44



Scale 1:500 (A4)

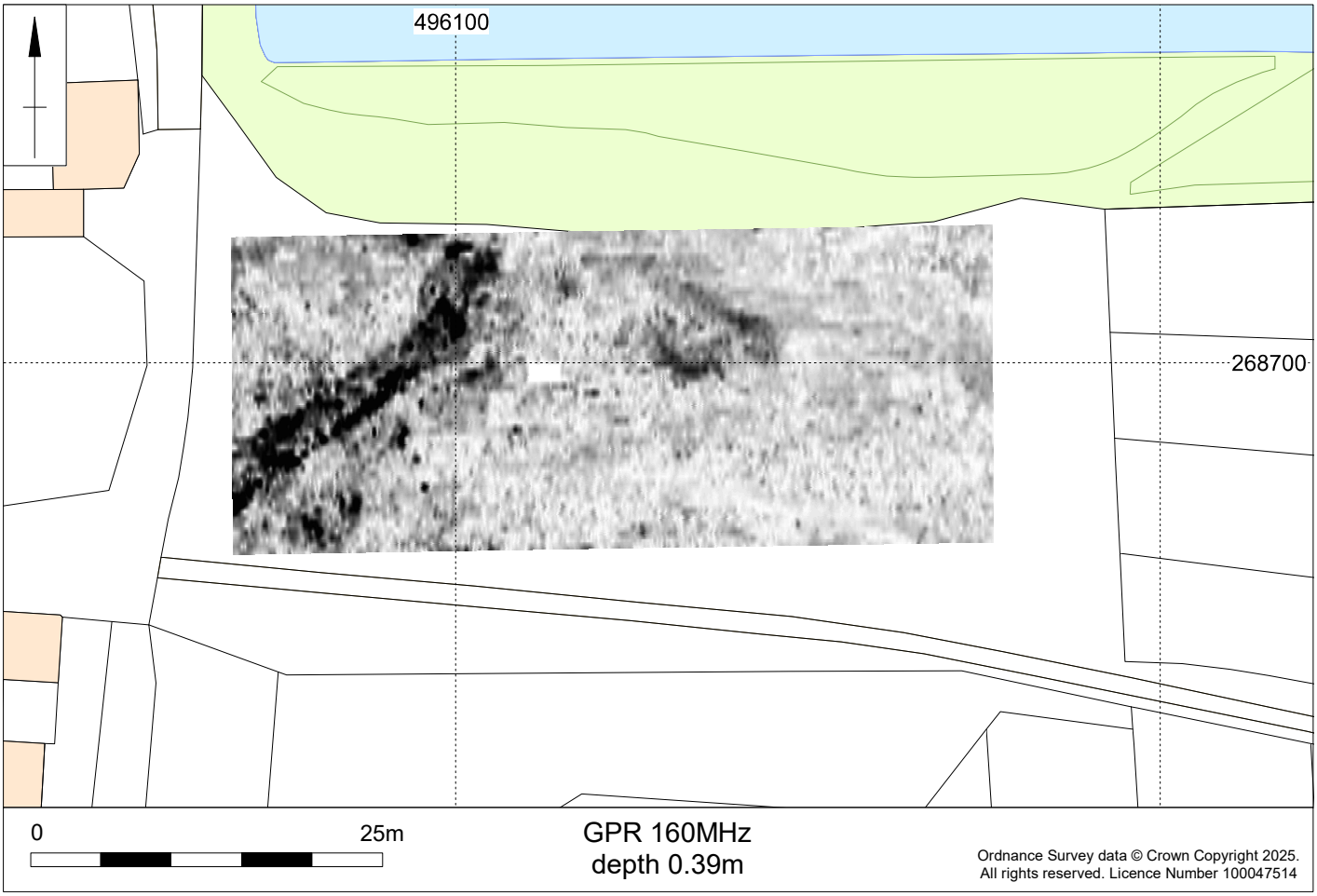
160Hz timeslices - Green Dragon (north) and John White Close (2) Fig 45

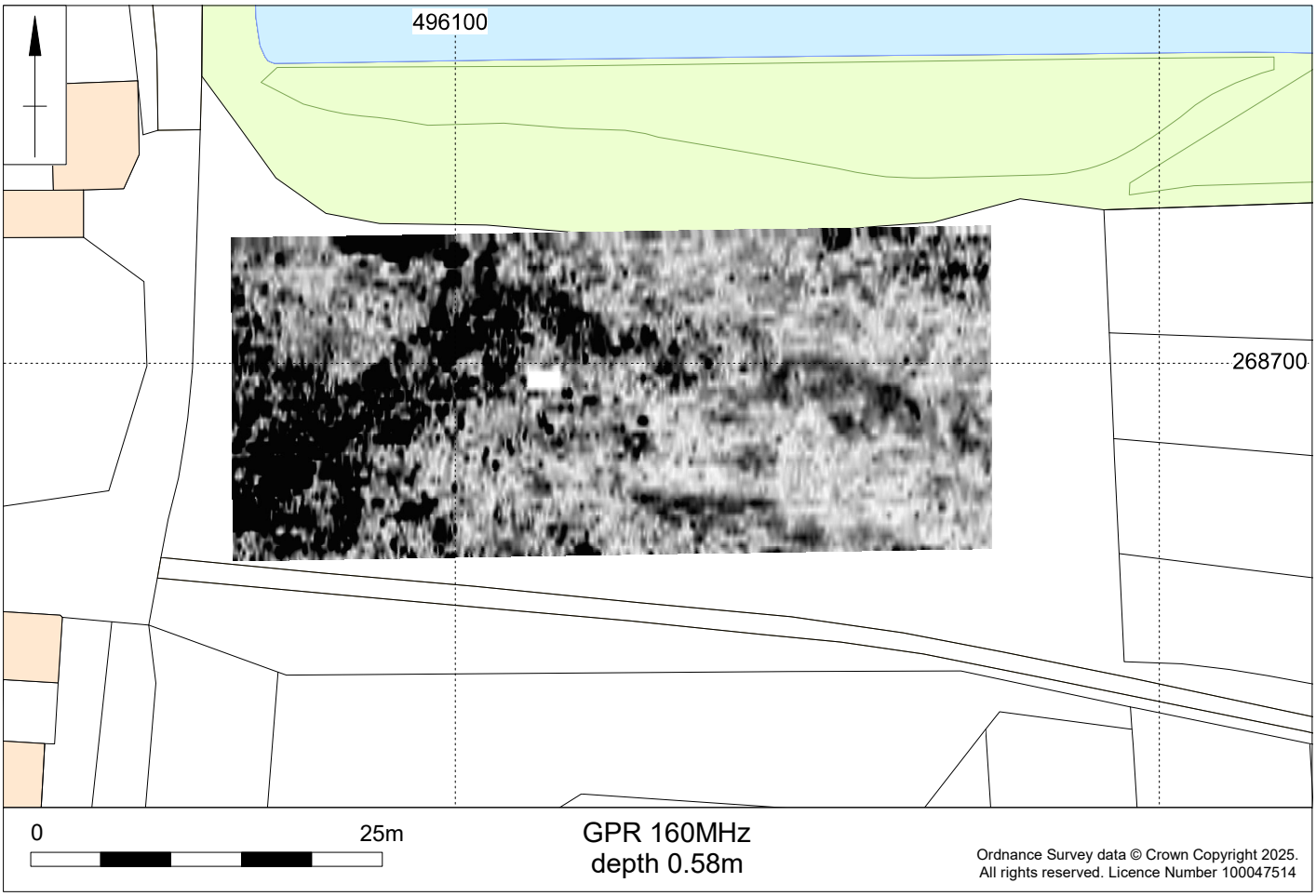




Scale 1:500 (A4)

