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TORKSEY AFTER THE VIKINGS: URBAN ORIGINS IN ENGLAND

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In AD 872–3 a large Viking Army overwintered at Torksey, on the River Trent in Lincolnshire. We have previously published the archaeological evidence for its camp, but in this paper we explore what happened after the Army moved on. We integrate the findings of previous excavations with the outcomes of our fieldwork, including magnetometer and metal-detector surveys, fieldwalking and targeted excavation of a kiln and cemetery enclosure ditch. We provide new evidence for the growth of the important Anglo-Saxon town at Torksey and the development of its pottery industry, and report on the discovery of the first glazed Torksey ware, in an area which has a higher density of Late Saxon kilns than anywhere else in England. Our study of the pottery industry indicates its continental antecedents, while stable isotope analysis of human remains from the associated cemetery indicates that it included non-locals, and we demonstrate artefactual links between the nascent town and the Vikings in the winter camp. We conclude that the Viking Great Army was a catalyst for urban and industrial development in Torksey and suggest the need to reconsider our models for Late Saxon urbanism.

Keywords: Vikings; Great Army; Anglo-Saxon England; urbanism; ceramics; burials

INTRODUCTION

In 2016 we published the archaeological evidence for the documented overwintering of the Viking Great Army of AD 872–3 at Torksey in Lincolnshire. Insights from fieldwork, metal-detector survey and landscape analysis revealed a camp of some 55ha on the east bank of the River Trent, north of the modern village.[1] This evidence suggested that the Army must have numbered in the thousands, and that the camp was larger than contemporary Anglo-Saxon or Scandinavian trading sites, requiring a degree of planning and organisation, and introducing the Scandinavian incomers to what could be regarded as urban living.[2] Similar

1. Hadley and Richards 2016.
2. Williams 2020, 99–102.

Viking camps have since been identified at Aldwark, near York, associated with the return of part of the Army to Northumbria in 875–6, and near Foremark in Derbyshire, now seen as the location of the main camp of the Viking force that overwintered at Repton in 873–4.[3]

However, although understanding of Viking camps has increased dramatically in recent years, what happened next is largely unexplored but equally important, demonstrating the role of the Viking Great Army as a catalyst for urban growth and industrial development in England. In this paper we again focus on the evidence from Torksey. Once a thriving town, its late medieval decline offers unparalleled opportunities to undertake fieldwork unhampered by modern urban development, and currently it is the only place where we have archaeological evidence for both a Viking winter camp and an early medieval town. While the island that had hosted the Viking camp was largely abandoned, reverting to shifting sand dunes and meadow until it was later levelled and taken over for farming, the high ground to the south became an important town. Torksey was also a major early industrial centre, producing some of the first wheel-thrown pottery in post-Roman England, and we have now found traces of more pottery kilns than in any other place in late Anglo-Saxon England. Torksey offers a unique perspective on a long-standing debate about the emergence of towns in England, its chronology and the influence of craftworkers and traders who arrived in the wake of the Viking Great Army.

URBAN ORIGINS: CURRENT DEBATES

Debate about urban origins in early medieval England has focused variously on the fate of Roman towns, the influence of the 'Mercian supremacy' of the eighth and ninth centuries, the growing power of Wessex in the ninth and tenth centuries and the role of networks of defensive burhs in both Wessex and Mercia. However, few traces of continuing occupation, still less of urban activities, can be found in former Roman towns before the ninth century, while royal palaces and ecclesiastical centres of the Middle Saxon period do not, on the whole, lie beneath urban sites of the tenth and eleventh centuries. Similarly, Middle Saxon trading sites (wics or emporia), such as those identified at London, Southampton, York and Lincoln, are typically in different locations from later towns.[4] The role of Scandinavian settlers in urban origins and growth has also been subject to long-running debate. Many maintain that the Scandinavian input was minimal, beyond the likelihood that Viking raids 'encouraged people to seek the shelter of strong walls', and that urban development did not take off until well into the tenth century when English rule had been restored to areas of Scandinavian settlement.[5]

There are few contemporary references to towns in areas of Scandinavian settlement before *Domesday Book*, and archaeological investigation has produced little evidence for urban activities before the mid-tenth century.[6] In York, the orderly Coppergate tenements, with diverse craft activities and post and wattle buildings dating to *c* 930/5–*c* 955/6, have long provided a template for a tenth-century town under Scandinavian control. However, little of the archaeological record can be directly related to Scandinavian influence. There is also a gap of at least three decades between the demise of the Middle Saxon trading site at Fishergate in the late 860s or 870s and the laying out of the Coppergate tenements, during which our knowledge of

3. Williams 2020; Jarman 2021, 63–7.
4. Carver 2010, 127–45.
5. Blair 2018, 266–81, and 269 for the quotation.
6. Hall 1989; Hall *et al* 2014.

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urban development is slim.[7] Carver has argued that since urbanism in the ninth and tenth century does not represent continuity from earlier focal points, but rather a 'new agenda ... being set', it is accordingly not continuity but 'innovation and the reasons for it that should command attention'.[8] This paper tackles precisely this challenge.

THE BOROUGH OF TORKSEY

Our earliest written evidence for the urban status of Torksey comes from *Domesday Book*. In 1066 it was held by Queen Edith in demesne, along with the neighbouring manor of Hardwick. Together they paid a fifth of the geld owed by the city of Lincoln, of which Torksey was described as a *suburbium* with 213 burgesses. Torksey was still royal property in 1086, now held by King William, but the number of burgesses had fallen to 102, with 111 tenements described as 'waste', although the value of Torksey with Hardwick had risen to 30 pounds from 18 pounds in 1066. Other early indications of urban status include the presence of a mint by the late tenth century and the use of the Old English term *burwarmot* for the medieval court of the burgesses.[9]

One of the key factors that drew the Viking Great Army to overwinter at Torksey was no doubt its position at a key nodal point in the regional transport network (fig 1). *Domesday Book* records that 'if the king's messengers should come [to Torksey] the men of the same town should conduct them to York with their ships and their means of navigation'.[10] The town developed where the River Trent, which flows from midland England to the Humber estuary, joins the Foss Dyke connecting Lincoln with the Trent. The canal is widely regarded as being of Roman date, but Alan Vince suggested that it may date to the later tenth century when quaysides were constructed in the Wigford area of Lincoln, although this could relate to a period of refurbishment.[11] The Roman road now known as Till Bridge Lane runs from Ermine Street just north of Lincoln, crossing the Trent north of Torksey and heading northwards towards York.[12] The modern A156 heads north through Torksey, connecting Roman sites on the higher ground to the east of the Trent valley, and may have been an Iron Age trackway. Geomorphological research and LiDAR data reveal that both the winter camp and the medieval town were naturally defensible locations, raised above the Trent floodplain and surrounded by marshy ground.[13] The Old English place-name 'Turc's island' describes equally well the locations of the winter camp and the medieval town.[14]

By the twelfth century Torksey had a market charter, three parish churches (St Peter's, St Mary's and All Saints) and two monasteries (the Augustinian priory of St Leonard's and Cistercian nunnery of St Nicholas).[15] A 1237 survey described Torksey as 'the key of Lindsey as Dover is the key of England'.[16] Its position in regional trade networks is reflected by thirteenth- and fourteenth-century records of tolls paid on goods passing

7. Hall *et al* 2014, 543–62.
8. Carver 2010, 132.
9. Dolley and Strudwick 1956; Cole 1906, 478; Barley 1964, 167.
10. Foster and Longley 1924, 11.
11. Vince 2003, 240–41.
12. Sawyer 1998, 17–19, 197.
13. Stein 2014, 147–210, 270, 297, 319, 358, 361–3.
14. Cameron and Insley 2010, 122–6.
15. Cole 1906, 485–95; Barley 1964, 172–3.
16. Cole 1906, 473.

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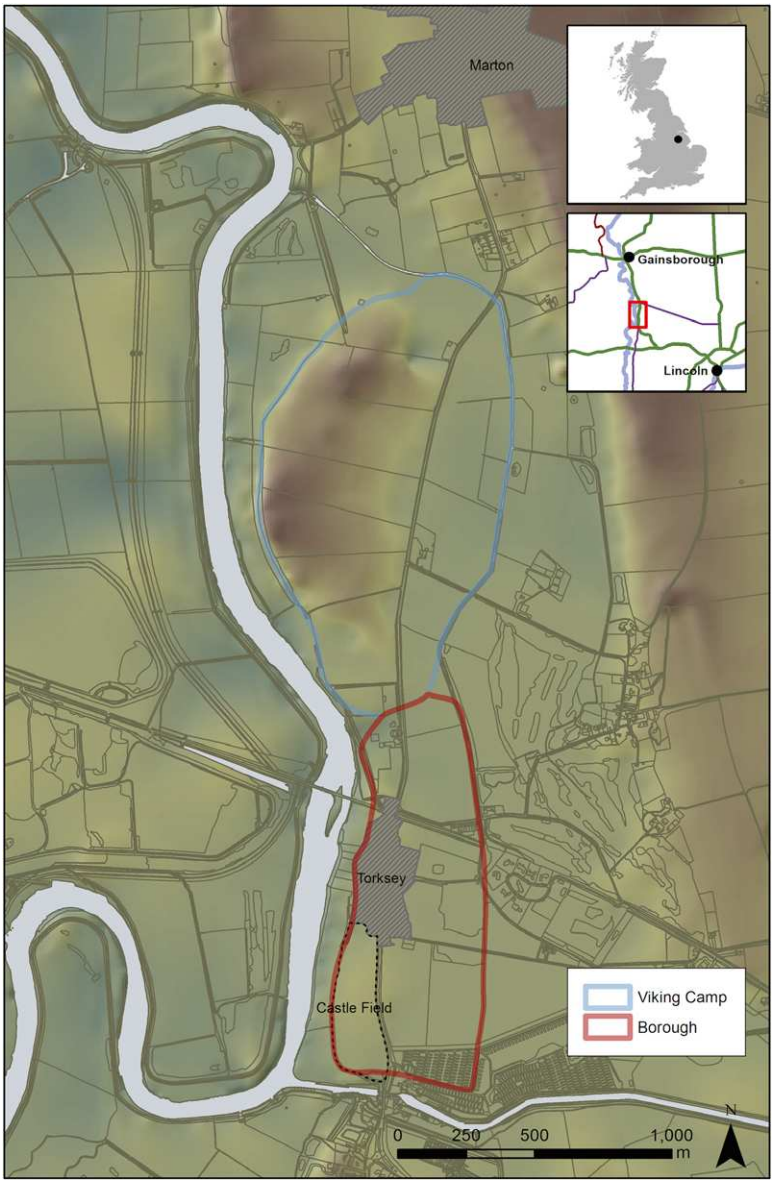

