

# Roman water management and the Moorfields marsh: Crossrail excavations at Moorgate and Finsbury Circus, London EC2

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## Introduction

Between 2010 and 2013 Museum of London Archaeology (MOLA) carried out a series of investigations at Moorgate (XSP10) and Finsbury Circus (XRZ10) worksites as part of the Crossrail Project (Fig. 1). The Moorgate worksite was located at 17–31 Moorfields, Moorgate station and 91–109 Moorgate, but also included shallow utility trenches and trial pitting within the surrounding roads and buildings. To the east, the Finsbury Circus shaft and grout shaft trenches were located within Finsbury Circus gardens and the surrounding roadways.

The worksites lie in the area of the Walbrook valley to the north of the City, which became known as the Moorfields marsh. It has been well demonstrated that the upper reaches of the Walbrook were managed and the area utilised from the late 1st century AD, prior to the formation of the marsh. Previous archaeological investigations at Finsbury Circus (site codes RIV87, ELD88, FIB88, BSP91, BDC03 and ENS03), c. 100m to the northeast of the Crossrail worksite, have revealed evidence for the northern Roman cemetery of Londinium, prehistoric and Roman tributaries of the Walbrook, quarrying and an east–west aligned road.<sup>1</sup> At Moor House (site code MRL98), c. 20m to the south of the Moorgate worksite, Roman channels and drainage ditches were recorded along with disarticulated human remains and a possible Roman inhumation.<sup>2</sup> Current evidence suggests that the marsh developed in the upper Walbrook valley following the construction of the city wall, probably in the very late 2nd or early 3rd century.<sup>3</sup>

## The late prehistoric and early Roman landscape

The underlying geology of the sites consisted of fairly uniform and gently undulating Thames river terrace gravels capped by patches of brickearth. Discoloured or weathered brickearth was observed on the Moorgate worksite, as well as a thin homogeneous waterlain clay which probably indicated intermittent flooding.

The earliest feature recorded at the Finsbury Circus worksite was a possible channel running north-east to south-west. Environmental samples from the channel fills yielded some evidence of aquatic and wetland plants, and included quite high numbers of seeds from blinks (*Montia fontana*), a species typically found in places that are wet in winter but subject to seasonal drying. Seeds of celery-leaved crowfoot (*Ranunculus sceleratus*) and aquatic invertebrates, in the form of ‘waterflea’

eggs (Cladoceran ephippia) and caddis fly (Trichoptera) larval cases, reinforce the picture of a seasonally water-filled channel. The largest numbers of identified taxa, however, came from dry-ground plants of disturbed (including cultivated) habitats and grassy places, and suggest the presence of managed meadows or pastures, with cultivation possibly indicated nearby. The latter is perhaps supported by the presence of four glume bases from spelt wheat (*Triticum spelta*).

Waterlogged seeds from the channel fills provided a calibrated radiocarbon date of cal AD 0–130 AD (Table 1).<sup>4</sup>

