

Early Holocene deposit beneath Abbey Street, Kilkenny city

Susan Hegarty

Geography Dept, St Patrick's College, Drumcondra, Dublin 9

Dr Susan Hegarty is a lecturer in the Geography Department, St Patrick's College, Drumcondra. After completing her BA in UCD, she worked in the Geological Survey of Ireland on the Kilkenny Groundwater Protection Scheme, funded by Kilkenny County Council. Her PhD looked at the last glaciation of Kilkenny, and she is engaged in ongoing research on the development of the landscape in Kilkenny.

Abstract

This paper examines a peat deposit found beneath Kilkenny city, located on the edge of the flood plain of the River Bregagh. Radiocarbon dates and a preliminary pollen analysis of the peat indicate that this deposit was formed approximately 9000 years ago, in an environment of open grassland. The paper ends with a brief summary of the landscape evolution of this part of Kilkenny city from the end of the last glaciation.

Introduction

During tunnelling for the Kilkenny Main Drainage Scheme in 1997, a four metre deep trench was dug beneath Abbey Street, Kilkenny (Fig. 1). Excavations revealed a compact peat above lacustrine clays and gravels, into which piles were driven during medieval times. This paper examines the environment in which these organic sediments were laid down, and gives a tentative date for their formation, based on data gained from analysis of samples taken from the site. It ends with a brief outline description of the environmental history of the site from the end of glaciation to the evolution of the more modern floodplain of the River Bregagh.

Previous work on the Abbey Street site

Kilkenny city is built on the floodplains of the rivers Nore and Bregagh. Ó Drisceoil (2003) suggests that 48% of the total area of walled medieval Kilkenny was reclaimed from the floodplain as the population of the town expanded and people began to push the limits of the urban area. Abbey Street marks what may have been the southernmost edge of the Holocene floodplain of the River Bregagh, with a major break of slope just behind the site to the south (Fig. 1).

During work for the Kilkenny Main Drainage Scheme, tunnelling for a four metre deep circular shaft on Abbey Street (NGR 250600 156133) revealed a deposit of rounded gravels (with 0.2 metres seen within the trench, though they possibly extend much further than this). The gravels lie beneath 0.15 metres of a white to grey, stiff lacustrine clay or marl deposit. Above this, there are 0.3 metres of a peaty deposit. Initially, this peat is alternately laminated with the white clays, but is denser and more amorphous for the final 0.15 metres, with no laminations seen. This sequence is completed with a layer of sand and silt towards the top (Fig. 2a and 2b).