Fig 1. Location plan, showing study area and approximate outlines of Viking winter camp and Anglo-Scandinavian borough. *Map*: authors and Helen Goodchild. Base map on this and subsequent figures derived from 2m LiDAR data, © Environment Agency copyright 2014, all rights reserved; field boundaries from Ordnance Survey Mastermap, © Crown Copyright/database right 2014, an Ordnance Survey/EDINA supplied service; general map of Great Britain derived from Ordnance Survey MiniScale map.

through Torksey by road or water – including fish, corn, wine, lead, iron, timbers, millstones and materials related to textile working – while in 1340 Torksey was chosen as the collection point for the midland counties when Parliament granted Edward III

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20,000 sacks of wool to fund his foreign wars.[17] However, there were already indications that the town was in decline, through competition from other regional ports, such as Boston, Gainsborough and Grimsby.[18] Another factor was the silting up of the Foss Dyke in the fourteenth century, when repeated demands were made for its repair, and by 1375 regional trade had 'now stopped for the lack of repair and cleaning'.[19] The southern part of the town had disappeared by the mid-sixteenth century when the antiquarian John Leland reported that 'The old buildings of Torksey were on the south of the new town, but there now is little scene of old buildings, more than a chapel, where men say was the parish church of old Torksey'.[20] It is this reduction of the urban area that renders Torksey so archaeologically accessible, providing a unique opportunity to trace the progression from Army camp to urban centre.

URBAN ORIGINS: THE POTTERS OF TORKSEY

There is little to suggest that the winter camp became a focal point for later settlement. The metal-detected evidence reveals a sharp cut off in coin dates of the early 870s, and of the 3,600 plus artefacts catalogued from the winter camp by May 2022, no more than a dozen can be dated to the tenth or eleventh centuries. Our fieldwalking within the camp also recovered little pottery of this date, suggesting that for the origins of the town we should look to the adjacent island to the south.[21]

The modern village reflects the north–south orientation of the medieval town, albeit having contracted at both the south and north ends, but never extending much further east due to topographical constraints.[22] A 1237 description of the north-eastern edge of the parish refers to Brampton Marsh and Torksey Marsh, where excavation revealed a peat deposit, which radiocarbon dating suggested began to form in the Bronze Age.[23] Traces of ridge and furrow identified by excavation at the rear of a property east of Main Street (fig 2, B) reinforce that this was the eastern limit of the medieval town.[24] However, a 1751 map records a series of closes east of the A156, suggesting some former settlement activity parallel to the Foss Dyke, where Torksey ware and later medieval pottery was recovered by fieldwalking along the southern edge of unoccupied common land in the 1960s.[25] To test the antiquity of this pattern we undertook a metal-detector survey of a field spanning this area and recovered medieval finds only from the area of the closes but not the common, confirming the lack of settlement here.[26] The town also extended

17. Ibid, 474–5.
18. Sawyer 1998, 197–8.
19. Edwards and Hindle 1991, 128.
20. Toulmin Smith 1907.
21. Stocker and Everson (2006, 219–21) have suggested that another market focus later developed at Marton on an inlet from the Trent to the north of the winter camp island, where there is a concentration of mid-tenth-century sculpture typical of that from mercantile centres elsewhere, including the Wigford district of Lincoln. There is currently no other archaeological evidence for any urban development at Marton, and it may have lost out in competition with Torksey.
22. Barley 1964; Rowe 2008.
23. Cole 1906; Johnson and Palmer-Brown 1997; Stein 2014, 79.
24. McDaid 1997, 6.
25. Barley 1964, 171, 186, and 1981, 273.
26. Richards and Hadley 2020b.

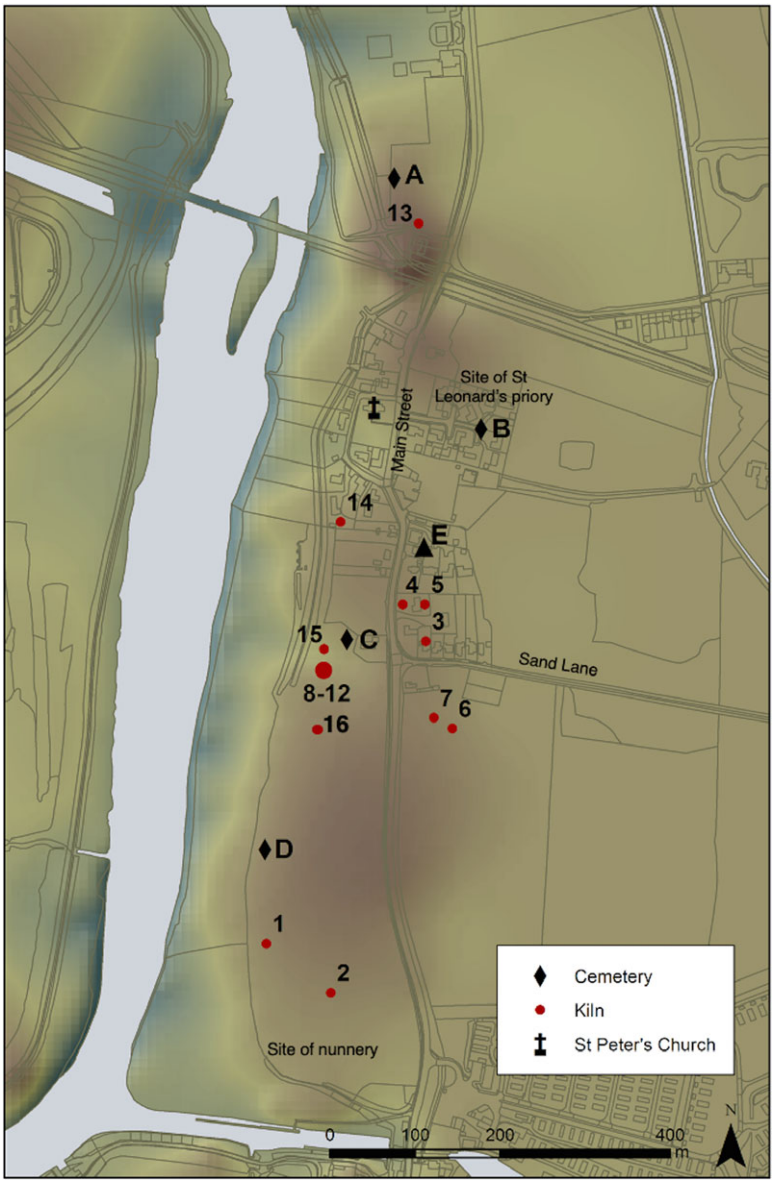

Fig 2. Map of Torksey showing the location of the pottery kilns (red dots) and excavated cemeteries (black lozenges). The approximate location of the horse remains is marked by the black triangle (E). *Map*: authors and Helen Goodchild.

eastwards along the north side of the common, where the remains of the priory of St Leonard's have been excavated, but excavations on the common revealed no indication of medieval activity.[27] There is no evidence that the town, of *c* 25ha (and therefore less than

27. Williams and Field 2002; McDaid and Young 2005.

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half the area of the winter camp) was enclosed, with local topography perhaps rendering this unnecessary.

The most extensive archaeological evidence for the origins of the town comes from its pottery industry and burial record. Most of our fieldwork has been undertaken immediately south of the present village (approximately centred on SK 83636 78365). This is scheduled as the location of the 'Medieval Town of Torksey', dubbed Castle Field from a ruined Tudor manor house at its north-western corner.[28] Approximately rectangular in shape, the Castle Field has gentle contours, with the highest point in the middle of the western edge, *c* 8m above Ordnance Datum, from where the land drops away steeply to the floodplain to the west, and slopes gradually eastwards down to the A156. Excavations by Maurice Barley and University of Nottingham Extramural Department students in the 1960s revealed a cemetery and two kilns. To contextualise these discoveries we conducted geophysical and metal-detector surveys, fieldwalking and excavation within the Castle Field, analysis of the osteological and pottery assemblages and a wider programme of test pitting within the village. Our fieldwork had four main aims, which were to: 1) determine the scale of industrial activity in this part of Torksey and relationship to kilns elsewhere in the town; 2) illuminate the forms and chronology of the kilns and their products; 3) date the cemetery uncovered by Barley and to establish the demography and origins of those interred there; and 4) characterise any contemporary and preceding settlement. Our research, including a reassessment of unpublished developer-funded excavations and Barley's excavation archive, has provided important new insights into the transition from camp to town at Torksey. The full reports on our fieldwork and supporting data have been deposited with the Archaeology Data Service, and provide a supplementary dataset to this paper.[29]

The pottery industry of Torksey: previous work

Torksey has long been known for its pottery industry, producing cooking pots, bowls, storage jars and spouted pitchers in a black or grey sandy ware, decorated with rouletting and thumbed bands of applied clay. Barley identified seven kilns at the southern edges of the modern village between 1960 and 1968,[30] and developer-funded excavations have since revealed at least another eight spread across Torksey (fig 2).[31]

The earliest contexts in which Torksey ware has been found date no earlier than the late ninth century. These include Flaxengate in Lincoln and Coppergate in York, where Torksey ware first appears in Phase 3, predating the laying out of the tenements *c* 900, and it is absent from Middle Saxon Fishergate. This is consistent with the evidence from well-dated rural settlements, such as Flixborough (Lincolnshire), where Torksey ware is first found in Phases 4–5a dated to the mid- to late ninth century, replacing the continental and regional imports no longer available to its inhabitants. At Cottam (East Yorkshire) Torksey ware is absent from the Middle Saxon settlement, which was abandoned by

28. Scheduled Monument no. 1005056; Listed Building no. 1064079.
29. https://doi.org/10.5284/1083529.
30. Barley 1964, 1981. Lincolnshire folklorist and archaeologist Ethel Rudkin recorded a concentration of unglazed pottery south of the village in 1932, and surface scatters of pottery led M. Spencer Cook to excavate a kiln there in 1949, and, while never published, these finds were known to Gerald Dunning (1959, 44). It was re-excavated by Barley as his Kiln 1.
31. Palmer-Brown 1995; Pre-Construct Archaeology 1996; McDaid 1997; Rowe 2008.