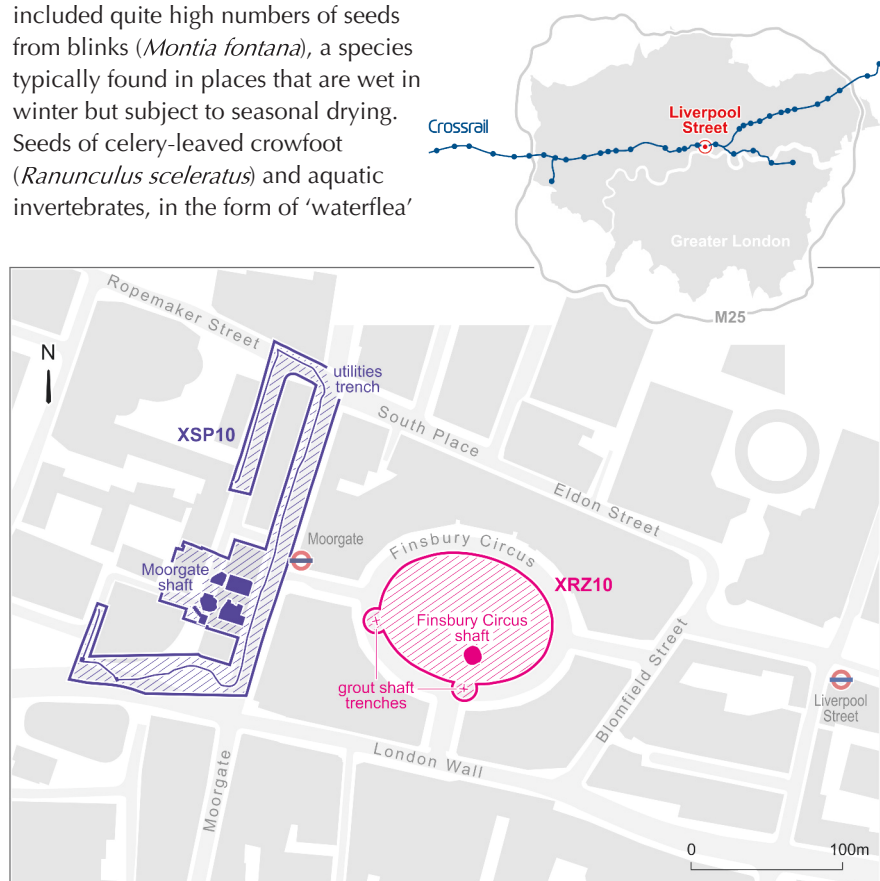
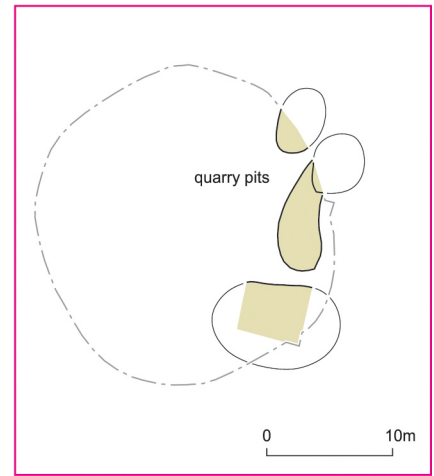
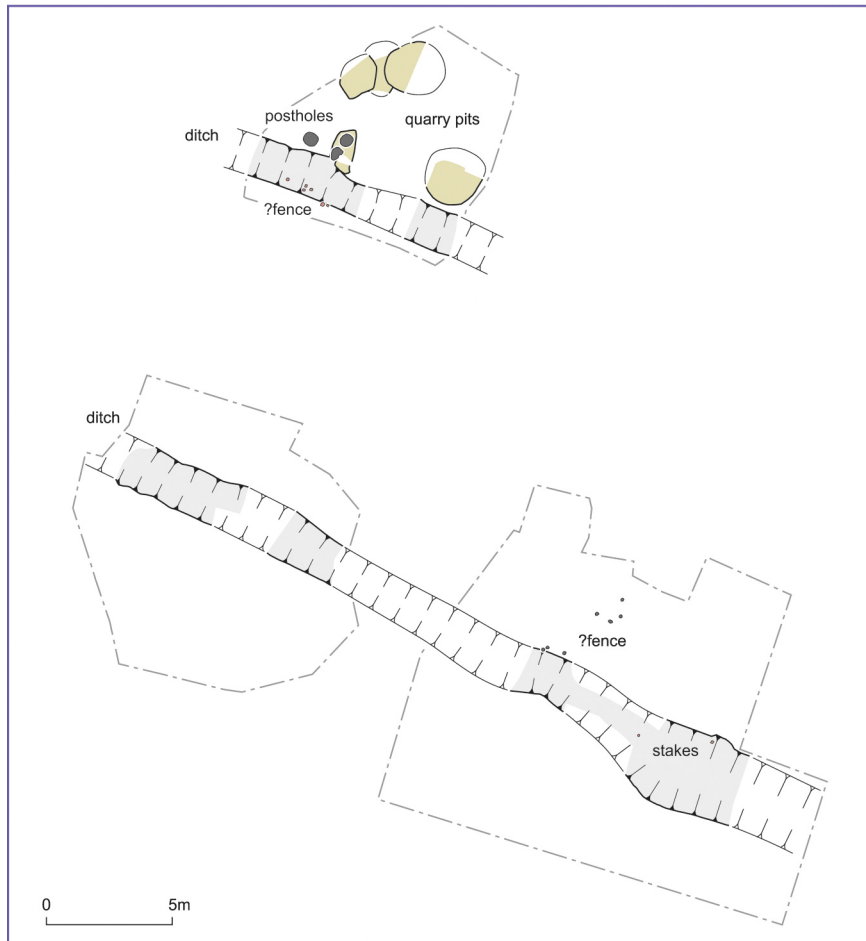
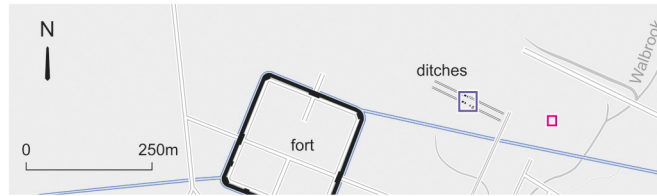