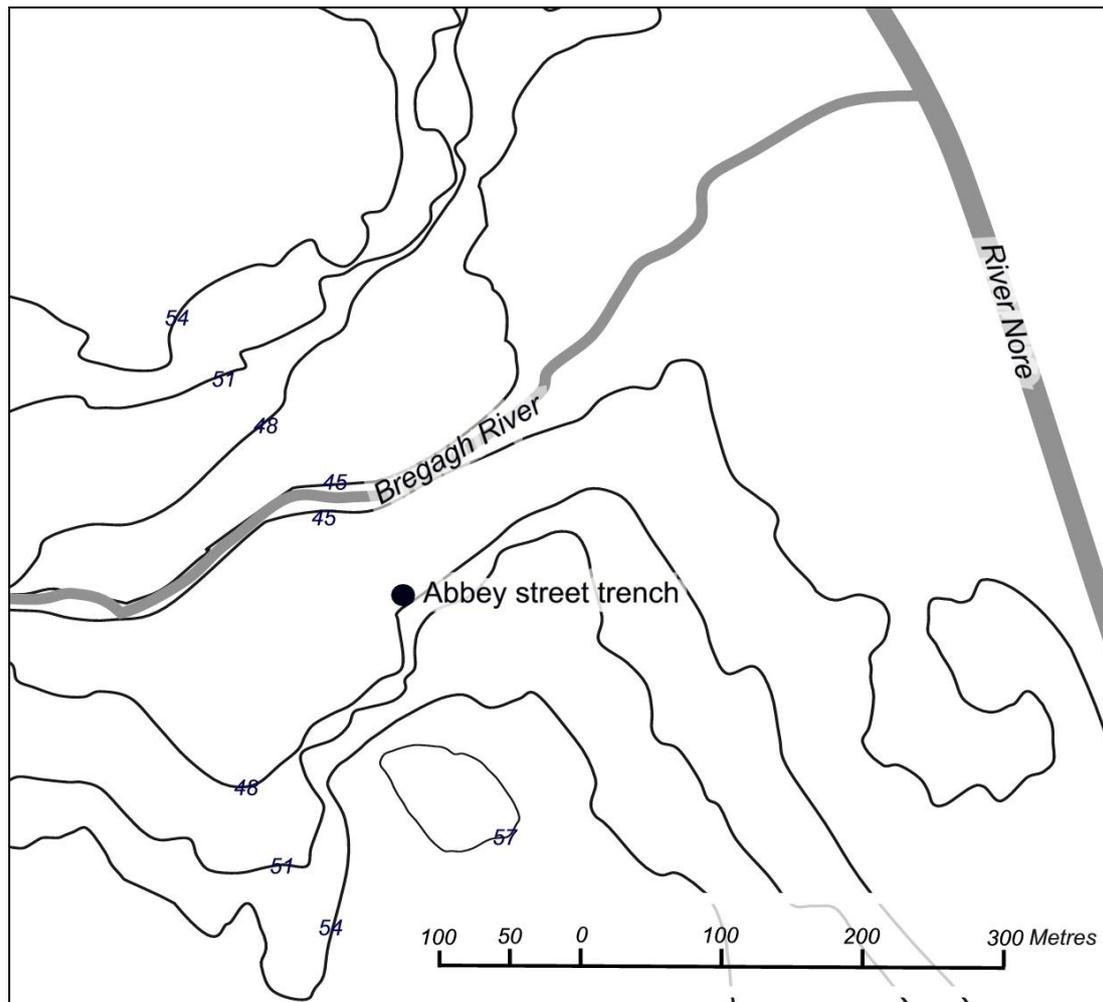


FIG 1: Diagram of 3m contours in Kilkenny city, showing the site of the Abbey Street trench. Note the change of slope just to the southeast of the site, indicating the edge of the floodplain of the Bregagh River (contours redrawn from OSi 1 :5000 map)

Like many other parts of the city, the area around Abbey Street was reclaimed during medieval times as the Anglo-Norman presence in Kilkenny was growing. The archaeological evidence to support this came from the same trench in Abbey Street as the samples examined in this paper, and includes closely-packed oak-piles driven diagonally into the peat deposit mentioned above. These piles were also excavated as part of the Kilkenny Main Drainage Scheme (Desmond 1999), and have been dated to ca. 1240 AD (Neary, pers. comm., in O Drisceoil 2003).

While much work has been carried out on the archaeological remnants found during the Kilkenny Main Drainage Scheme excavations at this site (Reid 1996; Neary 1997; Desmond 1998), the deposit into which the oak piles were driven has never been fully investigated.