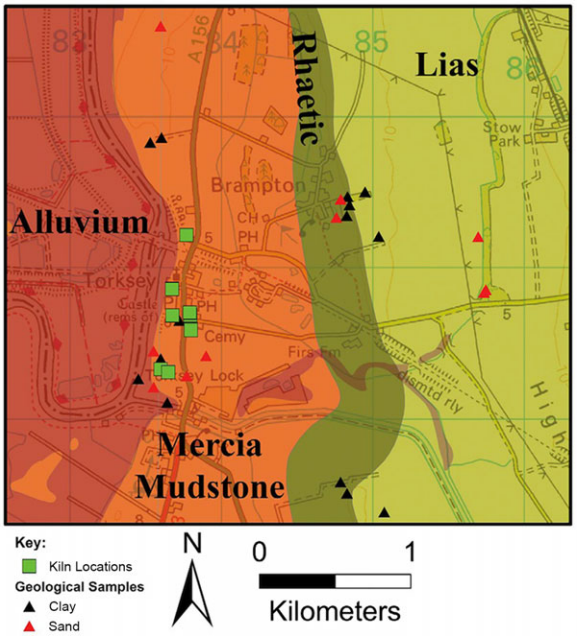

Fig 3. Torksey geology, showing locations of geological samples taken. *Map*: from Perry 2016. © Crown Copyright and Database Right (2015) Ordnance Survey (Digimap Licence) and Geology Map Data © NERC 2015.

the late ninth century, but occurs in the new Anglo-Scandinavian settlement to the north, where traces of Great Army activity have been identified.[32] While it is difficult to refine the dating more precisely, the evidence from stratigraphic and artefactual evidence from these four very different sites is consistent in suggesting that the industry originated no earlier than the last quarter of the ninth century and was already distributing its wares widely before *c* 900. Torksey pottery recovered from well-dated contexts in Lincoln has shown that rouletted decoration and inturned rims characterise the earliest phases of the industry from the late ninth to mid-tenth century, with thumbed decoration, everted rims and applied strips characteristic of the mid- to late tenth and eleventh centuries. The industry ceased operating towards the end of the eleventh century, perhaps reflected in the contraction of the town recorded in *Domesday Book*.[33]

As part of the current project, thin section petrography and scanning electron microscopy (SEM) were employed to examine the manufacturing techniques employed at Torksey, challenging previous assumptions.[34] This revealed that the clay for constructing the kilns was acquired from the Mercia mudstone on which Torksey is located, whereas the potting clay was from a band of Rhaetic clay *c* 1.5km to the east (fig 3). Petrographic analysis suggested that the potters had selected Rhaetic clays that incorporated sand, rather than, as Barley assumed, adding it as temper in the manufacturing process. From visual

32. Vince 1993; Young *et al* 2005, 90; Evans and Loveluck 2009, 369–70; Richards 2013, 208; Hall *et al* 2014, 559–61; Perry 2016, 76–7.
33. Young *et al* 2005, 14, 88, 90; Rowe 2008, app 3; Perry 2016, 79–80.
34. Perry 2016.

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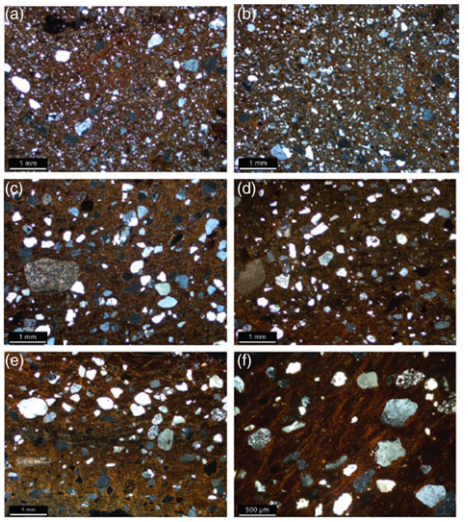

Fig 4. Petrographic thin section images of pottery, kiln structure and clay sources from Torksey. Scale bar (a)–(e) 1mm; (f) 0.5mm. The mineral composition of the lining of Kiln 13 (a) and a sample of Mercia mudstone clay (b) show that the kiln was made from Mercia mudstone. In contrast, comparison of thin sections of a sherd of Torksey pottery (c) and fired Rhaetic clay (d) reveal that the pottery was manufactured from this clay source. Pottery from York (e), long assumed to have been a local product copying the style of pottery manufactured in Torksey, has been shown by our petrographic analysis to have been made from the same clay source as Torksey ware and hence is a Torksey product. Thin section analysis also confirms that Torksey pottery is wheel-thrown, principally revealed by the diagonal lines visible in the clay (running from bottom left to top right) which are a product of spinning on the wheel (f). *Photographs*: Gareth Perry.

analysis of pottery sherds, Barley argued that 'the potters must have built up their vessels on a slow wheel by adding a series of large flattened coils', but our petrographic analysis confirmed that the vessels were fully wheel made. Under a high-powered polarising microscope, elongated grains parallel to the edges of the pot become visible, formed as the vessel spins and the potter squeezes and stretches the clay walls upwards (fig 4).[35]

Many sherds of Torksey ware exhibit a characteristic 'sandwich firing' – with grey/black surfaces, red margins and reduced grey/black cores. This indicates initial firing in an oxidising atmosphere but that this was insufficient for the oxygen in the kiln to fully penetrate and oxidise the whole body of the vessel, with the atmosphere switched to reducing in the latter stages to produce the grey/black surfaces. Our petrographic and SEM analysis suggested that the temperatures reached during firing were mainly between *c* 750–800 °C, although Kiln 2 seems to have had higher firing temperatures, mainly in the *c* 800–950 °C range, and also produced an entirely reduced pottery indicating a different firing regime from other kilns. A ceramic revolution had taken place in which existing coil-built ceramic traditions, with vessels fired in a bonfire, were replaced by new fabrics thrown on a potter's wheel, fired to high temperatures in updraught kilns. The techniques employed were totally unlike those used in the manufacture of Middle Saxon pottery in the region and encourage us to look elsewhere for the antecedents of the Torksey ware industry.

35. Barley 1964, 177–80; Perry 2016.

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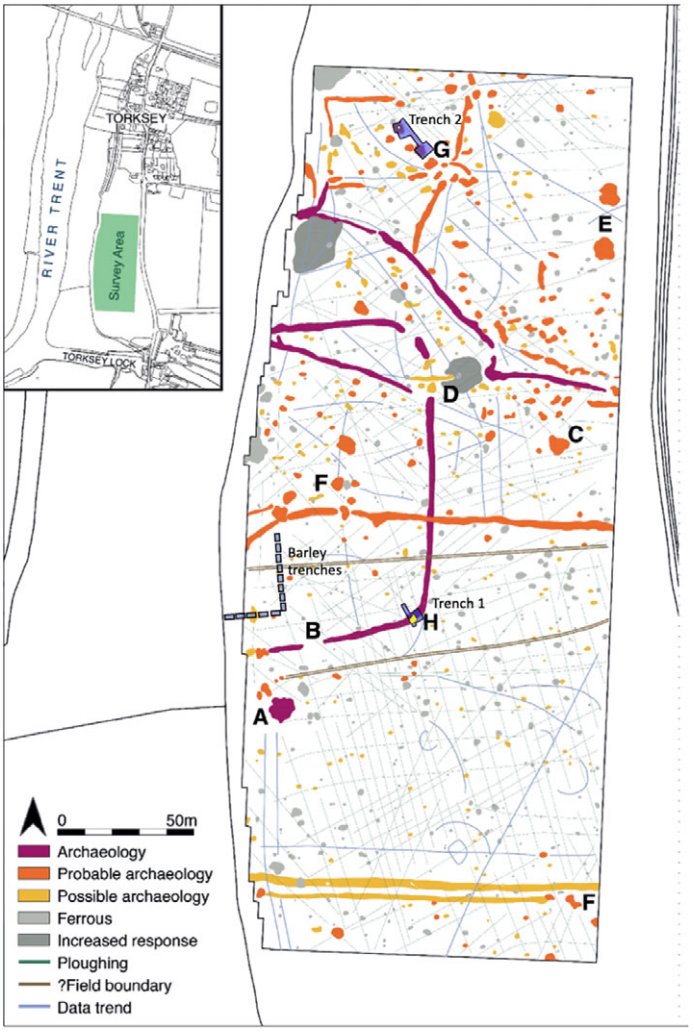

Fig 5. Magnetometer survey interpretation of the Castle Field, showing features referred to in the text, approximate location of Barley's trenches based on archive sketch plan and location of our excavation trenches. *Image*: authors and Hannah Brown.