Fig. 1: location of the sites and MOLA investigations



**Fig. 2: 2nd-century features at the Moorgate (XSPI0) and Finsbury Circus (XRZ10) worksites, and the wider Roman landscape**

The presence of a grape pip and the head of a grain weevil (*Sitophilus granarius*) also suggest that the channel was backfilled early in the Roman period. Grain weevils have never been recorded in deposits which pre-date the arrival of the Romans in Britain.

Excavations to the north have found similar, potentially prehistoric and later stream channels,<sup>5</sup> which were evidently not formal attempts at drainage or water management. The channel at Finsbury Circus would have formed part of this natural drainage network that fed the main Walbrook channel to the east, approximately on the line of Blomfield Street.

**Londinium’s northern hinterland in the 2nd-century AD**

The area of the upper Walbrook valley

to the north of the Roman city began to be used for burials from the late 1st/early 2nd century,<sup>6</sup> and there is evidence that from the mid-2nd century the surrounding landscape began to be used more intensively. There was planned management of the Walbrook and its tributaries, with the infilling of minor streams to allow for the construction of trackways or roads, one of which was established to the north of the site in c. AD 120–40.<sup>7</sup> The sites are located away from the main routes in and out of the Roman city, and though it has been suggested that there may have been a continuation of the north-south road running approximately on the line of modern Moorgate, no evidence for it has yet been recorded beyond the line of the later city wall.<sup>8</sup>

Plant assemblages from Moorgate

dated to the 2nd century produced an increased quantity of aquatic and wetland plants in comparison to those from the apparently seasonal channel at the Finsbury Circus worksite, indicating an increase in standing water as well as marshy ground. Two parallel roughly east–west aligned ditches (Fig. 2), continued across the Moorgate site and were probably excavated to alleviate the wet conditions. The southernmost ditch was traced for over 27m, and the alignment of the ditches respects that of the other contemporary features that would have dominated the area, notably the northern wall of the Cripplegate Fort (constructed during the early 2nd century) to the south-west, and the road constructed around the same time further to the north (Fig. 2). Similar drainage features have also been identified at Moor House, including a gully tentatively identified as a boundary ditch predating the later city wall.<sup>9</sup> It is possible that together these formed part of a series of similar sized and aligned drainage ditches, indicating a concerted attempt at water management.

Both ditches were similar in width and depth, and contained considerable plant matter, with a predominance of wetland remains, including plants which grow either in shallow water or in adjacent marshy / muddy areas. Seeds of pondweed (*Potamogeton sp*) and stonewort oogonia (*Chara sp.*)

represent fully aquatic plants which grow submerged or floating in bodies of water, but although the plant assemblages suggest the presence of flood-prone water channels and still or slow flowing water, they also indicate that there was dry ground nearby. Cultivated plant remains were limited to an assemblage of charred crop-processing waste, composed mainly of cereal chaff from spelt wheat (*Triticum spelta*), with a few cereal grains and seeds of brome (*Bromus* sp.) and other weeds. This mix of wet- and dry-ground plants is similar to that found from channel fills, ditches and flood deposits of the same period at ENS03 and BDC03,<sup>10</sup> but with more evidence of the dumping of refuse from those sites.

The southernmost ditch was dated to AD 150–300 by a sherd from a probable east Gaulish Dragendorff form 37 bowl, and a section of a Verulamium region white ware *unguentarium* which might be a product of the Northgate kilns as it has mixed clay.<sup>11</sup> Two decayed timber stakes were sealed by the lower fills of this ditch; the westernmost was fairly substantial and had been driven to a depth of 0.70m below the base of the ditch. Seven post-

holes located immediately to the north may represent a fence line.