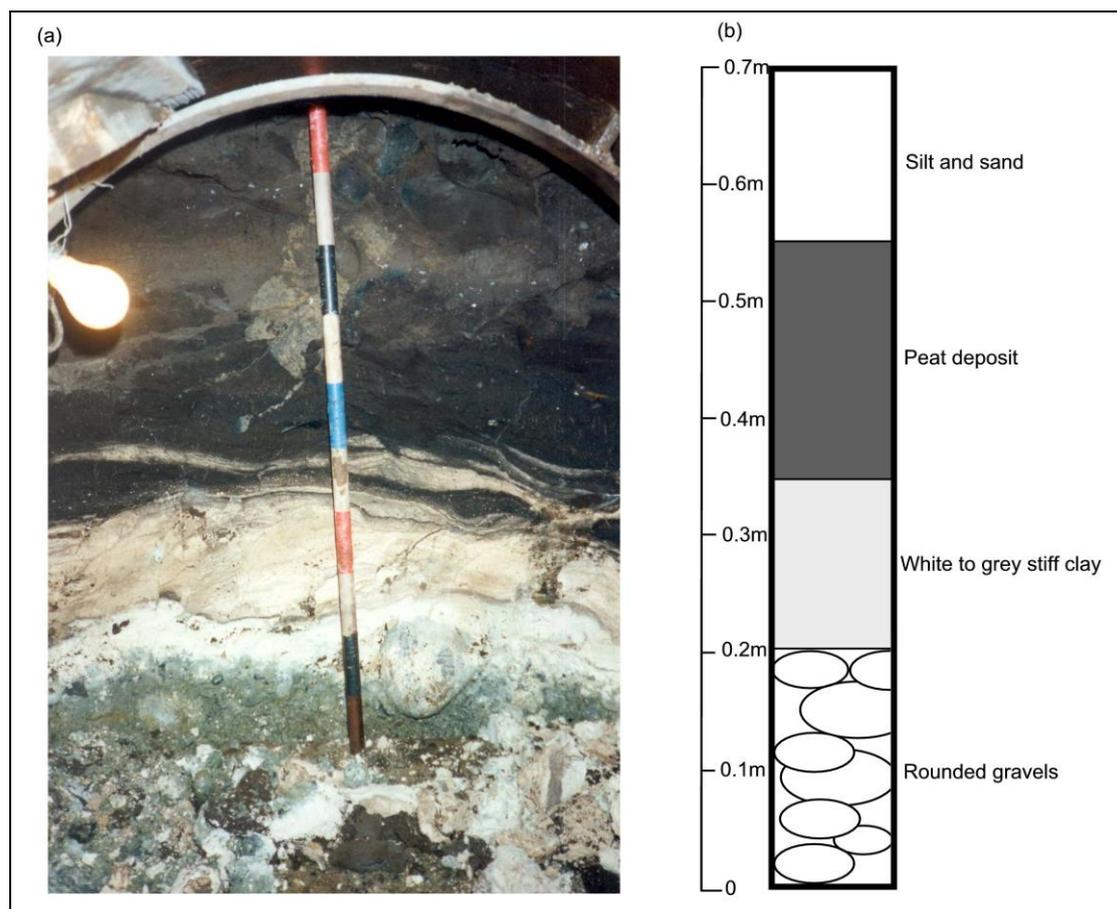


FIG 2: Sediments within the trench at Abbey Street. (a) Photograph of the section created for tunnelling as part of the Kilkenny Main Drainage Scheme. The ranging rod is divided at 0.05m intervals. (b) Schematic diagram of the sediments within the trench and the tunnel section.

Methodology

During excavations, a sample of the peat deposit was taken with a view to carbon dating the peaty layer (fig 2b). It was also hoped to examine the pollen contained within the peat in order to determine the nature of the surrounding environment at the time that the peat was formed. The sample was extracted by the project archaeologist (Neary 1997), and passed on to the author. It is therefore not known for certain from where within the sequence the sample was taken. However, as the peat sample had a contact with the clayey marl at the base, it can be assumed that the sample was taken from the base of the peaty layer. The sample was approximately 0.2 metres thick from base to surface.

The sample was subdivided and part was sent to the radiocarbon laboratory in the School of Physics, UCD for radiocarbon dating. A further sample was sent to the palynology laboratory of the Geography Department, TCD to examine the pollen contained within it. When the results of these two techniques are looked at together, they present a compelling argument for environmental conditions in the area of modern Kilkenny city during the early Holocene, which began ca. 10,000 years ago after the ice had left the landscape and the climate began to warm.

Results of analysis

The radiocarbon laboratory in UCD subsequently sampled two subsections of the larger sample to get a Carbon 14 date. Sample 9838 yielded a date of 8900 ± 57.49 BP (before present) while sample 9841 received a carbon date of 9178 ± 98.89 BP. Sample 9838 was taken using the humin fraction, while sample 9841 was taken using the humic acid fraction of the peat.

The palynological analysis showed that while the sample was very rich in organic material, it contained very little pollen. What pollen there was had disintegrated very badly in what appears to have been an oxidising environment (Coxon, pers. comm.) and is not statistically significant enough to give an indication of age on its own. Nevertheless, it is worth noting the pollen content, which indicates which plant species were present at the time that the sample was initially formed (Table 1).