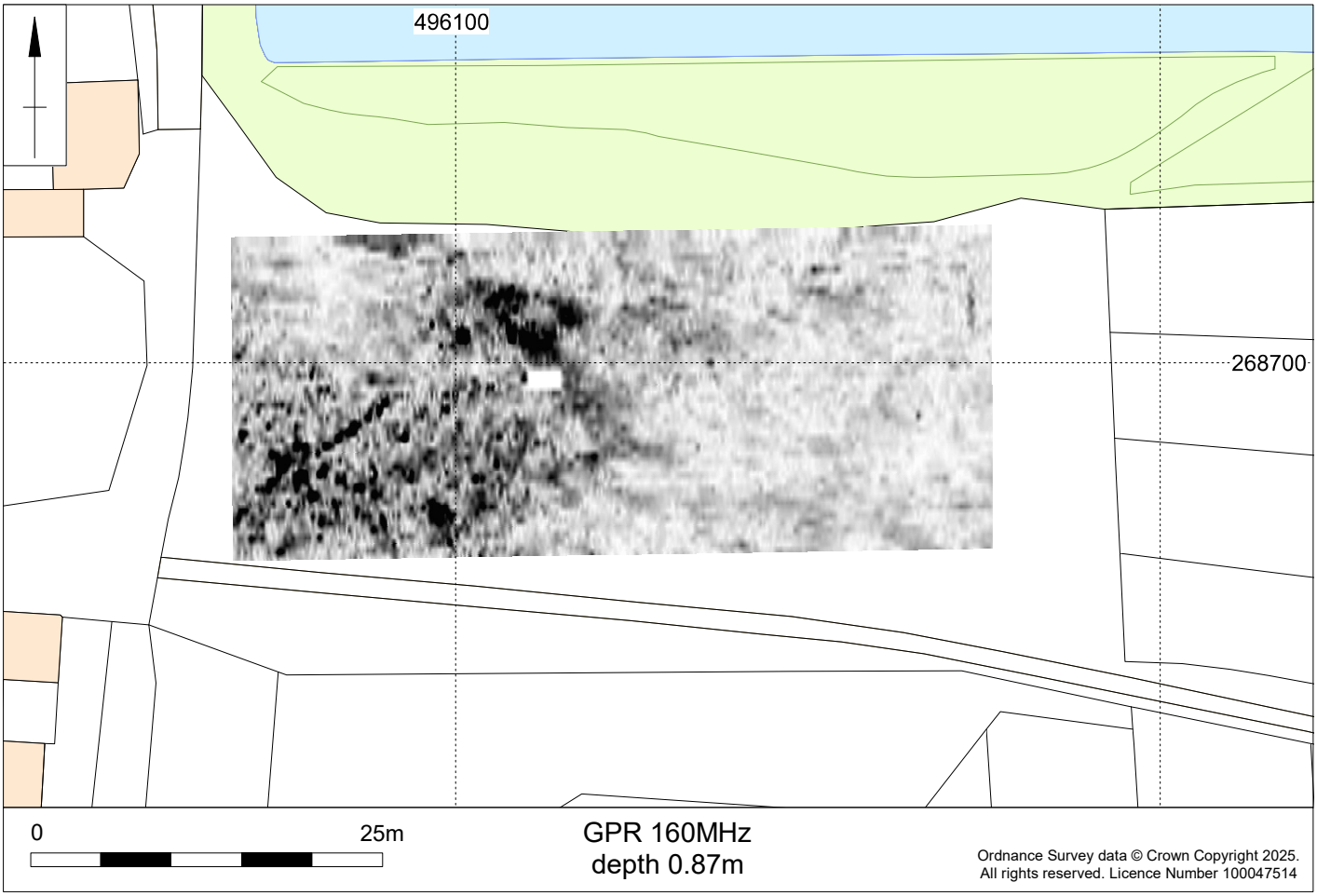
450MHz GPR timeslices - The Paddock Fig 46

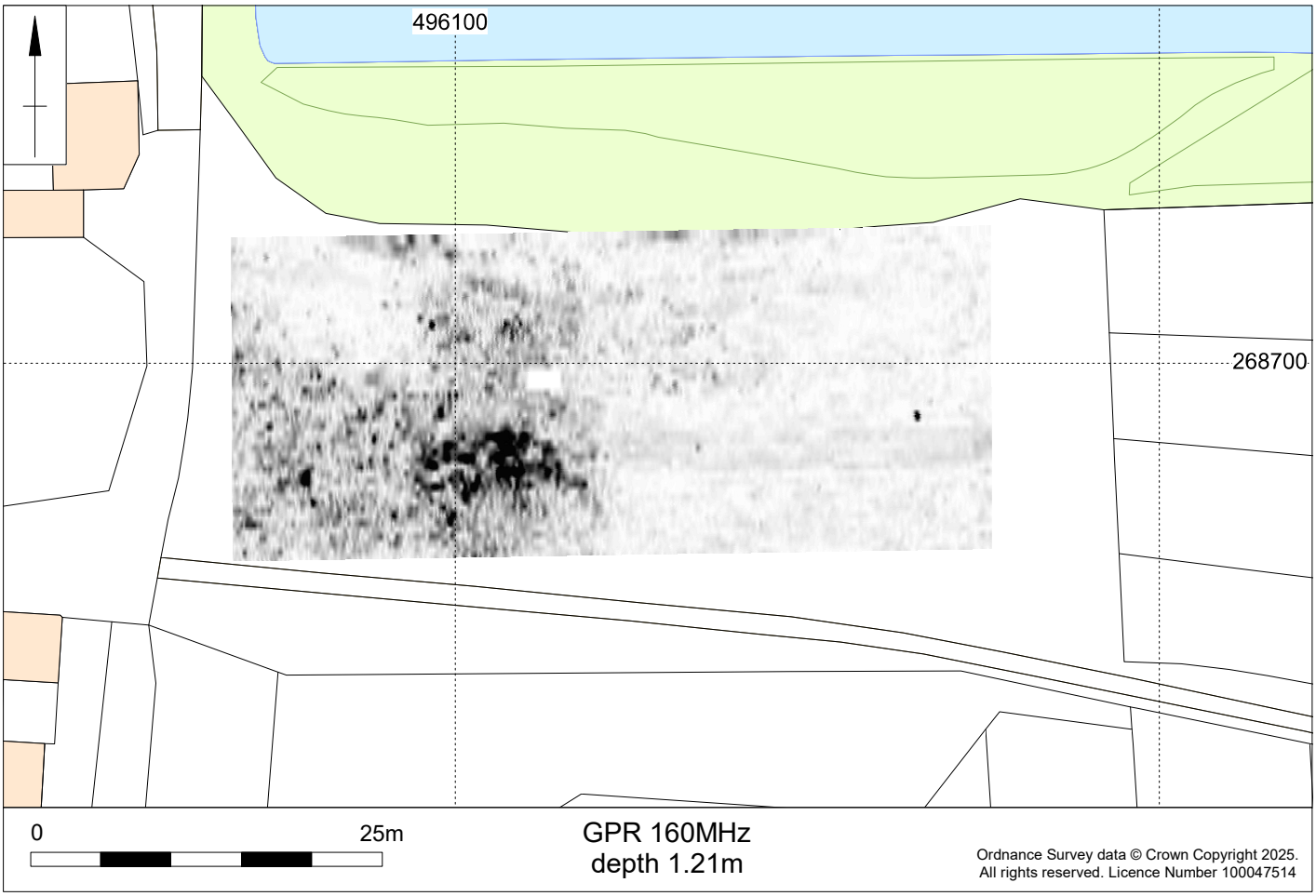




Scale 1:500 (A4)