New insights into the Torksey pottery industry

Our 2012 magnetometer survey covered an area of 4.6ha, three-quarters of the Castle Field, identifying several discrete anomalies suggesting areas of intense localised heating, many of them probably the locations of kilns, including one coincident with Barley's Kiln 1 (fig 5, A).[36] Confirmation came from our fieldwalking, undertaken over an area of *c* 3ha in the western half of the field, with all finds plotted to a 10m grid square.[37] This recovered 7,641 sherds of pottery, weighing 34,228g, 70 per cent of which was Torksey ware (5,370 sherds), the majority

36. Brown 2012, 7–9.
37. Perry 2020.

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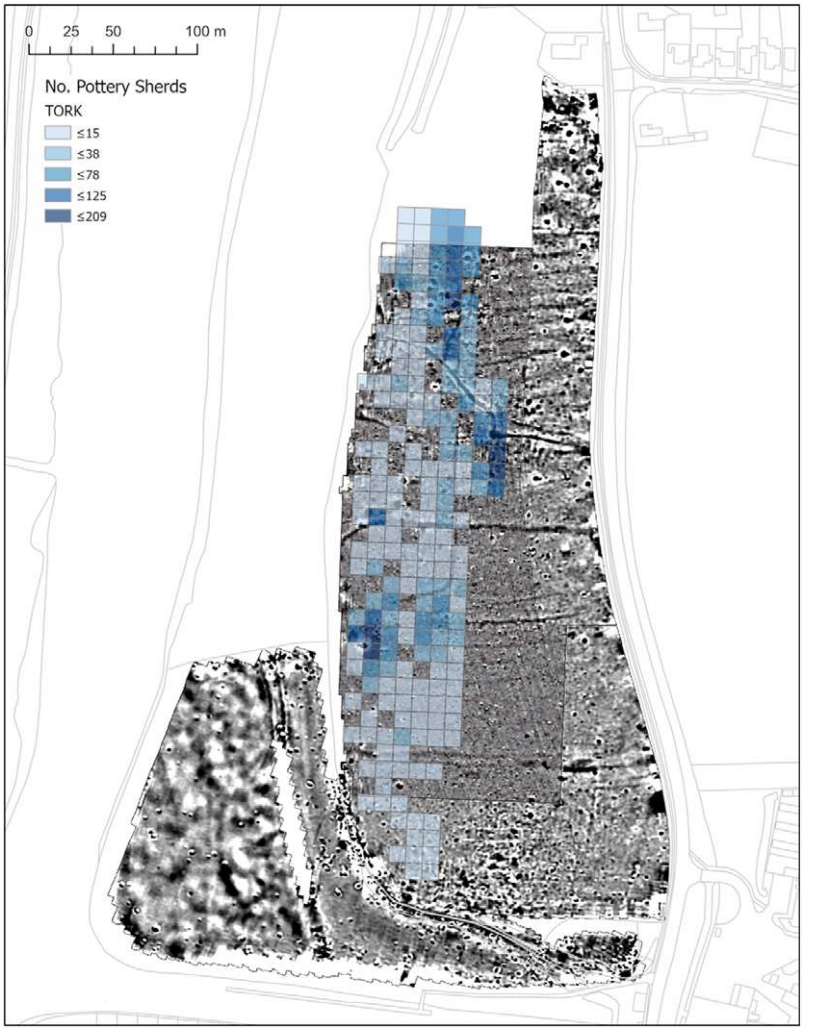

Fig 6. Density of Torksey ware recovered during fieldwalking in the Castle Field, superimposed on 2012 magnetometer survey data and also showing 2018 Headland Archaeology survey. *Image*: authors and Helen Goodchild.

wasters from pottery kilns, and the largest sample from anywhere within Torksey. The pottery was unevenly distributed, with some grid squares containing none and others returning over 200 sherds. The largest concentrations coincide with high resistance features on the magnetometer survey. For example, 474 sherds recovered from three adjacent grid squares appear to be waste from Barley's Kiln 1, and over 100 sherds were recovered from areas associated with other magnetic anomalies, suggesting the locations of additional kilns.

In 2018, prior to flood defence work, Headland Archaeology extended our survey area to the east and south, revealing another ten geomagnetic anomalies consistent with kilns (fig 6).[38] However, the location of Barley's Kiln 2 was notably not indicated either by

38. Harrison 2018.

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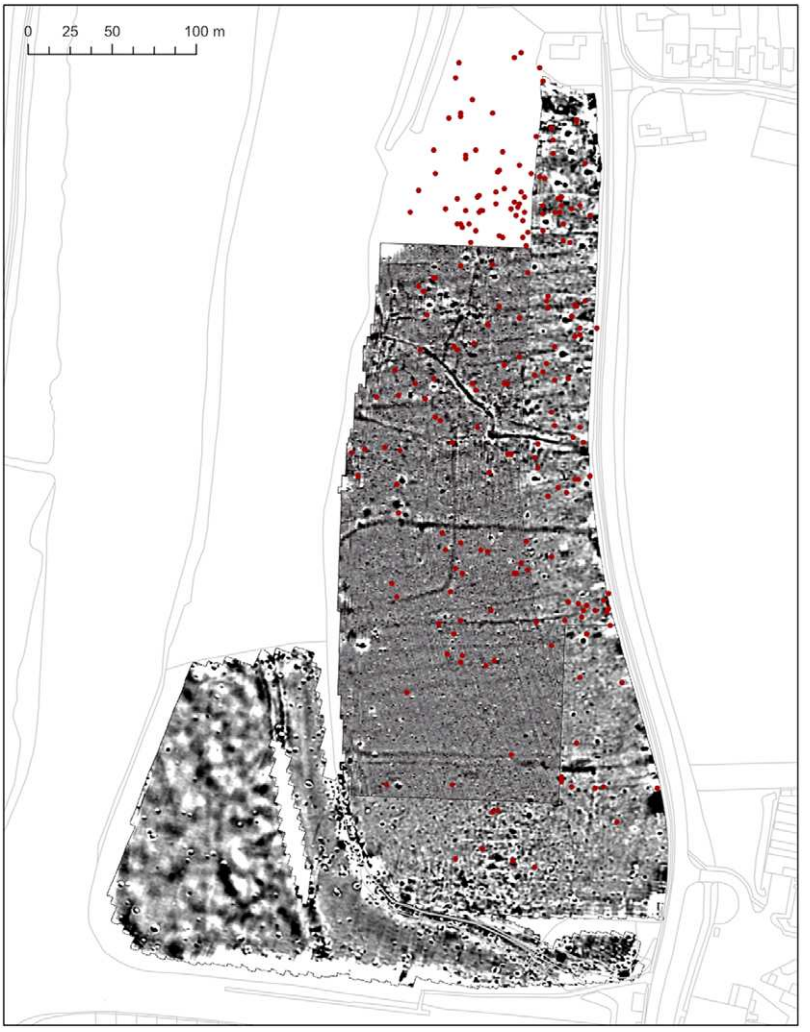

Fig 7. Distribution of artefacts recovered from metal-detector survey in the Castle Field (red dots) superimposed on magnetometer surveys. *Image*: authors and Helen Goodchild.

magnetometer survey or fieldwalking, and there were no high resistance features near some concentrations of Torksey wasters, emphasising the importance of using both prospection methods in revealing at least twenty probable kilns. The fieldwalking and geophysical surveys are, nonetheless, consistent in suggesting that pottery production was absent from the southern third of the field, a deduction reinforced by test pits dug in 2019 through the embankment by Headland Archaeology, which recovered mainly late medieval pottery and roof tiles, but no Torksey ware. Our metal-detector survey also mainly recovered material from the northern parts of the Castle Field, confirming that the southern part had a different occupational history (fig 7), reinforced by our test pit near Torksey Lock, which recovered just one sherd of Torksey ware.[39] Together this suggests that

39. Barley 1964, 186; Perry *et al* 2012; Roberts 2019.

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the Foss Dyke may not initially have been a principal means of transporting the products of the pottery industry, reinforcing Vince's argument about the date of its construction, or at least refurbishment. The paucity of occupation is perhaps what made it suitable for the construction of a nunnery here in the early twelfth century.[40]

Our fieldwalking revealed distinct clusters of Torksey ware with diagnostic datable features. Sherds with roulette decoration of late ninth- to early tenth-century date are concentrated around a number of high resistance features (fig 5, G), in what appears to be an early focus of Torksey ware production. In contrast, sherds from an area to the south (fig 5, D) are characterised by thumbed decoration and everted rims and are primarily mid-tenth to mid-eleventh century in date.

In June 2020 we undertook excavation to examine geophysical anomalies identified in the northern survey area (fig 5, Trench 2).[41] A key reason for targeting this area was that our fieldwalking had recovered a concentration of early Torksey ware nearby, including two rouletted and glazed sherds. This provided the first evidence ever recovered that Torksey's potters were experimenting with glazes. Excavation confirmed that one of the magnetic anomalies was an updraught kiln, henceforth labelled as Kiln 16 in the Torksey kiln sequence, and, although truncated by plough damage, we were able to reconstruct its form (fig 8). A circular bowl-like depression, *c* 1m in diameter, had first been created in the sandy subsoil. Regularly spaced cracks in the walls indicated that it had been lined with roughly hand-sized slabs of clay, and fingerprints were visible where the clay had been pressed into shape before firing (fig 9). Although it is not possible to say exactly how much Kiln 16 would have extended above the surviving level (height of 0.37m), the walls began to curve inwards at the top of the remains. The moderately intact fire bars (*c* 0.1–0.12m in diameter) found in the fire pit suggest that they had radiated from just above the preserved portion of the pedestal, and their diameter (0.43m) suggests there had been between six and eight fire bars. Several retained smooth and regular cylinder-like hollows, which were the impressions of wooden rods around which the clay bars had been formed, to provide rigidity (fig 10). There was a shallow flue pit on the north-eastern side (0.85m in diameter and 0.23m in depth). The mouth of the flue (a 0.3m–0.4m gap in the kiln wall) was framed on one side by a rectangular fragment of a gritstone quern, placed vertically on its edge. This is similar to the form of the flue cheeks of Kiln 2, which comprised two pieces of quernstone, of Niedermendig-type lava and Derbyshire millstone grit.[42] Two regularly shaped blocks of fire-reddened mudstone at the edge of the Kiln 16 flue may also have defined the entrance.