Species	Count	%
Betula (birch)	2	11.8
Juniperus (juniper)	3	17.6
Gramineae (grass)	6	35.3
Cyperaceae (sedge family)	5	29.4
Thalictrum (meadow rue)	1	5.9
Polypodiaceae (undifferentiated ferns)	20	117.6

TABLE 1: Pollen count for a sample from Abbey Street. Analysis by P. Coxon, Geography Department, TCD.

As can be seen from Table 1, the species present in Kilkenny at the time represented by the sample are indicative of a very open landscape, with grasses and sedges particularly abundant. The pollen of undifferentiated ferns is by far the most abundant within the sample. Juniper and birch were also present on the landscape, as was meadow rue, as indicated by a single pollen grain. While the counts may not be statistically significant enough to give an indication of date, it is known that birch and juniper thrived on an open landscape during the early Holocene, as discussed below. The evidence suggests that this landscape, at approximately 9000 BP (the time represented by the sample, or 7000 BC) consisted of low-lying vegetation in an open grassland situation, with grasses and ferns and occasional juniper and birch bushes.

Comparison of pollen analysis with other sites

Watts (1985) argues that, during the early postglacial period, vegetation lagged behind the climatic rise in temperature, with Irish vegetation staying open for longer than would be merited by the climate. According to Mitchell and Ryan (1997), juniper begins to give way to birch on the Irish landscape at approximately 9500 BP. The first response to warming conditions at the beginning of the Holocene was for grassland to invade. Following the grasslands, about 250 years later juniper began to encroach, and this was followed by the first trees, in the form of birches. This birch phase lasted until about 9250 years ago (Mitchell and Ryan 1997). This ties in very well with the sample from Abbey Street, where a date of approximately 9100 years BP was received for a sample that indicated an environment of open grassland with

some cosses of birch and some juniper also present. Hazel (which generally peaks at approximately 9000 BP) appears not yet to have reached the area, as there is no record of hazel in the pollen count. However, this absence could also be due to the hostile environment for pollen conservation, or indeed because of a lack of suitability of the growing environment at this location to hazel.

The data available from the site at Abbey Street points to a correspondence with the Boreal phase, before hazel expands, that Mitchell described as pollen-zone IV (Mitchell 1958). The Boreal phase in Ireland is generally thought to span between 9250 BP to 8250 BP (Jones and Keen 1993). It should be noted that when Mitchell was writing his 1958 paper, he was constrained in that he had no carbon dates with which to work. He therefore aligns the Irish palynological evidence with the chronological evidence available from Britain, and puts this phase as ending at approximately 9000 BP. Watts (1985) points to open grassland being very important on the landscape after the expansion of birch. Watts (1977) raises the question as to why *betula* did not thrive on the landscape to form forests, as it did in Britain. While Britain became covered with birch forests, the Irish landscape seems to have developed into what Watts terms the 'grass phase' at pollen-zone IV (Watts 1977). While we cannot speculate from the Abbey Street site why this occurred, it is interesting to note that the taxa present in the sample also point to this open-phase of flora on the landscape.

Environmental development

From what we have gleaned from this sample, and given what is known about the geomorphology of this area, we could summarise the environmental development of this site as follows.

Following the last glaciation of Ireland, large quantities of meltwater from the area to the south of the Slieve Bloom mountains flowed south to the Celtic Sea using the modern-day channel of the river Nore (Daly 1992, Hegarty 2002, Hegarty 2003). The area around Abbey Street, on the modern-day flood-plain of the River Bregagh, would have been part of this late-glacial meltwater system. This meltwater river would have been much wider than the modern-day Nore floodplain and would have incorporated an area up to 2 km to the west of the modern Nore River, with an equally extensive channel to the east (Hegarty 2003). The very well-rounded gravels evident beneath the peat and marl at the Abbey Street site attest to the fact that the Abbey Street site, currently 325 metres from the Nore River and only 50 metres from the Bregagh, was part of this outwash system. These gravels are similar to those found elsewhere on the river Nore, where they reach over 30 metres in depth in some places (Hegarty 2004). These deposits are best exposed within Hennessy's gravel pit at Bennettsbridge (NGR 255050 150720), where over fifteen metres of bedded gravels are exposed.