The northern ditch followed the same alignment and contained a variety of material likely washed in from deposits upstream, including small groups of cattle and horse bone, a human mandible, a box flue tile <T1> (Fig. 3) of c. AD 100–160 date and 55 sherds (831g) of pottery; the latest vessel dating to the early Antonine period (AD 140–160). The preservation of this pottery is in notable contrast to that from other features, and the bulk of the pottery comes from just two vessels: a black-burnished-style ware everted-rimmed jar <P1> and a Verulamium region coarse white-slipped ware ring-necked flagon with cupped mouth <P2> (Fig. 4). A small group of stake-holes recorded along the southern edge of the ditch may represent another fence line.

The largest quantities of Roman pottery (188 sherds/3636g) were retrieved from the ditches and associated features. The ditch fills and over-bank flooding deposits were dated from the Hadrianic to the end of the Antonine period (AD 120–200). However, there is an emphasis on early Antonine (AD 140–160) material, including several examples of both bead and flange mortaria and ring-necked flagons with cupped mouth (typical of this period). Stream channels

at Moor House contained a similar concentration of 2nd-century pottery.<sup>12</sup> The emphasis on pottery of 2nd century AD date is marked, with very little residual earlier material. Sherds from black-burnished ware vessels equate to almost a fifth of the total assemblage from this phase of activity. Black-burnished ware 2 vessels were a common choice for accessory vessels in the recently analysed assemblage from the upper Walbrook valley cemetery.<sup>13</sup> More tangible evidence for the existence of burials nearby was provided by ten fragments of adult human bone from a minimum number of two individuals. The dark colouration of the bone was consistent with it having been redeposited within waterlain deposits with the majority of the diaphyses absent due to post-mortem breakage.

The 2nd-century deposits from the Moorgate worksite also produced a number of Roman small finds, mostly broken objects, found in the ditches and water-lain deposits. The small group has an emphasis on personal objects broadly datable to the late 1st–

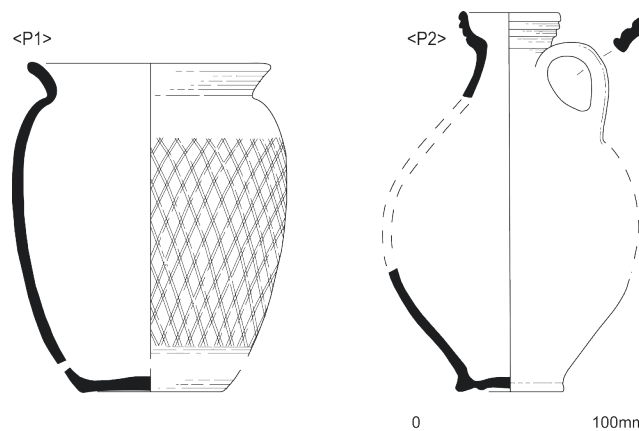


Fig. 4: vessels recovered from the northern ditch at the Moorgate worksite (XSP10)



Fig. 3: box-flue tile with combed keying from the northern ditch at the Moorgate worksite (XSP10)

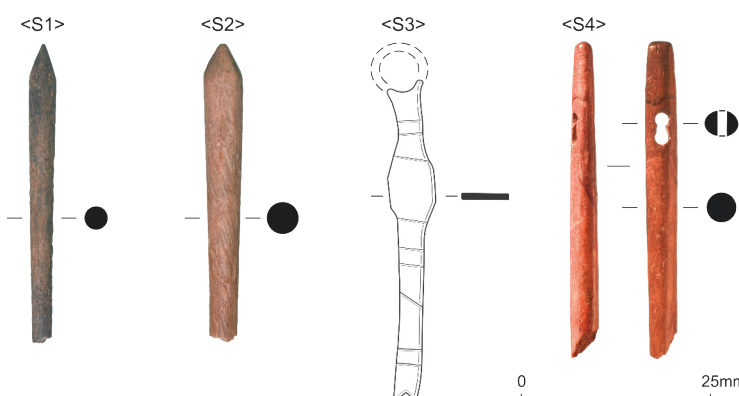


Fig. 5: Roman small finds from the Moorgate worksite: two bone hairpins, a copper-alloy nail cleaner and bone needle



2nd century and is comparable to other excavations within this landscape as at Moor House<sup>14</sup> and at Crossrail Broadgate Tickethall.<sup>15</sup> Whilst some of these finds may represent casual rubbish disposal at the periphery of town, it is possible that some could be grave goods disturbed from burials along with the human bone.