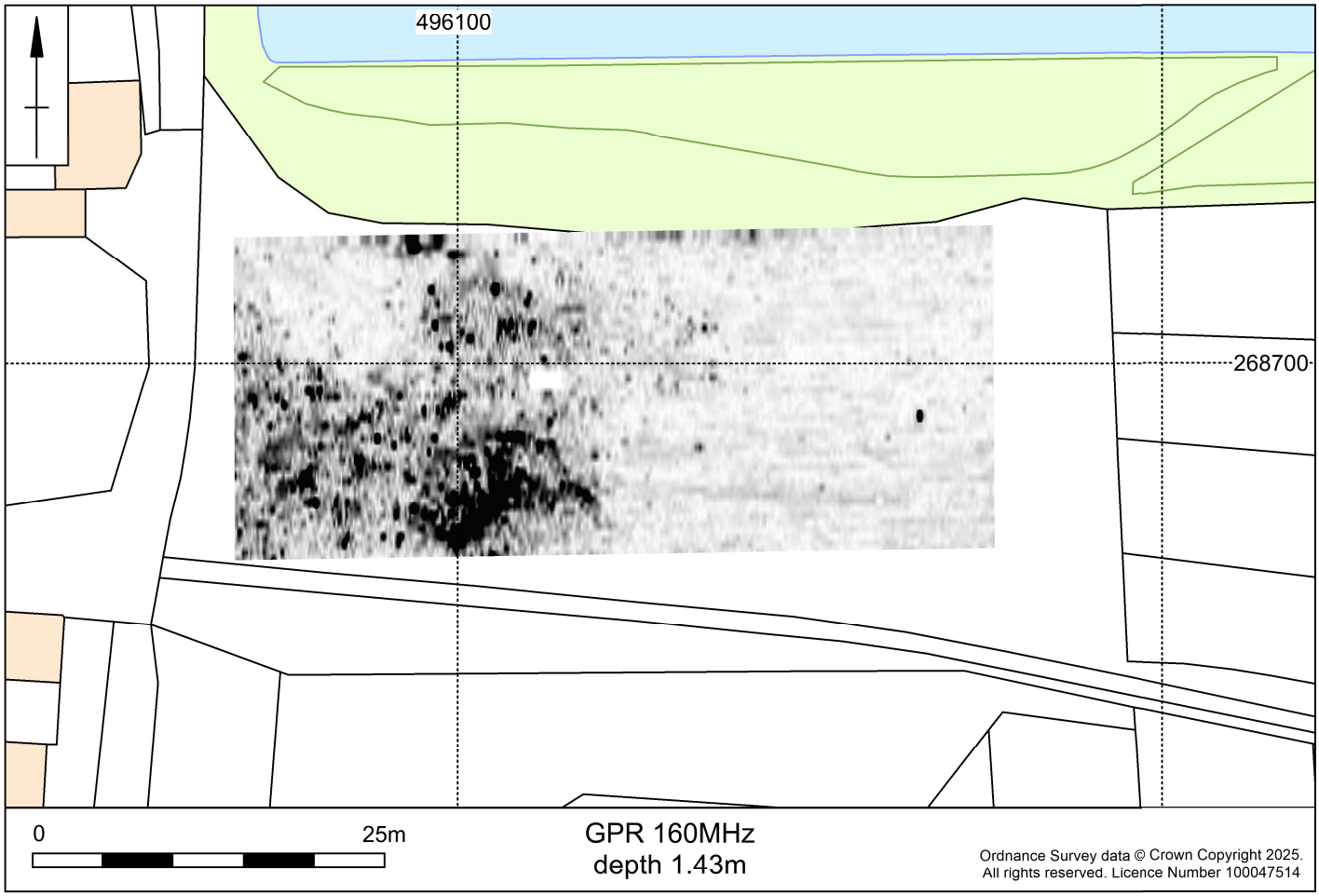
160MHz GPR timeslices - The Paddock (1) Fig 47





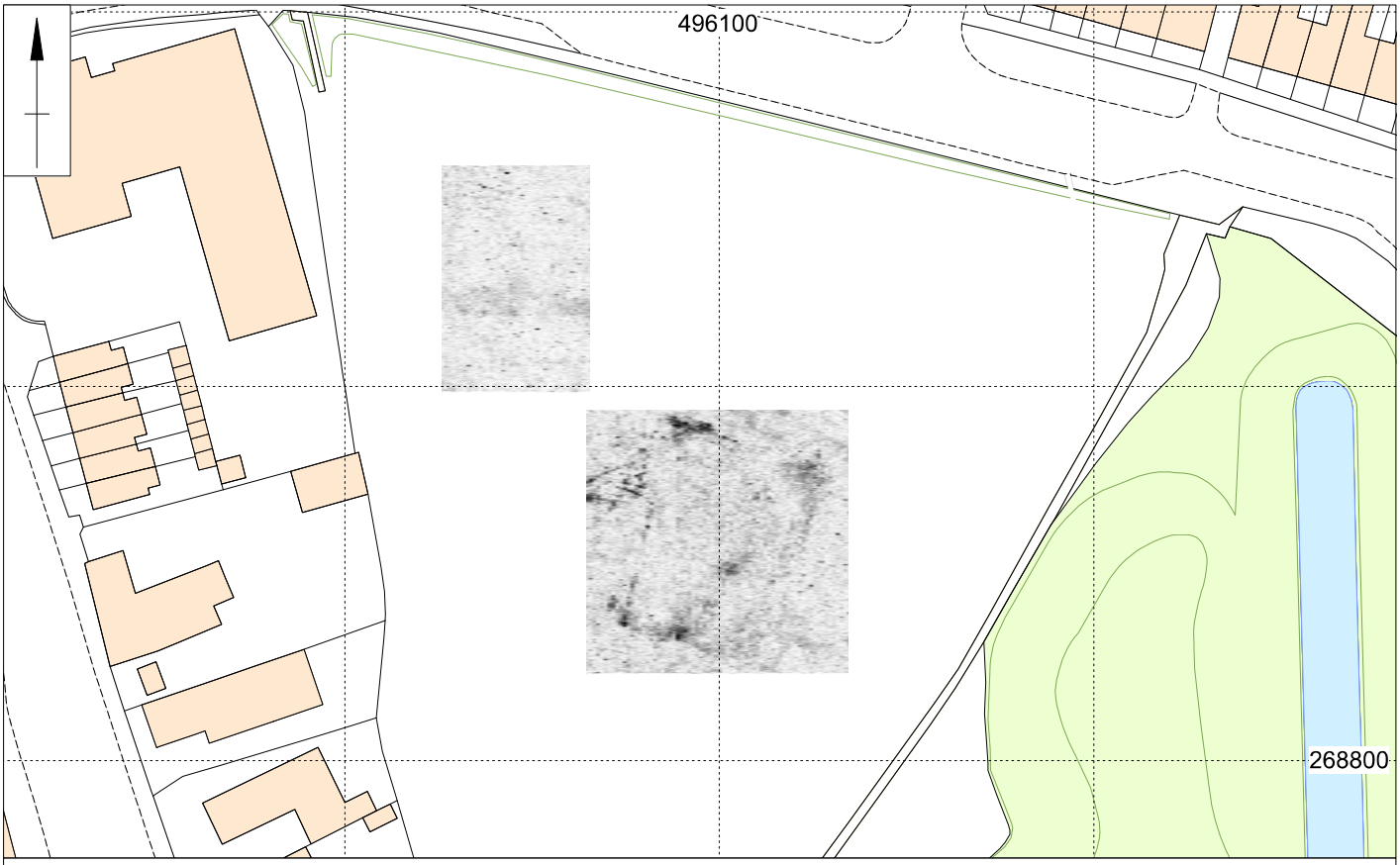
Scale 1:500 (A4)