Following deglaciation and incision of the Nore into the outwash gravels, and with the reduction of flow in Irish river systems with the onset of the Holocene, the area around Abbey Street was at the southernmost edge of the floodplain of the Bregagh. This environment must have given rise to ponding on the surface during the early Holocene, with lake marl being deposited at the bottom of a small lake or pond at the edge of the Bregagh floodplain. It was on this floodplain, and the associated lake marl, that the peat deposit developed approximately 9000 years ago, within a

landscape of open grassland. This peat deposit was overlain by sand and silt, possibly representing the modern (though pre medieval reclamation) floodplain of the River Bregagh.

Subsequently this site, which lay outside the medieval city walls, was reclaimed during the early medieval period using large oak piles (Desmond, 1999), possibly as part of the building of the Dominican Priory, established *c.* 1255. The piles yielded five dendrochronological dates of *c.* 1240 (Ó Drisceoil 2003). This river-side reclamation is a feature of medieval towns throughout Europe, with Ireland's best example perhaps being the Wood Quay revetments in Dublin, which were also dated to the thirteenth century. In Wood Quay, as in Abbey Street Kilkenny, the land was reclaimed between the medieval city walls and the river (Simms, 2001). Today, the site at Abbey Street lies beneath the tarmacadam of the bustling Kilkenny city.

Acknowledgements

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Bibliography

- Bradley, J. 2000. *Irish Historic Towns Atlas No.10: Kilkenny*. Royal Irish Academy, Dublin.
- Daly, E. 1992. *Groundwater Resources of the Nore River Basin*, Geological Survey of Ireland, Report Series RS 94/1 (Groundwater). Unpublished internal GSI report.
- Desmond, S. 1999. 'Abbey Street, Kilkenny' in I Bennet (ed.) *Excavations 1998*. Dublin. No. 346.
- Hegarty, S. 2002. *The Quaternary of Kilkenny : (with particular emphasis on the Castlecomer Plateau)*. Cumann Staidéar Ré Cheathartha na hÉireann/Irish Quaternary Association.
- Hegarty, S. 2003. *Pathways and processes of Late Pleistocene subglacial meltwater flows, County Kilkenny*. Unpublished PhD thesis, UCD.
- Hegarty, S. 2004. Limits of Midlandian glaciation in south-eastern Ireland. *Irish Geography* 37(1) pp 60-76.
- Jones, R. L. and Keen, D. H. 1993 *Pleistocene environments in the British Isles*, Chapman & Hall, London.
- Mitchell, G. F. 1958. Radiocarbon-Dates and Pollen-Zones in Ireland. *The Journal of the Royal Society of Antiquaries of Ireland*. 88 (1), pp 49-56.
- Mitchell, G.F., Ryan, M. 1997. *Reading the Irish landscape*. 3 revision ed. Town House and Country House.
- Neary, P. 1998. 'Kilkenny Main Drainage' in I Bennett (ed.) *Excavations 1997*. Dublin. No. 291.
- O Drisceoil, C. 2003. Kilkenny reclaimed: the archaeological evidence for medieval reclamation in Kilkenny city. *Old Kilkenny Review*, 55, pp 58-69.

Reid, M. 1997. 'Abbey Street, Kilkenny' in I Bennett (ed.) *Excavations 1996*. Dublin. No. 204.

Simms, A. 2001. 'Origins and early growth' in Brady, J. and Simms, A. (eds) *Dublin through Space and Time*. Four Courts. Dublin. pp 15-65.

Watts, W. A. 1977. The Late Devensian Vegetation of Ireland. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences*. 280 (972, A Discussion on the Changing Environmental Conditions in Great Britain and Ireland During the Devensian (Last) Cold Stage), pp 273-293.

Watts, W.A. 1985. 'Quaternary vegetation cycles' in Edwards and Warren. *The Quaternary History of Ireland*. Academic Press. Edinburgh.