Two bone hairpins <S1> and <S2> (Fig. 5) of the same simple form were found together in the southernmost ditch, and were broken to the same length. They are of a common type<sup>16</sup> used for female hairstyles of the 1st–2nd centuries AD and may have been used together and then deposited as a pair. A bone needle <S4> (Fig. 5) from another ditch fill has a neatly squared-off head and a decorative Figure 8 eye,<sup>17</sup> although this was probably a sewing implement, it has recently been suggested that some Roman needles are also hairdressing tools.<sup>18</sup> A copper-alloy nail cleaner <S3> (Fig. 5) is certainly associated with personal grooming. These curious bifid objects are often found as part of small toilet sets along with tweezers and ear scoops. While these other forms of toilet instruments are used across the Roman world, the distribution of nail cleaners is largely restricted to Britain and they seem to reflect the survival of a local native grooming practice within the province after the Roman conquest.<sup>19</sup>

Further evidence for Roman activity at the Moorgate worksite was characterised by localised quarry pitting and the dumping of refuse material, both of which appeared to be restricted to the north of the northern ditch and were broadly contemporary. It is possible that the area to the north of this ditch represented a separate allotment from that to the south, with a different owner or tenant, who utilised the resources differently. Of note from one of the dumps of refuse was a horse phalange that possibly showed the early stages of ‘false ring bone’, a pathological change thought to be associated with concussion, perhaps arising from heavy work on hard surfaces.<sup>20</sup>

Gravel quarrying took place on a larger scale at the Finsbury Circus worksite (Fig. 2), where two more substantial pits were recorded, one of which contained an assemblage of pottery dated to AD 120–160. The

dating and location of these features raises the possibility that this gravel extraction was associated with the mid-2nd century development of the area, which included the construction of the road to the north.<sup>21</sup>

The pits were sealed by a deposit that contained a small but distinctive group of highly fragmented cattle bone, possibly derived from further bone processing, perhaps for grease extraction following butchery. This may indicate localised industrial activity, or simply the dumping of refuse from further afield, prior to formation of the marsh.

### Marsh formation and medieval activity

An extensive marsh sealed the Roman horizons at both the Moorgate and Finsbury Circus worksites; its survival was intermittent at Moorgate, but a full 1m+ sequence survived at Finsbury Circus. The formation of the marsh post-dated the mid-2nd century activity recorded at both worksites, but evidence for the precise date at which this occurred was sparse. A deposit overlying the southern ditch at the Moorgate worksite contained pottery dated AD 140–160/200, but this is likely to be residual (and possibly displaced by the marsh formation process)<sup>22</sup> though consistent with the theory that the formation of the marsh was contemporaneous with the construction of the city wall.

The marsh was represented by well-sorted mixed blue-black brown silts, with the lower deposits compacted and dominated by large amounts of vegetal

material, including plant roots, stems and moss. The most prevalent seeds were from aquatic and wetland plants which rooted under water with submerged or floating leaves. A sample from the base of the marsh sequence at the Finsbury Circus worksite contained seeds of soft hornwort (*Ceratophyllum submersum*), horned pond-weed (*Zannichellia palustris*) and duckweed (*Lemna sp.*), a combination which is characteristic of the *Ceratophylletum submersi* plant community<sup>23</sup> typical of vegetation found in sluggish water.

At the Finsbury Circus worksite, waterlogged seeds from the base of the marsh sequence were submitted for radiocarbon dating, but returned a late Saxon/early Norman date (cal AD 1010 to 1160, Table 1).<sup>24</sup> It is likely that this is later material incorporated into the lower sections of the sequence through bioturbation or other natural processes.

The earliest post-Roman feature was a shallow ditch at the Moorgate worksite dated to c. 1240–1480, perhaps an early (albeit unsuccessful) attempt to drain the marsh. Certainly by the end of the 14th century the marsh was seasonally dry enough in places to allow for the excavation of a rubbish pit (XSP10 [115], Fig. 6), which contained 70 sherds of pottery, dominated by products of the Surrey white ware industry (fabric codes CBW and CHEA), and dated to c. 1350–1500. Vessel types represented include two large rounded or bung-hole jugs and further fragments from a conical jug, two money boxes and various jars, bowls and dishes (in CBW) and sherds from a



Fig. 6: medieval rubbish pit [115] at the Moorgate worksite (XSP10), facing south-east

barrel-shaped jug and an inverted lid-seated jar or cooking pot (in CHEA). The pit also produced animal bone, including rabbit and fish from marine and migratory species, and a small group of late 14th-century shoe parts including pointed soles and a vamp from a pointed latchet-fastening shoe.<sup>25</sup>

The remains of several stacked wood barrel or tub hoops dating to the 14th–15th century may have been the remains of a well or pit lining. A circular feature lined with chalk fragments contained Tudor brick, and may represent the remains of isolated building, such as a pier base associated with an arched foundation. It has also been suggested that Moorfields was used to burn chalk<sup>26</sup> to produce lime in the late 15th century, which may provide an alternative interpretation for this feature, although there was no evidence of burning *in situ*.