160MHz GPR timeslices - The Paddock (2) Fig 48

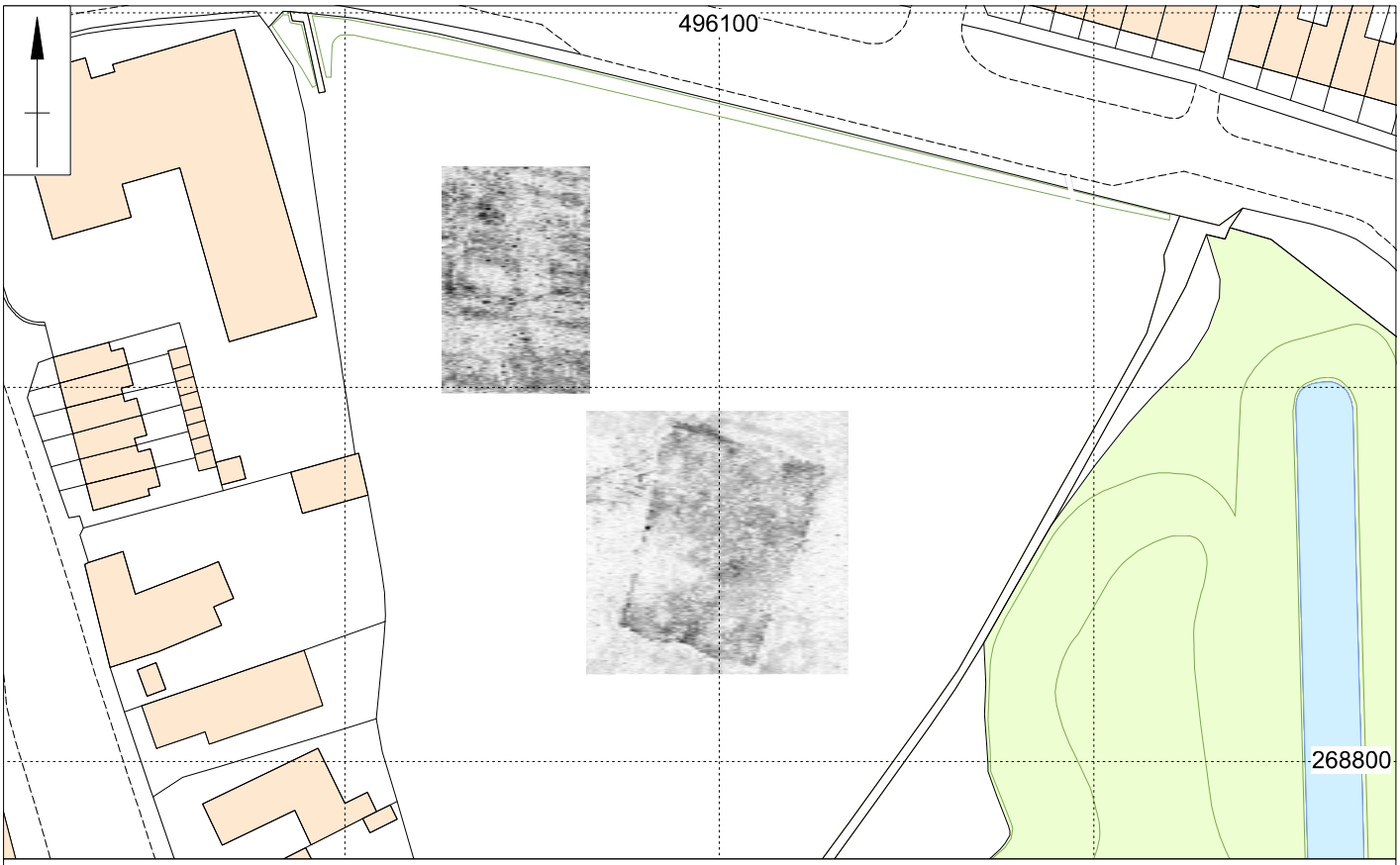


Scale 1:500 (A4)