From the base of the kiln and flue we recovered 200 Torksey ware sherds, from both bowls and jars, suggesting that different vessel types were manufactured even during one firing (fig 11). Several sherds had pieces of limestone embedded in the fabric at the break, indicating that the pot had shattered at a weak spot in the vessel wall. Archaeomagnetic dating based on a combination of the floor and pedestal samples returned only a broad date range of AD823–1203 (AD1013±190 years) for the final firing of Kiln 16.[43]

40. Geophysical survey by Headland Archaeology revealed a substantial stone building here (*c* 37m × 7m) (Harrison 2018, 4), probably that partially uncovered by Barley (1964, 174) in 1961.
41. Hadley and Richards 2020.
42. Barley 1964, 175.
43. Wilkinson and Batt 2022.

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Fig 8. Kiln 16 after exposure of truncated walls, looking south, approximate diameter 1m. *Photograph*: authors.

Nonetheless, its pottery allows us to narrow this range as it includes bowls with inturned rims, typical of the early phases of Torksey ware, but not the rouletting decoration typical of the early kilns (2, 3, 4); nor is there thumb-impressed decoration typical of the later tenth century (eg from Kilns 1, 5, 6, 7). With its central pedestal and radiating fire bars, Kiln 16 is typical of the larger, tenth-century kilns (1, 5, 6, 7, 8, 9, 13). Yet, at just over 1m in diameter, it is similar in size to the two earliest kilns (2 and 4), but which both lack a central pedestal, while Kiln 2 also lacks fire bars. Its firing regime of oxidation followed by reduction is similar to that of all other kilns except Kiln 2, which is believed to be the earliest. Together this evidence suggests that Kiln 16 is likely to have been operating in the middle decades of the tenth century, and is a transitional type between the two principal forms of kiln: a 'missing link' that is important for our understanding of the evolution of kiln structures at Torksey.

We recovered 869 sherds of Torksey ware from the plough soil in the excavation trench. Some must have been the products of neighbouring kilns, as their features span the entire period of Torksey ware production, including early types characterised by rouletted rims and body sherds, and inturned rims, later rim forms decorated with thumbed impressions, and a wide range of vessel forms, including small and large jars and bowls (fig 12). Sixteen glazed sherds of Torksey ware were also recovered, all early forms, typical of the late ninth and early tenth century (fig 13). Glazed Torksey ware was previously unknown but can now be added to contemporary evidence for glazing from Lincoln (Early Lincoln Glazed Ware)

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Fig 9. Clay lining of Kiln 16, showing hand impressions where slabs of clay had been pressed into the pit, across an area of *c* 0.4m. *Photograph*: authors.

Fig 10. Example of a fire bar from Kiln 16, showing impression left by wooden rod around which it had been formed. *Photograph*: authors.

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Fig 11. Kiln 16 during excavation from above showing collapsed kiln furniture and Torksey ware sherds, with pedestal to right, *c* 0.2m in height. *Photograph*: authors.

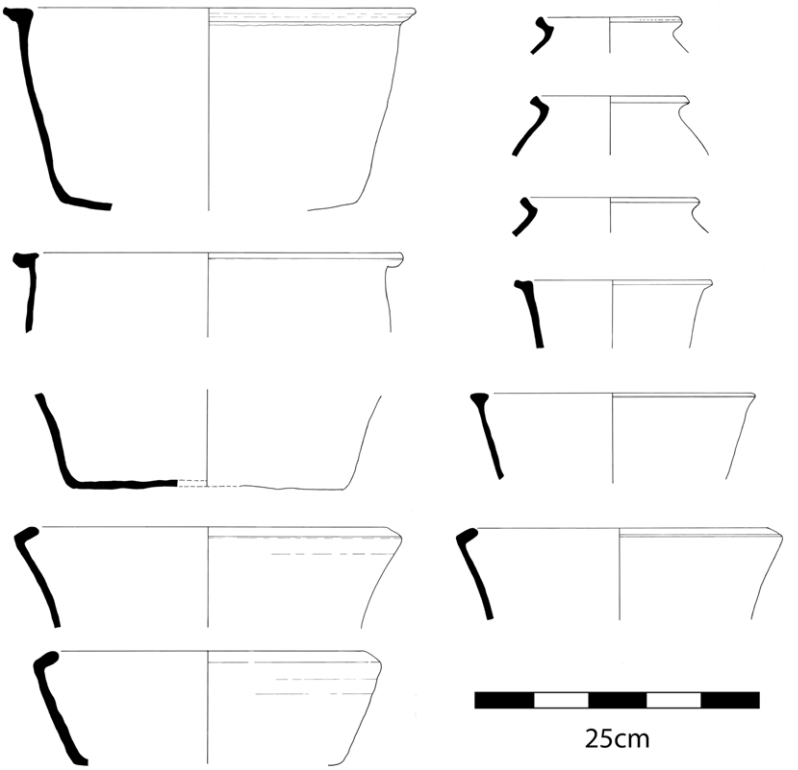

Fig 12. Profiles of Torksey ware forms manufactured in Kiln 16. *Image*: authors.

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Fig 13. Examples of Torksey ware splashed with glaze, recovered from the vicinity of Kiln 16. *Photographs*: authors.

and Stamford.[44] Glazing of external vessel walls suggests an intention at decorative embellishment.

URBAN ORIGINS: THE CEMETERIES OF TORKSEY

The early medieval cemeteries of Torksey: previous work

Early medieval cemeteries have been excavated at four different locations in Torksey, in a pattern of complex funerary organisation common to urban communities (see fig 2). The surviving parish church of St Peter must have been a fifth place of medieval burial. Nonetheless, there were more cemeteries in Torksey than there were recorded parish churches, suggesting either other unrecorded churches or cemeteries unassociated with a church. Barley's 1960 excavations identified a cemetery in the Castle Field (fig 2, D). One trench revealed seventeen skeletons 'in an area only 9 feet by 5 feet'.[45] Since the grave fills contained more shell-filled ware than Torksey ware, but there were no later medieval green-glazed wares, Barley dated the burials to the thirteenth century. Another trench revealed skeletons adjacent to a pit containing soil 'reddened by fire', charcoal, lumps of lime, pieces of unburnt lias limestone and a spouted bowl of Torksey Kiln 1 fabric. Barley argued that the undisturbed skeletal remains had destroyed the upper profile of the pit; however, his interpretation seems to have been based on the lack of a cut for the pit in the west face of his trench, but this fails to account for the known build-up of windblown sand across the site. It seems more plausible that the lime pit was later in date, as his section drawing and published and archival photographs show intact skeletons only beyond the edges of this feature and none above it. It was clearly a large cemetery as Barley noted that 'according to local report, skeletons have been disturbed about 200 yards further north still' of his first trench, and his archive shows he found another intact skeleton *c* 20yds

44. Young *et al* 2005, 62–4, 71–3, 93–7.
45. Barley 1964.

https://doi.org/10.1017/S0003581522000269 Published online by Cambridge University Press

Fig 14. Cist-lined grave 479 from the cemetery east of Main Street, before and after removal of capping stones. *Photographs*: from Williams and Field 2002.

north-east of those described in his paper. He assumed that a church must be nearby, despite a lack of building debris and no traces of one from his resistivity survey.[46]

At the southern end of the present village, at Castle Farm, ten adult burials were excavated in the 1990s, with disarticulated human remains and 'grave like cuts' indicating further burials nearby (fig 2, C). No coffins or grave goods were noted, but a *terminus ante quem* was provided by a pit that disturbed one burial and contained ten late eleventh-century coins. The fill of another grave contained an early Torksey ware rim type, and was cut by a feature in which there was decorated Torksey ware of no later than tenth-century date. Together with the intercutting of graves, this suggests that the cemetery was in use over several generations. The cemetery was separated from pottery kilns to the south by a shallow ditch, suggesting that they were contemporary.[47]

Excavations conducted between 2001 and 2005 to the east of the A156 uncovered a third cemetery with at least twenty individuals, seven interred in stone cists (fig 2, B; fig 14). Osteological analysis identified ten adults, four children and an infant; five further graves were noted but not excavated. The graves pre-dated late medieval buildings, probably part of St Leonard's priory, and the cists have local parallels of the tenth and eleventh centuries, at Lincoln, Stow and Fillingham (Lincs).[48] Radiocarbon dates of AD 1035–1155 and AD 1030–1210 at the 95 per cent confidence level were acquired as part of the current project;

46. Ibid, 172–3.
47. Field 1990; Palmer-Brown 1995, 14, 22–3, app 2.
48. Williams and Field 2002, 10–11; Rowlandson 2005.

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the latter was from a mature adult male with gold thread at his wrist, believed to be from a gold-brocaded woven band of a type commonly used to ornament early medieval ecclesiastical garments.[49] Antiquarian accounts suggest that the lost medieval parish church of St Mary was located nearby, and this has been tentatively identified as an apsidal ended building excavated *c* 70m to the west of the burials in 1997. However, if this was a church then it is unlikely to be related to these burials as it was separated from them by a *c* 3m wide ditch dated by the presence of Torksey ware to the tenth or eleventh century.[50]

Finally, in 2007 an archaeological evaluation at the very northern end of the higher ground on which the town was located revealed the graves of nineteen individuals, and the disarticulated remains of another eleven (fig 2, A). The cemetery was the least orderly of those excavated in Torksey, with burials on varying alignments, and two graves containing multiple individuals. While the excavators suggested a twelfth- or thirteenth-century date for some of the burials, dating is, in fact, uncertain, as the burials were only partially exposed to the top of the grave fills, with windblown sand layers compromising the clarity of the stratigraphy. It was suggested that an adjacent stone wall and twelfth-/thirteenth-century roof tiles were from the lost parish church of All Saints.[51] While some burials seemed to cut through a dump layer containing twelfth-century pottery, these are clearly the latest burials, with intercutting of other graves suggesting more than a single burial generation, as does the presence of disarticulated remains in a windblown sand layer otherwise devoid of dating evidence. The cemetery was close to another kiln (Kiln 13), of mid-tenth- to eleventh-century date, with earlier Torksey ware and a geophysical survey suggesting other kilns nearby. An early medieval glass bead (of which there are another half-dozen recorded from the winter camp) was a residual find in a grave containing an adult and four children lying on their side with their arms folded up towards their heads (fig 15), and an iron clench nail was a residual find in another grave containing a child lain on its side and crouched across the pelvis of an adult. These two artefacts provide a potential link with the Viking camp, just to the north. These two graves are certainly atypical of later medieval churchyard interments, and they stand comparison with a multiple grave at Repton containing a juvenile and three children crouched on their sides.[52]

New insights into the funerary landscape of Torksey

Our fieldwork in the Castle Field provided a fresh opportunity to investigate the burials encountered by Barley. Our magnetometer survey revealed a substantial D-shaped ditched enclosure, approximately 60m by 100m, on the western edge of the field, its straight side formed by the edge of the bank above the floodplain. A gap in the southern side appears to have marked an entrance way (fig 5, B).[53] Fieldwalking recovered 862 human bones or bone fragments, and another ten fragments were plotted by one of the metal-detectorists.[54] This enabled mapping of the distribution and density of skeletal material, revealing a concentration on the western edge of the site, within the northern half of the D-shaped

49. Rowlandson 2005, 19, app 6; Richards and Hadley 2016.
50. Barley 1964, 172.
51. Rowe 2008.
52. Hadley and Richards 2021, 158–60.
53. Brown 2012, 6–7.
54. Craig-Atkins 2020.