The top of the marsh sequence at the Finsbury Circus worksite was significantly more compacted, indicating a return to generally drier conditions with some flooding and periodic dumping of domestic waste and stable refuse. There was a marked increase in the range of dry-ground taxa suggesting that the area may have successfully drained by this time. The deposit contained ceramics dated 1480–1550, which was broadly supported by a calibrated radiocarbon date of 1430–1620 (Table 1).<sup>27</sup> A fragment of type 4 horseshoe<sup>28</sup> also suggests the stabling of horses in the locality. Leather objects were well preserved within the anaerobic marsh deposits. The footwear includes the front section of a wide ‘cow-mouth’ sole (c. 1530/40), a style associated with the court of Henry VIII but widely worn by the increasingly wealthy

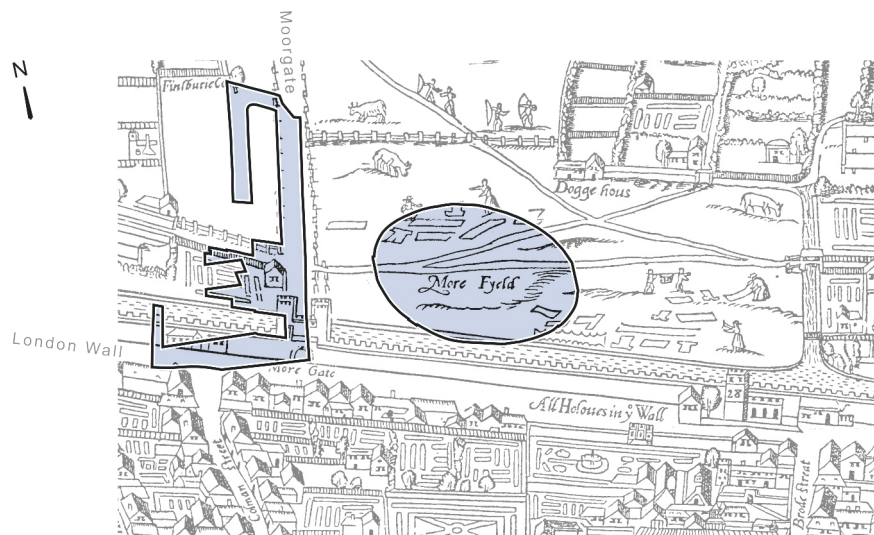


Fig. 7: Moorfields depicted on the Agas map of c. 1562<sup>22</sup>

middle classes, part of a round-toed vamp of a similar date, and a pointed sole from a late 15th and early to mid-16th century raised leather-soled patten, of a type used as a sandal or overshoe.<sup>29</sup>

This evidence corresponds with documentary evidence of deliberate attempts at marsh reclamation catalogued by John Stow in 1512 and 1527 that attempted to ‘*drein [sic] the waters of the... More fields...into the course of the Walbrooke, and by these degress was this fen or more at length made...hard ground.*’<sup>30</sup>

A series of dumps 1.5m thick dating from the 16th–18th century indicated a long period of refuse disposal within this area of open fields immediately north of the City walls. Moorfields in the 16th century was described as containing ‘*raised paths and refuse-heaps, [and] deep black ditches*’,<sup>31</sup> a description supported by the archaeological record and contemporary maps (Fig. 7). A well preserved 17th–18th-century storm

drain/sewer may be associated with the development of the New Bethlem Hospital, constructed in 1675–6, that bordered the south of Moorfields. Further dumping preceded the development of Finsbury Circus Gardens in c. 1815–17.