160MHz GPR timeslices - The Paddock (3) Fig 49



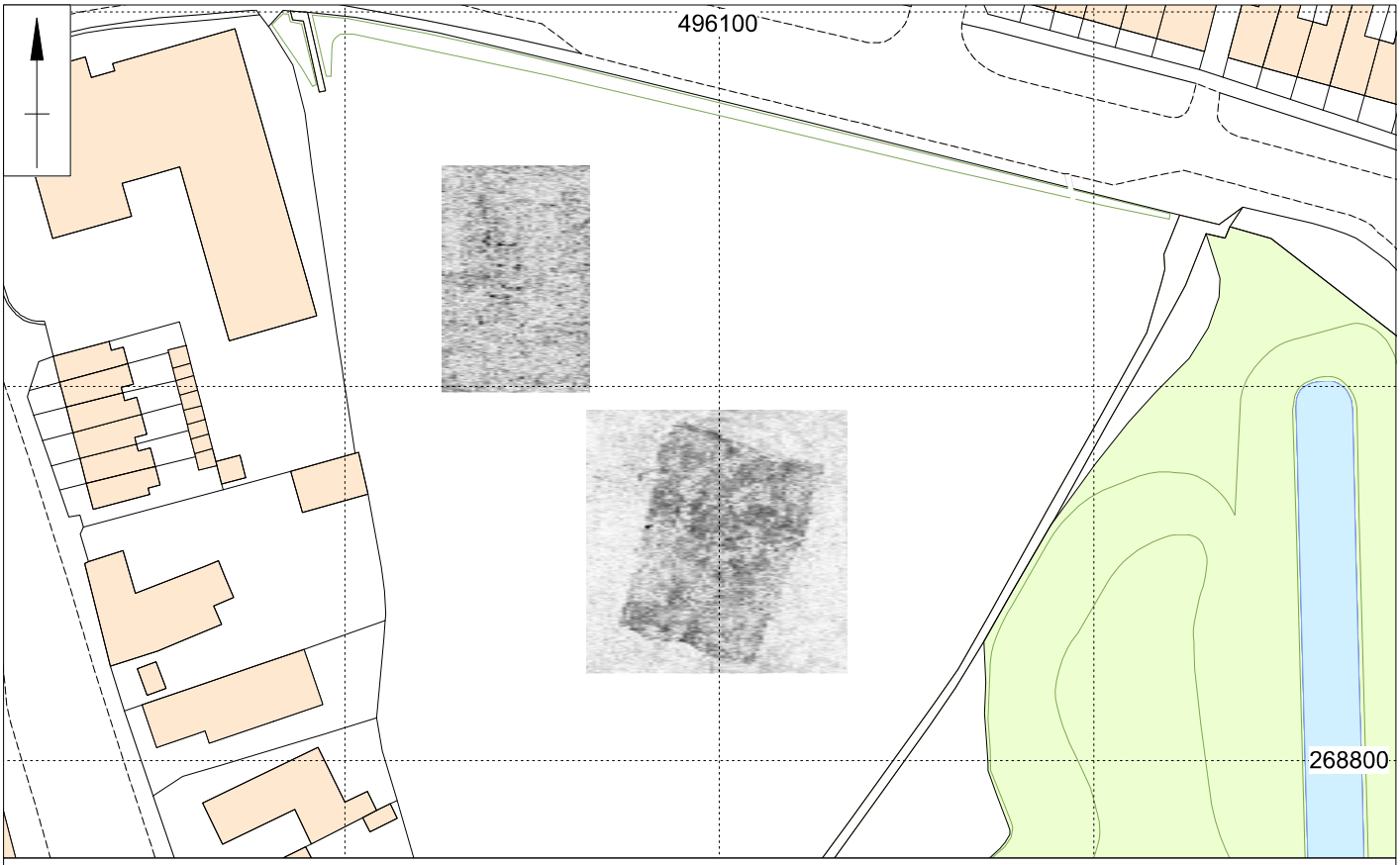
GPR 450MHz
depth 0.18m



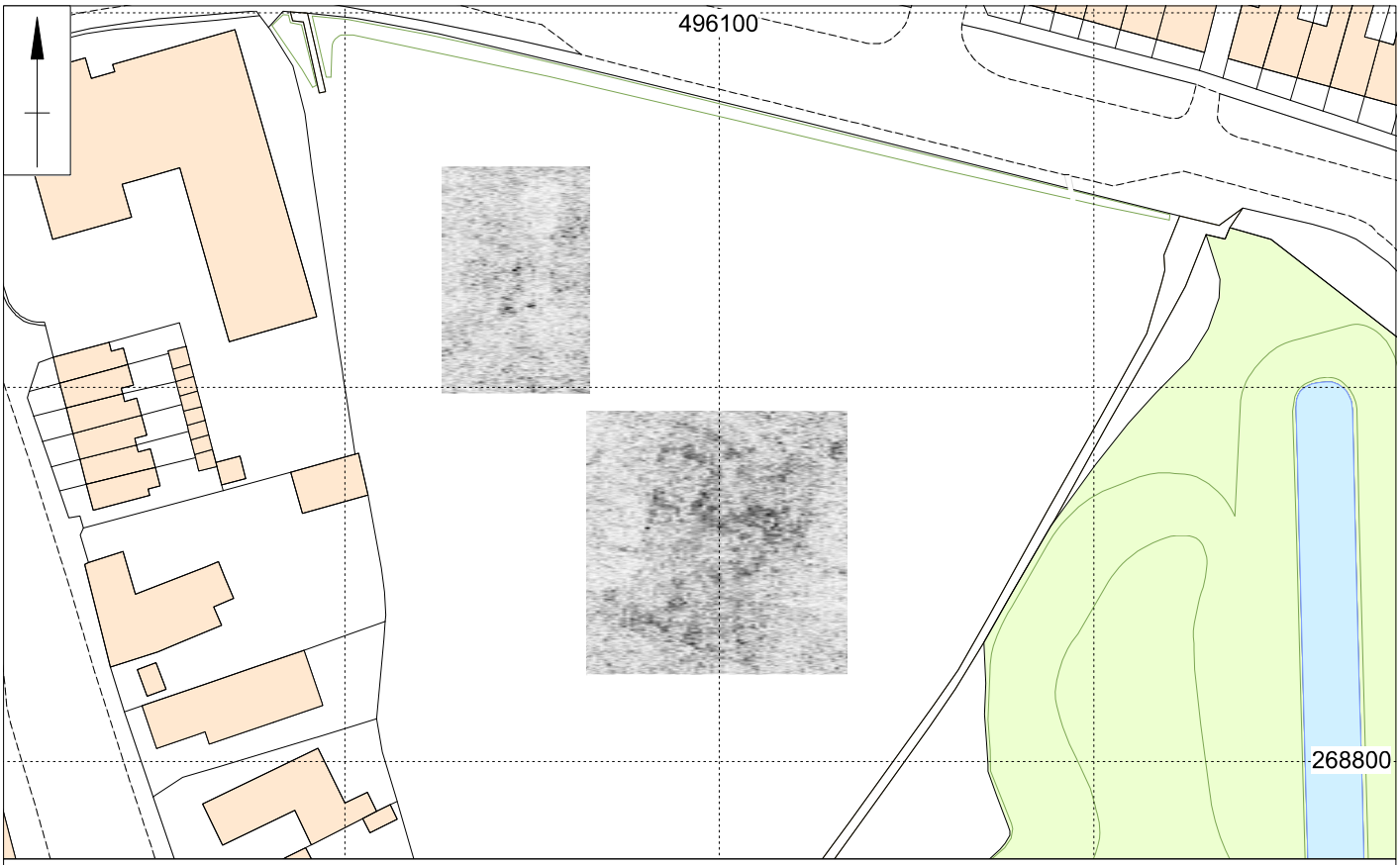
GPR 450MHz
depth 0.29m

Scale 1:1000 (A4)