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Fig 15. Multiple burial 527 from cemetery north of the village, showing partially excavated burials. *Photograph*: from Rowe 2008.

enclosure (fig 16). Small groups of bone fragments appear sporadically to the north and south of this concentration, probably moved by ploughing.[55] Human remains were also collected by Lincoln Museum staff between 2005 and 2015 from the bank above the floodplain, having been disturbed by badger setts; as we can now see that they were on the western edge of the D-shaped enclosure, and so were from the cemetery, they were included in our osteological analysis.

The enclosure clearly formed the cemetery boundary, and must have been in contemporary use with the pottery kilns, as the magnetic anomalies from our geophysical survey are mainly to be found outside its ditch.[56] Furthermore, the concentrations of Torksey ware recovered during fieldwalking are also considerably greater outside the enclosure, while, in contrast, the distribution of Roman and Early Saxon pottery and fourteenth-century and later pottery did not respect its location.

In 2020 we undertook an excavation at the south-east corner of the enclosure, to investigate the size, character and date of the ditch, with the trench sited to intersect the

55. Eleven bone fragments were recovered too far south of the main concentration to reasonably derive from the same cemetery. These may relate to yet another cemetery near the Foss Dyke, believed to have been the location of the Cistercian nunnery (Barley 1964, 174). One bone, which could only be identified as 'human', produced a radiocarbon date of AD 1166–1215 at the 68 per cent confidence level.
56. Brown 2012, 8, 11.

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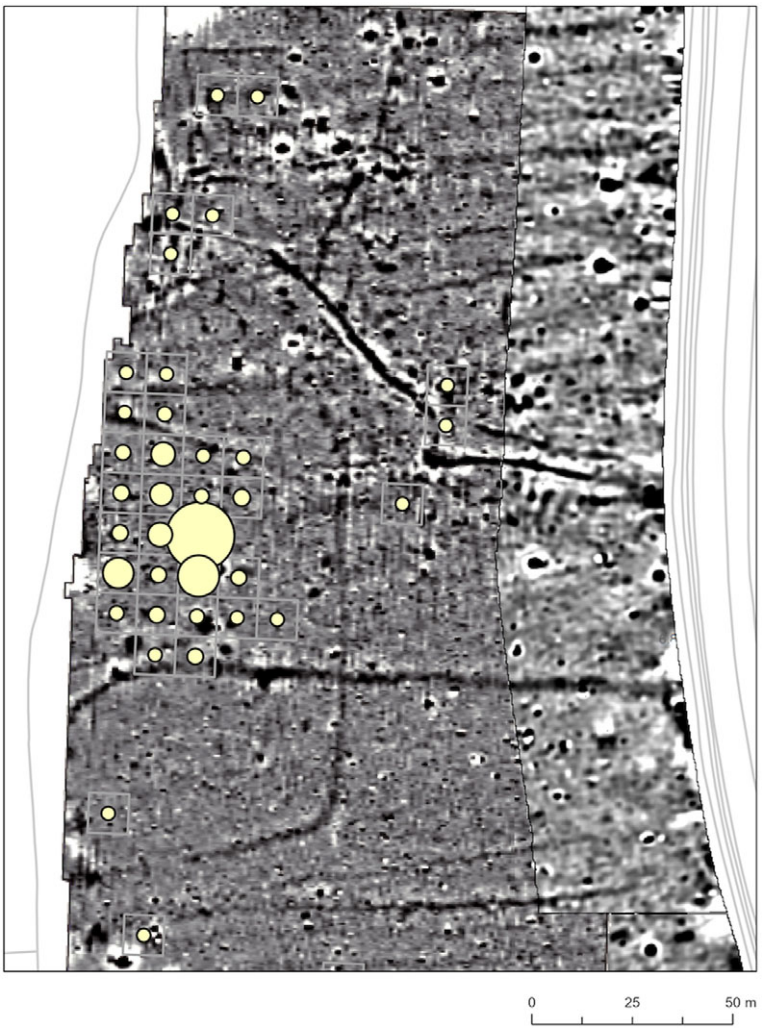

Fig 16. Density of human bones (yellow circles) recovered by fieldwalking within the enclosure. *Image*: authors and Helen Goodchild.

southern arm of the ditch just before it turned northwards (fig 5, Trench 1).[57] We also wanted to investigate whether the paucity of human remains collected during fieldwalking at the southern end of the enclosure was a real pattern, or a product of differential erosion across the enclosure or of deposition of windblown sand, affording burials at the southern end a greater degree of protection.

The excavation (figs 17–18) revealed that the first phase of the ditch (fig 18, 113) was cut through windblown sand into natural clays. It was steeply sloping on both sides, and 1.5m wide at the top and at least 0.75m deep. A posthole (111) *c* 0.2m in diameter was cut into its base, perhaps one of a line of postholes in the base of the ditch, suggesting that the

57. Hadley and Richards 2020.

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Fig 17. Excavated section of cemetery ditch. *Photograph*: authors.

enclosure was fenced, or a single post near the corner, maybe used as a guide for the ditch-diggers to indicate the south-eastern corner. Subsequently, a primary fill built up in the base of the ditch, including some slumping from the ditch edge. At this point the marker post was removed, and loose sand fell into the hole it left (110). The ditch was then recut, with the new base to the south of the previous edge, and with a shallower external profile, leading to a new ditch that was about the same depth but wider, up to 2.5m wide at the top (104). The primary fill (108/109) built up in the base of the new ditch over an extended period, and was followed by a secondary fill of sand and stones (107). Erosion of the sides led to the collapse of some of the southern clay edge into the ditch (106). This was followed by an extended period of natural accumulation of windblown and collapsed sand (103), which removed any physical trace of the enclosure ditch. Excavation established that the final backfilling did not take place until at least the late ninth or tenth century, since the upper fill contained a sherd of Torksey ware, which was too abraded to be more closely dated. The absence of other artefacts from the ditch fill is remarkable, suggesting it was largely backfilled by natural processes of windblown sand deposition and confirming that there was little domestic or industrial activity immediately within the enclosure.

The absence of any sign of graves, even allowing for the presence of a bank immediately inside the ditch, confirmed that the cemetery did not extend to the southern quarter of the enclosure. This is consistent with the lack of skeletal remains recovered from the surface here during fieldwalking, and shows that this is not due to burials here being at a greater depth. Although not mentioned in his publication, consultation of his archive revealed that

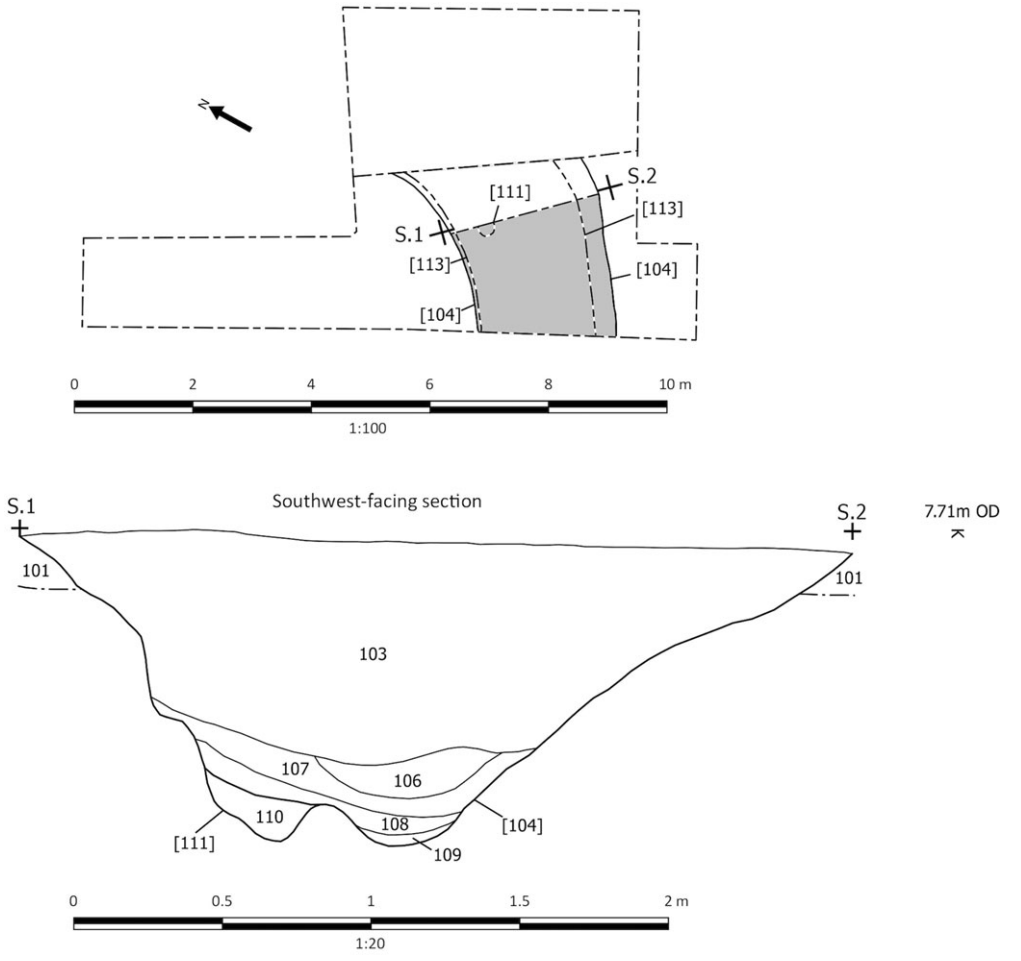

Fig 18. Plan of Trench 1, with section of ditch (104) and possible posthole (111). *Drawings*: Allen Archaeology.