To the south, within the roadway of London Wall, a series of deposits may have been dumped to backfill the redundant City ditch in the later 17th century. The medallion applied to the near-complete Bartmann jug (Fig. 8) found here displays the arms of the City of Amsterdam. In addition to the recorded features, at Moorgate a small quantity of residual medieval pottery was also recovered from the backfilled cut of a mid-19th century sewer (designed in an innovative inverted ‘egg-shape’ and overseen by Sir Joseph Bazalgette (1819–1891)). This assemblage included a Valencian lustreware ‘basil-pot’ dated to the 15th-century (generally used as a garden ornament), unique within British archaeological contexts.<sup>33</sup>

Context /sample	MOLA ref.	Lab no.	Material	Pre-treatment	δ13C	Conventional Age (BP)	Calibrated date (cal yr AD) (95% probability)
[29] {14}	XRZ10-c29s14	BETA 396257	seeds	acid/alkali/acid	-28.1‰	1940±30	0–130
[15] {6}	XRZ10-c15s06	BETA 396256	seeds	acid/alkali/acid	-23.9‰	960±30	1010–1160
[14] {7}	XRZ10-c14s07	BETA 396255	seeds	acid/alkali/acid	-24.8‰	400±30	1430–1620

Table 1: radiocarbon dating results. Samples for radiocarbon dating comprised identifiable terrestrial plant macrofossil remains. They were sent to Beta Analytic, Miami and measured by Accelerator Mass Spectrometry. Calibrations are calculated using the datasets published by Reimer et al in ‘IntCal13 and Marine13 radiocarbon age calibration curves 0–50,000 years cal BP’ Radiocarbon 55 (2013)1869–87, and the maximum intercept method in OxCal v4.2 (Bronk Ramsey). Full details of the dating are available in the site archive.





**Fig. 8: Frechen stoneware jug with a medallion portraying the arms of the City of Amsterdam**

### Conclusions

The excavations at Moorgate and Finsbury Circus add to a growing body of evidence from surrounding sites for the planned exploitation of the upper Walbrook valley on a fairly large scale during the mid-2nd century AD. Results indicate that prior to this the area was possibly prone to seasonal flooding. Stream channel deposits at the Finsbury Circus worksite showed evidence of early Roman activity, in particular cereal pollen and arable weeds attest to cultivation during the late 1st–early 2nd century and onwards. Conditions appear to have become wetter in the 2nd century, and there was an apparently concerted attempt to drain and utilise the area, possibly enabling grazing or cultivation to take place on seasonally dry areas, with evidence for quarry pitting possibly linked to the construction of roads nearby.

The ditches were then flooded, and became filled with homogeneous clays containing bone from disturbed burials, likely originating from the northern Roman cemetery. A complete lack of features that could be confidently dated to the 3rd or 4th century AD suggests that marsh development may have commenced soon after, or perhaps before, the construction of the city wall in the late 2nd or early 3rd century AD. The construction of the wall may have made access to this area more difficult, and it may be a combination of this together with the increased waterlogging of the ground that led to the apparent lack of activity following the construction of the wall. However, this evidence contrasts with evidence from the nearby Moor House, where stream channels, pits and fence lines were dated to the 3rd and 4th centuries.<sup>34</sup>

Dating the formation of the marsh in the upper Walbrook valley is difficult, and the sites at Moorgate and Finsbury Circus are no different. There is little evidence to contradict or amend the view that the marsh began to form during the 3rd century following the construction of the city wall. There is evidence that the area was utilised in the medieval period in spite of the persistence of marshy conditions, and that some attempt may have been made at drainage. The marshland environment changed again, becoming drier overall during the late medieval or early post-medieval period.

### Acknowledgements

MOLA would like to thank Crossrail for funding the archaeological excavations, in particular Jay Carver, Ian Williamson and Chris Sharples. Also Grant Eade (Laing O'Rourke) for assistance on site.

The excavation team were supervised by the author, with thanks to Antonietta Lerz (MOLA supervisor). Also thanks to Maggie Cox (photography), Mark Burch, Catherine Drew, Raoul Bull and Moises Hernandez Cordero (geomatics). The following specialists also provided contributions: Virgil Yendell and Jason Stewart (geoarchaeology), Ian Betts (Building Material), Amy Thorp and Nigel Jeffries (pottery), Lyn Blackmore and Michael Marshall (the accessioned finds), Beth Richardson (leather), Anne Davis (plant remains), Alan Pipe (animal bone), Don Walker and Natasha Powers (human bone). Mary Ruddy re-calibrated the radiocarbon dates, which were undertaken by Beta Analytic. The article illustrations were prepared by Carlos Lemos and the finds photography by Andy Chopping. The fieldwork was managed by MOLA Contracts Manager Nicholas Elsdon and the post-excavation work by Louise Fowler.

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