450MHz GPR timeslices - Castle Field (1) Fig 50



GPR 450MHz
depth 0.46m

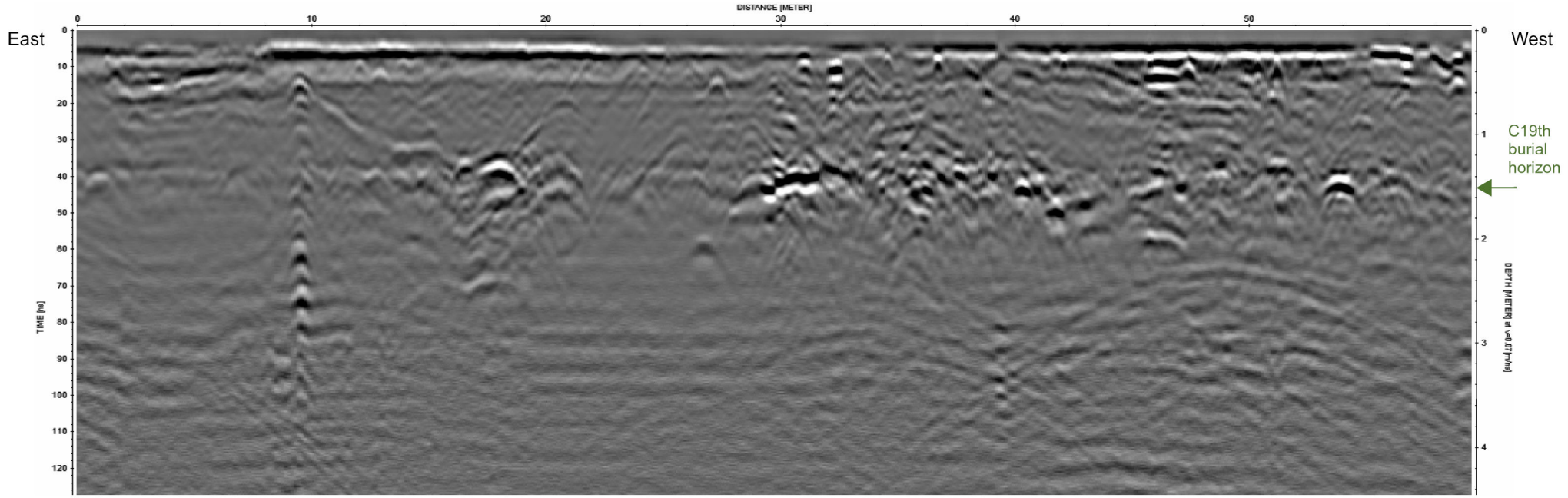


GPR 450MHz
depth 0.75m

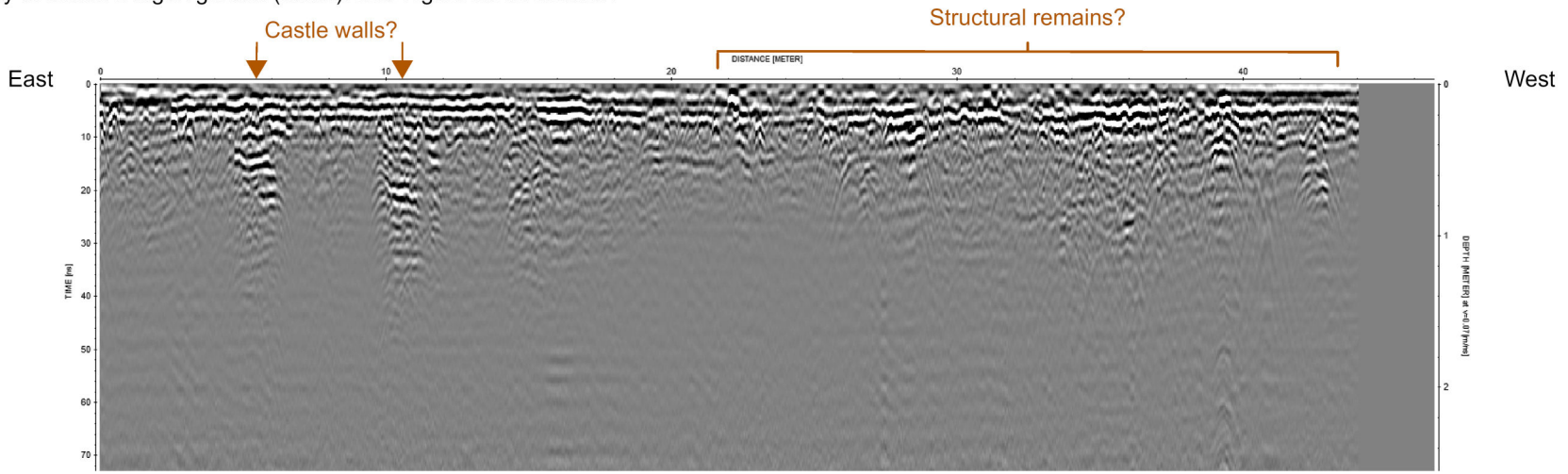
Scale 1:1000 (A4)