Barley excavated a north–south line of test trenches here (see fig 5), the three southernmost of which were labelled as 'sterile' on the site drawings, as were two test trenches on a west–east line, reinforcing the absence of burials in this area. Therefore, while the ditch did enclose a cemetery it appears that burial had commenced in the northern part of the enclosure, and had not reached the southern edge by the time it went out of use. Barley excavated traces of a building *c* 50m north of Kiln 1, represented by a wall slot and a posthole, with a row of three further postholes *c* 1.7m to the south, which he interpreted as a house. It certainly seems far too insubstantial to be a candidate for a church, but we can now see that it was located immediately inside the ditch and marked the entranceway to the enclosure, possibly acting as some form of small gatehouse. The presence of pottery from Kiln 1 trodden into the sand outside the building suggested that it dated to the tenth century. It seems unlikely that a church was present at the southern end of the enclosure, and it would be unusual for a cemetery to be located only on the north side of an early medieval church; if there had been a church, it seems most likely to have been within the centre of the

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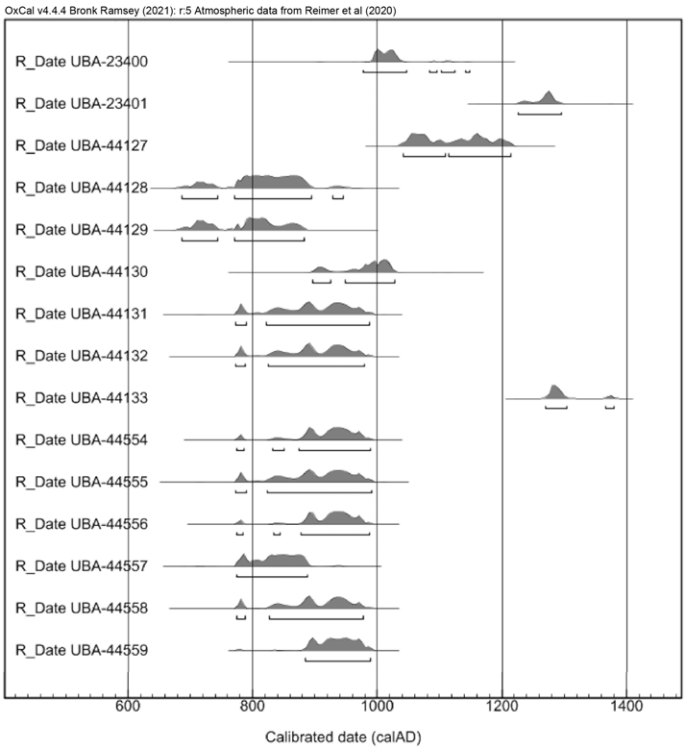

Fig 19. Radiocarbon dates for the human remains from the cemetery enclosure (Bronk Ramsay 2009). Calibrated using OxCal v4.42 Bronk Ramsey (2021): r5 Atmospheric data from Reimer *et al* (2020). *Image*: authors.

enclosure, perhaps where sporadic magnetic anomalies were traced by the magnetometer survey (fig 5, F).

The human skeletal material from the field and the badger setts was fully disarticulated and commingled, each bone and bone fragment having no demonstrable archaeological relationship to any other. Therefore, the analytical process adopted was informed by best practice for analysing commingled and disarticulated human remains.[58] A total of 1,410 (65.9 per cent) were identifiable to exact skeletal element, and 526 (24.6 per cent) to skeletal location (axial/appendicular), but the remaining 204 (9.5 per cent) could only be identified as human bone. A minimum number of thirty-eight individuals was represented, of whom twenty-two were adults and sixteen juveniles. Ages at death ranged from infancy to older adulthood and there were both males and females, suggesting the cemetery served an ordinary community. While Barley did not publish any details of the skeletons he uncovered (and it appears they were reinterred), an annotated plan in his archive labels those from his northernmost trench as including adult males and females, children and infants.

Radiocarbon dating indicates that the human remains ranged in date from the middle to late Saxon periods and into the thirteenth century. There is a concentration in the ninth and tenth centuries, although there is a possibility that the earliest date from the eighth century (fig 19). These results confirm that the main period of use of the cemetery was

58. McKinley and Smith 2017; Nikita *et al* 2019.

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contemporaneous with the Torksey pottery industry operating outside the enclosure, suggesting that the potters and their families were among those being buried in the cemetery, in an arrangement paralleled at both Castle Farm and near Kiln 13 at the northern end of the town. It also appears that the cemetery largely went out of use at the same time as the industry declined, from the eleventh century, with continued (or later) usage on a small scale in the thirteenth century, by which time the boundary ditch had long since been infilled. There may also have been newcomers to eastern England among the cemetery population. From those that had been radiocarbon dated to the early medieval period, we selected eight mandibles retaining at least one *in situ* posterior tooth for stable isotope analysis. The results indicate that at least four were non-local individuals and the combined oxygen and strontium values are equally compatible with them growing up in western Britain, central France, southern Scandinavian or the Low Countries; the evidence reflects something of the diversity of the growing urban population at Torksey.[59]

Evidence for contemporary and preceding settlement

One of the aims of our fieldwork was to recover evidence for settlement contemporary with the industrial and burial activity in the Castle Field. Traces of sooting and carbonised deposits occur on some of the Torksey ware recovered from topsoil near to Kiln 16 and from fieldwalking, indicating domestic activity nearby. This was accompanied by soot-bearing contemporary wares from Lincoln and Stamford, revealing that the inhabitants of Torksey were provisioned with pottery from other manufacturing centres as well as using locally made wares. Low concentrations of charred plant remains in the environmental samples from the ditch of the D-shaped enclosure also suggest domestic activity nearby. Some of the wild or weed plant seeds, such as stinking chamomile (*Anthemis cotula*) and fat hen (*Chenopodium album*), were probably by-products from processing of crops, such as the hulled barley (*Hordeum distichum/vulgare*), rye (*Secale cereale*) and wheat (*Triticum* sp. free threshing) also recovered.[60]

A review of developer-funded excavation reports identified further evidence of pottery revealing domestic use near kilns (eg Kilns 8–12, 13), while impressions of the hooves of a young pig in the floor of Kiln 6 suggest potting was taking place in yards where animals were also kept.[61] Excavations on the east side of Main Street in the centre of the village recovered large amounts of wasters indicating kilns nearby, and evidence of antler working was also recovered (fig 2, E). Two horses were buried in ditches dated to the tenth century by the forms of Torksey ware in the fill.[62] Their remains were either used in other industrial processing or represent some form of ritual deposition, which seems most likely to be a product of Scandinavian practice. Horse burials are common in Viking-Age Scandinavia, but the deposition of horses in a town in England is unparalleled.[63] Contemporary occupation was also revealed near Kiln 13 from a pit containing ninth- and tenth-century Torksey ware, charcoal, animal remains, charred wheat grains and seeds of vetch or peas, consistent with food waste.[64] We targeted other kiln sites with our test pits.

59. Full data is presented in Craig-Atkins 2022, and will form the basis of a future paper.
60. Hadley and Richards 2020, 39–42.
61. Barley 1981, 275; Palmer-Brown 1995; Pre-Construct Archaeology 1996; Rowe 2008.
62. McDaid 1997.
63. Cross 2011.
64. Rowe 2011.

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One was excavated in the centre of the village on Church Lane close to where kiln furniture and wasters had been identified in 1996 (Kiln 14), and we recovered pottery with external soot residues, and a rim sherd with evidence for post-firing wear. Torksey ware sherds containing fragments of carbonised vegetable matter and iron-rich grains possibly derived from slag were recovered from our test pit near to Kiln 3.[65] Together this evidence suggests that the kilns were not located in isolated industrial areas, but were interspersed with areas of domestic activity.[66]

Torksey is located in a section of the Trent valley for which palaeoenvironmental evidence is limited, partly because post-medieval drainage has dried out critical post-Roman peat sequences.[67] Therefore, we processed soil samples from Kiln 16 to seek information about the management of the local landscape required to support the pottery industry. The charcoal assemblage indicates exploitation of a diverse range of taxa for use as fuel, including oak (*Quercus* sp.), field maple (*Acer campestre*), hazel (*Corylus avellana*), poplar/willow (*Populus*/*Salix* spp.), bird/wild cherry (*Prunus* cf *avium*/*padus*), hawthorn/apple/pear/rowan/service tree/whitebeam (Pomoideae) and birch (*Betula* sp.). One hazel and seven Pomoideae charcoal fragments have strong ring curvature, indicative of smaller branches or twigs, while two of the oak charcoal fragments have weak ring curvature and tyloses in the vessel cavities, suggesting the use of heartwood from large diameter branches or trunk wood. Similarly, the charcoal assemblage from Kiln 8 excavated at Castle Farm comprised heartwood of oak and ash (*fraxinus*) from the flue areas and small diameter wood of alder (*Aldus*) and gorse/broom (*Ulex*).[68] Using large diameter oak would have produced a slow rise in kiln temperature and a sustained fire, while a rapid rise in temperature would be achieved by burning bundles of small diameter wood from shrubs or small trees such as hazel, Pomoideae, birch, maple, broom, gorse and alder, as well as plant material such as straw, reeds and heather.[69] The place-name of Brampton (Old English *brōm*, *tūn* 'farmstead where the broom grows') within the parish of Torksey may indicate a local source of some of the kiln fuel.