450MHz GPR timeslices - Castle Field (2) Fig 51

160MHz GPR survey of Churchyard. See Fig 57 for location



450MHz GPR survey of Green Dragon garden (south). See Figure 56 for location



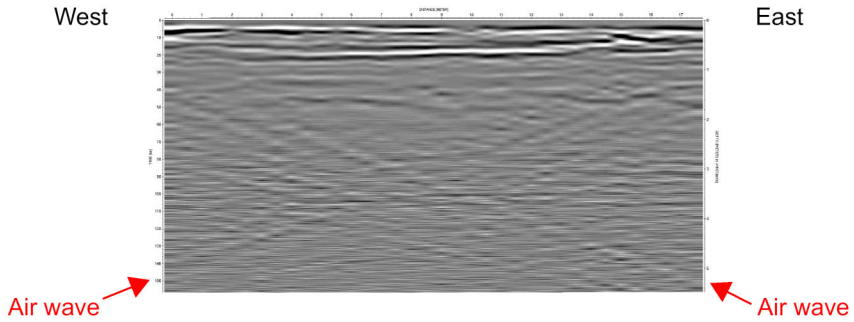
Horizontal scale

0 15m

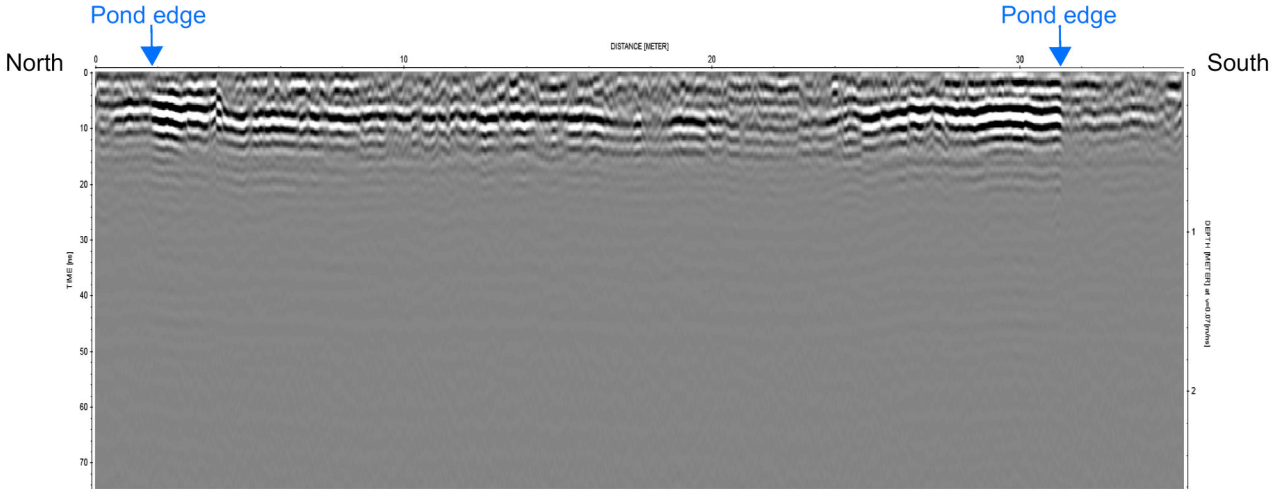
Horizontal scale: 1:250 @A4

Sample radargrams - Churchyard and Green Dragon garden (south) Fig 52

160MHz GPR survey of Green Dragon garden (north)
See Fig 57 for location



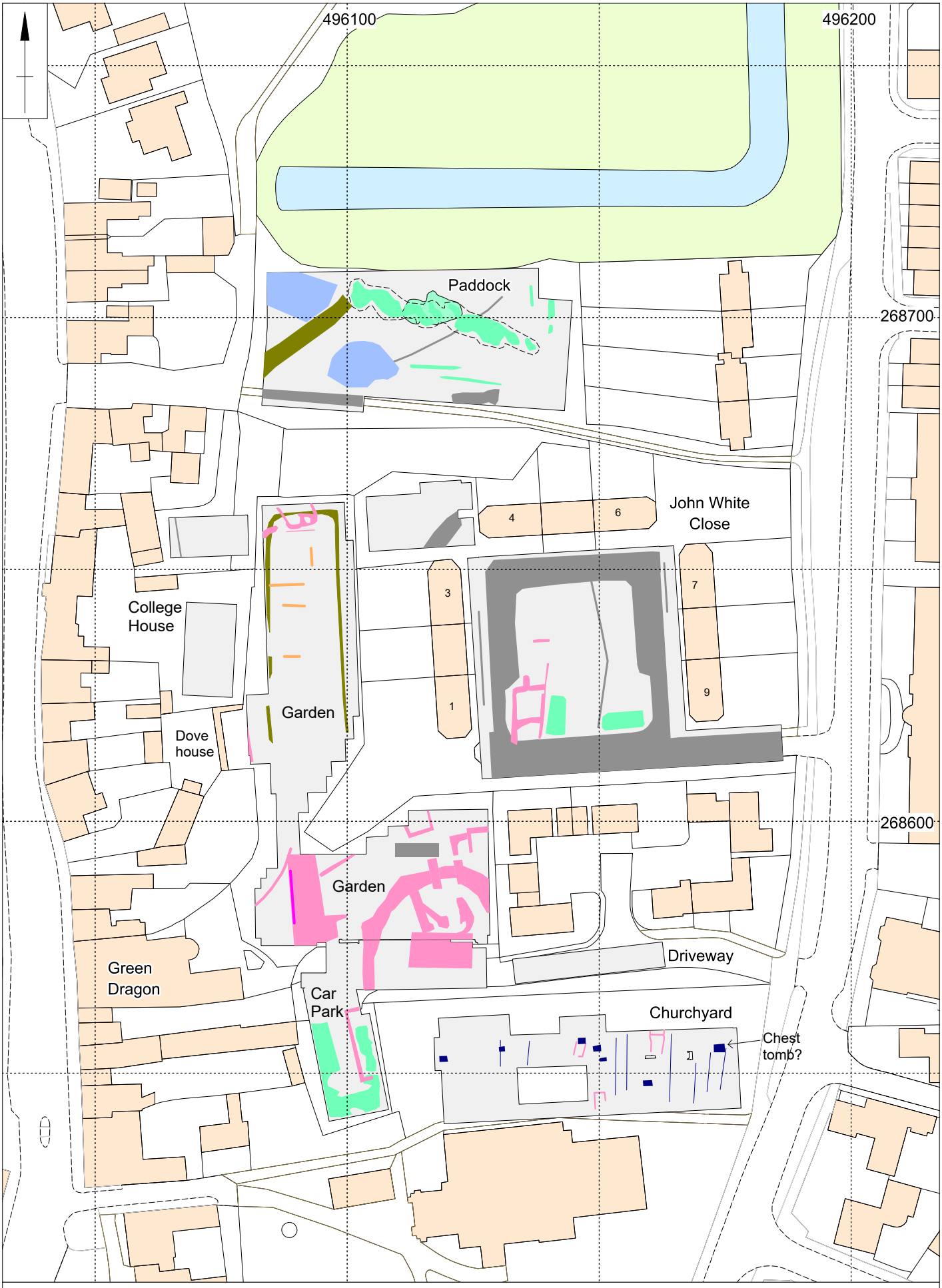
450MHz GPR survey of Castle Field pond
See Fig 56 for location