Our metal-detector survey recovered only twelve early medieval artefacts from the Castle Field (8 per cent of the total).[70] Nonetheless, four demonstrate a link to the Great Army's winter camp to the north. Most significant is a hollow conical lead gaming piece (fig 20, sf6), found within the cemetery enclosure, which can be directly paralleled with hundreds of similar finds from the winter camp and is a diagnostic artefact manufactured by members of the Viking Great Army in Torksey. A second lead cone (sf166) has a solid base but seems likely to be another gaming piece, given its ribbed decoration. A third link may be provided by an iron clench nail (fig 21, sf208), generally associated with ship repair, but given its findspot from the western edge of the cemetery enclosure it may have been introduced on a section of planking, perhaps used as a coffin bier (as in an example from York Minster); Barley's archive suggests another was found among skeletons he excavated.[71] An iron draw knife (sf180) used for shaping wood, recovered by our metal-detector survey close to a cluster of kilns detected by geophysical survey, is of a type known from the

65. Perry *et al* 2012.
66. Palmer-Brown 1995, app 3; Rowe 2011, app 3.
67. Stein 2014, 247.
68. Palmer-Brown 1995, app 3.
69. Marguerie 2002.
70. Richards and Hadley 2020a.
71. Kjølbye-Biddle 1995.

Fig 20. Lead gaming pieces (sf6 and sf166). *Photographs*: authors.

Fig 21. Iron clench nail (sf208). *Photograph*: authors.

Fig 22. Iron draw knife (sf180). *Photograph*: authors.

winter camp and also from Coppergate (fig 22).[72] It had a curving blade and two tangs where each end would have been attached to the wooden handle, and with a blade *c* 65mm wide it must have been used for fine woodworking. The other early medieval finds comprised fragments of two copper-alloy strap ends, one of Thomas type E5, dated to the late tenth or eleventh century (sf78), and pieces of decorative copper-alloy mounts and

72. Ottaway 1992, 531–2.

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buckles, and a pendant. A single silver coin (sf175) of Edward the Confessor (r. 1042–66) belongs to the period when the town was thriving.

We also sought evidence for any settlement activity that preceded the pottery industry, but only twenty-one early Anglo-Saxon sherds (0.27 per cent of the total assemblage) were recovered from the Castle Field, which nonetheless represent the largest assemblage of early Anglo-Saxon pottery discovered anywhere in Torksey.[73] Notably there was no Middle Saxon pottery, while the metal-detector survey recovered nothing that need date any earlier than the ninth century either. Therefore, while the cemetery within the D-shaped enclosure conceivably originated a little earlier than that, there is little indication of extensive activity prior to the establishment of the pottery industry towards the end of the ninth century.

DISCUSSION: THE DEVELOPMENT OF TORKSEY AND WIDER IMPLICATIONS

The potters who came to Torksey in the late ninth century instigated an industrial revolution there using a fast wheel and updraught kilns, firing a range of standardised wares to high temperatures, and we have shown for the first time that they also conducted early experiments in glazing. There are early kilns both north and south of the modern village, and both areas have a clear connection with the Viking winter camp, through diagnostic artefacts including clench nails and gaming pieces. Across the emerging town, kilns were constructed on the higher ground overlooking the Trent, all associated with domestic activity and most with cemeteries, perhaps suggesting that the cemeteries were used, if not founded, by distinct potting communities. The evidence from Torksey is echoed at Thetford (Norfolk), where the Great Army had overwintered in 869–70. Pottery kilns are interspersed with numerous contemporary pits, ditches and postholes, and multiple burial sites. Some burials are in unusual locations (pits, ditches), and often unrelated to the locations of known churches, and at least two burials are furnished with grave goods.[74] The late ninth-century evidence from Coppergate has been difficult to characterise, but craftworking such as blacksmithing, copper-alloy, bone, antler and amber working, has been identified. Isolated burials have been assumed to be associated with a nearby church, but they are interspersed with domestic activity, in a similar manner to those in Torksey and Thetford.[75] What is also becoming clear from the work at Torksey is that the sites where the Great Army overwintered were typically close to, but not in the same locations as, the places where urban life developed in the decades afterwards. While we do not know the location of the Thetford camp, there has been sufficiently extensive excavation to suggest it is not in the area of the town, while the camp associated with York is now known to have been located *c* 12km north-west at Aldwark.[76]

Our investigation of Torksey after the Vikings has wider relevance to understanding the impact of the Viking Great Army on urbanism and industry in Anglo-Saxon England more broadly. It is striking that the wheel-thrown pottery industries emerged in those regions where the Great Army had been active, including places where it overwintered, and some which remained under Scandinavian control into the tenth century, such as Thetford,

73. McDaid and Young 2005; Rowe 2008.
74. Hadley and Richards 2021, 262–5.
75. Hall *et al* 2014, 543–62.
76. Hadley and Richards 2021, 201–18, 262–4.

Stamford, Lincoln, Norwich (Norfolk), Leicester, Northampton and York. While some of these industries emerged in the tenth century, there is currently no reliable evidence that dates any of these wheel-thrown industries earlier than the late ninth century.[77] This industrial revolution had a long-term influence, as the earliest centres of wheel-thrown production spawned 'daughter' industries. Indeed, our work has shown that in the tenth century a Torksey potter relocated with their technological skill set *c* 23km up the Trent to Newark (Nottinghamshire); their products are distinguishable only through the new clay source they used.[78] Elsewhere coil-built wares persisted, and aceramic regions remained so until after the Norman Conquest, a conservatism in sharp contrast to the great change evident in eastern England.[79]

Yet the technologies were certainly not imported from Scandinavia, where wheel-throwing and kiln firing were unknown. Dunning long ago observed that their origins may lie on the Continent, a view that has been widely accepted albeit that the mechanisms for their introduction into England remained unexplored.[80] However, with more recent kiln excavations on the Continent it is possible to pursue this suggestion, and we suggest that the technological choices of wheel-thrown, kiln-fired industries in northern France and the Low Countries, broadly from Paris to Dorestad, are very similar to the range of practices introduced to England in the late ninth and tenth centuries. The parallels in vessel forms, rim shapes, decoration and kiln structures[81] strongly suggest that the potters arrived from these regions, which had been frequented by Viking raiders immediately before some of them came to England to join the Great Army.[82] The form of Kiln 2, especially, is directly paralleled on the Continent, and its distinctive firing regime, and as the only Torksey kiln whose products were wire cut from the wheel, reinforces the argument that this was the earliest of those excavated. Kiln 2 type Torksey ware is found in late ninth-century contexts at both Flixborough and Lincoln, indicating that the industry was swiftly integrated into regional trading networks.[83] In the light of this evidence, it is intriguing that the possible origins of individuals buried in the Castle Field cemetery include those areas of the Continent from which potters may have arrived.

The potters required resources from across the landscape, both for fuel and potting clay which was acquired from clay beds *c* 1.5km east, but they constructed their kilns adjacent to the Trent as their growing distribution network required easy access to riverine transport. It seems unlikely that the potters arrived without the backing of an authority capable of controlling access to the wider landscape. A similar situation of lordly patronage can be observed when the Torksey daughter industry was founded at Newark.[84] In the later medieval period, when such matters are first documented, access to resources for pottery production, principally clay and fuel, was tightly controlled and generated income for landholders from the potters.[85] The leaders of the Great Army had extensive experience

77. Perry 2016. In Blair 2018, 267, the only wheel-thrown industry accepted as earlier was Stafford, but new radiocarbon dates suggest this originated in the late ninth century or later: Hamerow *et al* 2020, 587, 589.
78. Perry 2019.
79. Brown 2003.
80. Dunning 1959, 34; see also Vince 1993; McLeod 2014, 153–6.
81. Hincker and Husi 2006.
82. McLeod 2014, 132–58; Hadley and Richards 2021, 44–56.
83. Evans and Loveluck 2009, 370.
84. Perry 2019.
85. Le Patourel 1968, 106–15, 117–18.

of exploiting local resources, and we suggest that it was under their auspices that the potters first arrived in Torksey from the Continent, offering a context for the arrival of the new potting technologies. It was certainly not unusual for the Army to make arrangements to keep control over the regions in which they had overwintered, as evidenced by the establishment of 'puppet' rulers in York, Repton and East Anglia.[86] By the end of the ninth century, Torksey ware was being consumed at estate centres such as Cottam and Flixborough, and in the Scandinavian controlled towns of York and Lincoln, reflecting the areas of political influence established after the Great Army conquered eastern Mercia and Northumbria. In both towns coins were minted for Scandinavian rulers before the end of the ninth century, and by the early tenth century sculpture was being erected in Lindsey (north Lincolnshire) on stone imported from the lands of the Archbishop of York and coins were being minted in Lincoln that were influenced by the design of York coins.[87]

The potters were not the only craft specialists who arrived in England in the wake of the Great Army's campaigns, as Continental moneyers were used by Viking kings to mint coins in eastern England and York in the 880s and 890s. While the mechanisms by which this was achieved are irrecoverable, and we cannot know if they were coerced or came willingly to exploit new economic opportunities, we suggest that it was part of a coordinated plan to conquer, settle and engage in expressions of elite authority and trading activities in a manner unfamiliar to Scandinavia and which necessitated specialist craft support from regions where the Army had spent decades campaigning.

There is little evidence for any substantial activity anywhere in Torksey before the Army arrived, but when it departed it left the beginnings of a town in its wake. We do not suggest that there was a single model for urban development, but the role of the Viking Great Army is becoming clear – a large mobile force engaged in trade and manufacture, which divided and set about conquering and settling. Nicholas Brooks memorably described ninth-century England as 'the crucible of defeat' following the Viking onslaught,[88] but we can now also see it as the crucible of manufacturing and urbanisation, in which the Great Army was crucial.

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86. Hadley and Richards 2021, 63–4, 67.
87. Sawyer 1998, 119–20; Stocker and Everson 1999, ch 5.
88. Brooks 1979.

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