Horizontal scale
0
15m

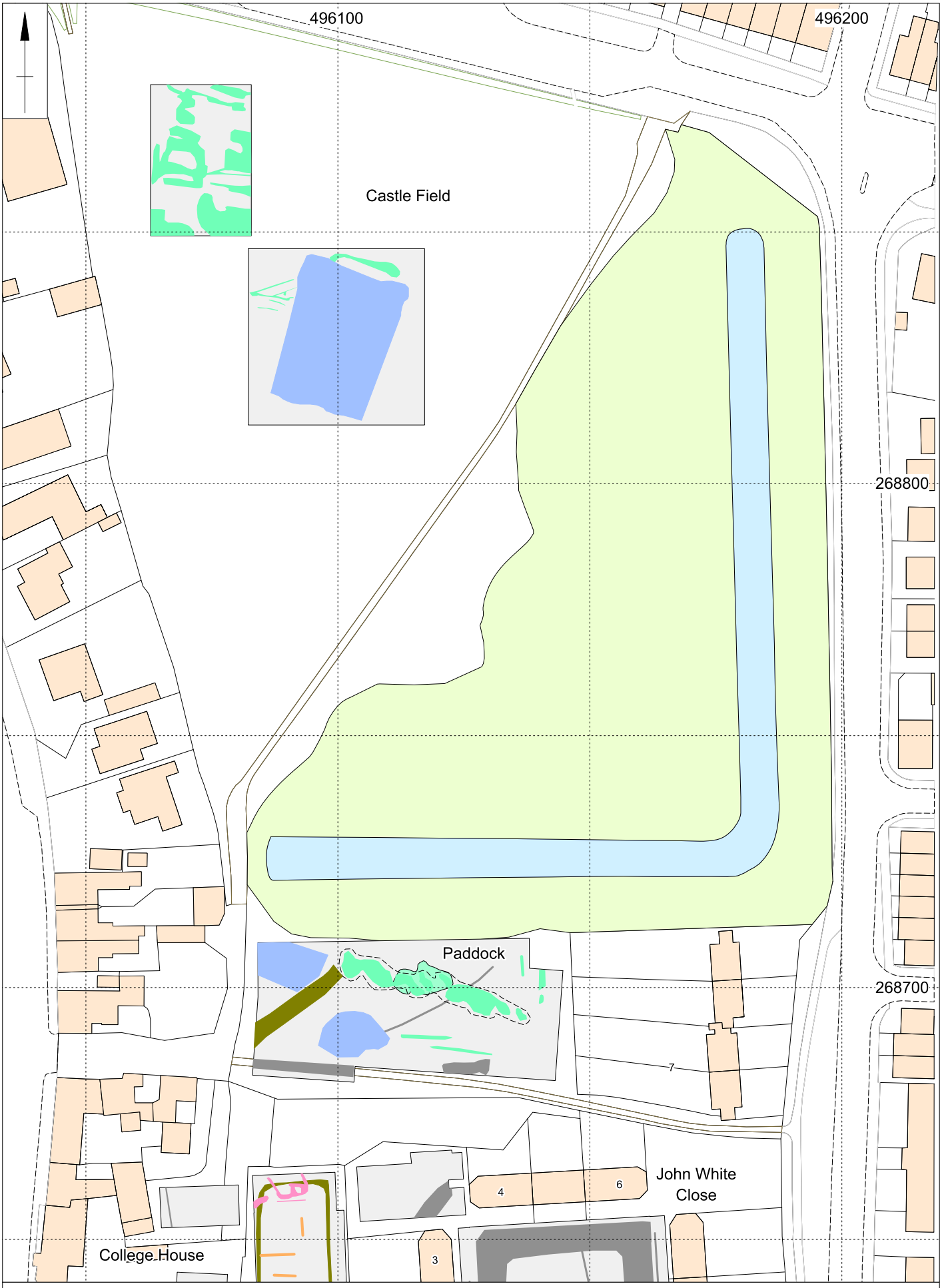
Horizontal scale: 1:250 @A4

Sample radargrams - Green Dragon garden (north) and Castle Field (pond) Fig 53



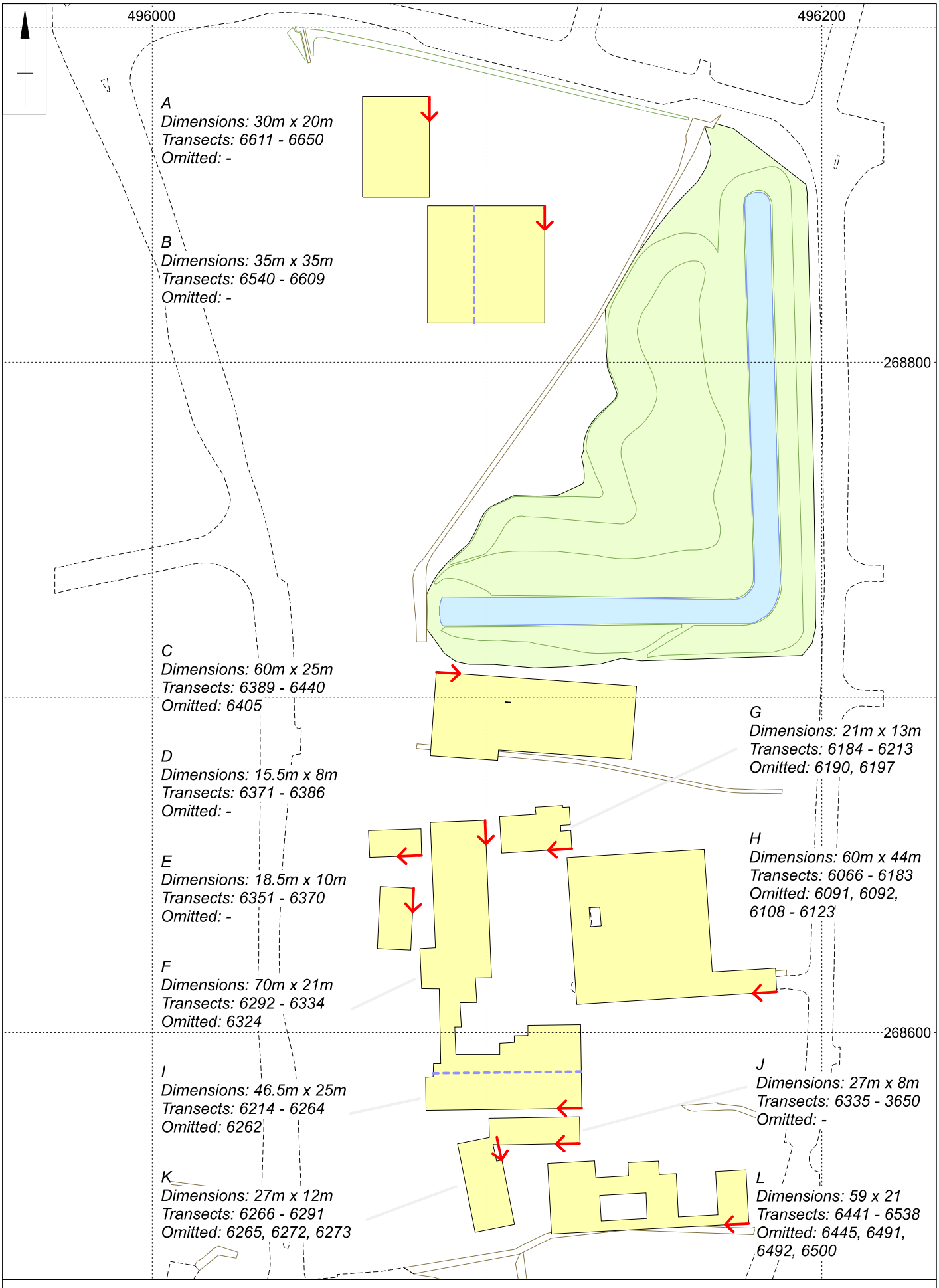
Scale 1:1000 (A4)

GPR interpretation, south (160MHz and 450MHz combined) Fig 54



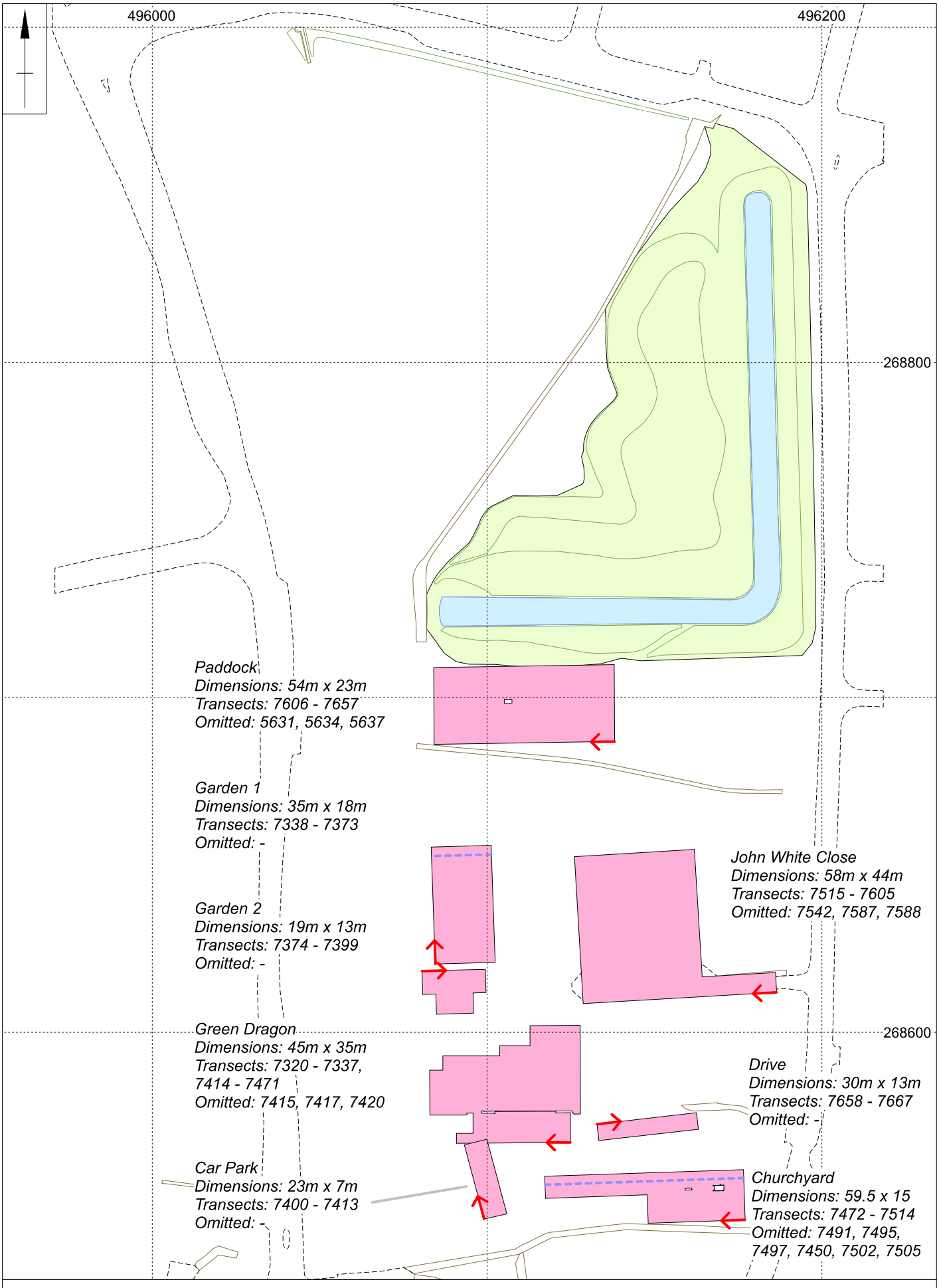
Scale 1:1000 (A4)

GPR interpretation, north (160MHz and 450MHz combined) Fig 55



Scale 1:1500 (A4)

Grid layouts (450MHz) Fig 56



Scale 1:1500 (A4)

Grid layouts (160MHz) Fig 57

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