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Medieval Talbot's Tower,
Kilkenny.

By

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Summary

This report attempts to recreate the medieval landscape and the activities which were carried out in the vicinity of Talbot's Tower, Kilkenny. The extant tower once formed the south-western corner of the medieval Hightown defensive walls. Archaeological excavations at the base of the tower, which were carried out from 2007-2010, resulted in the sampling of large amounts of archaeobotanical remains (archaeological seeds), which have been scientifically identified and analysed. The remains were retrieved from four phases of the site's medieval history. Phases 1 and 2 date to the early medieval period, prior to the construction of the Anglo-Norman ditch and wall (c. 700's-early 12th century). Phases 3 and 4 are associated with the Anglo-Norman period (c. 12-13th centuries).

The plant remains indicate activities which were being carried out near the site in the medieval period. A general reconstruction of the local environment can be suggested from the seeds which were present on the site. Changes in this environment and local land-use can be detected through the changes in cereal and weed types. Food choices and wider social and economic factors can also be surmised from the remains.

The seeds from Phase 1 and 2 consisted of barley, oats, wheat, cereal chaff and legumes. Weed species included wild oats, the dock family, the daisy family, the carrot family and the goosefoot family. Wild cherry/sloe was also present. It is probable that the samples were discarded waste from crop-processing or cereal-drying kilns. The micro-environment of Phase 1 is suggested to be that of a mixture of open pasture and tilled fields, which were bounded by a hedgerow, or small open woodland, lined with a variety of weeds. Some damp areas and nutrient-rich patches are also suggested.

The seeds from Phases 3 and 4 are less varied than Phases 1 and 2. They consist mainly of barley, oat and wheat grains and a small amount of weed seeds, such as those from the cabbage family, the dead-nettle family and the bedstraw family. This indicates that the activities have changed somewhat on the site, which was probably a result of the construction of the tower and ditch. Cereal cultivation was taking place in the wider environment, but the area around the defenses was probably open and disturbed land, with less hedgerow and wild plants as the previous phases. There is no indication that the ditch was waterlogged, although it is likely that the assemblage was formed during the late summer and spring, which tend to be the driest seasons in the Irish calendar. Wood analyses suggest the presence of both managed hazel stands and natural copses in the wider area.



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1 Introduction

- 1.1 This report was commissioned by the Heritage Office of Kilkenny Borough Council to inform future landscaping works and interpretation at Talbot's Tower, as part of the overall Talbot's Tower conservation and representation programme, funded by Kilkenny Local Authorities and the Irish Walled Towns Network. It attempts to describe the medieval landscape in the vicinity of Talbot's Tower, and the activities through which archaeobotanical remains were deposited here. This has been attempted through the collation of archaeobotanical evidence retrieved from the site.
- 1.2 The extant tower is located in the south-west of Kilkenny city and it originally formed the south-western corner of defensive walls, which enclosed the medieval Hightown (Bradley 2001, 4). Prior to the construction of the defences, this land was probably owned by the monastery of *Domhnach Mór*, which is believed to have been founded in the 5th century.
- 1.3 Excavations at Talbot's Tower were carried out by Kilkenny Archaeology from 2007-2010, which resulted in the discovery of four phases of medieval land-use around the site. Phases 1 and 2 pre-date the Anglo-Norman levels, when the land was probably owned by or associated with the monastery of *Domhnach Mór* (Bradley 2001, 1). Phase 1 was radiocarbon-dated to AD 710–890 (cal. UBA-10222). This period was represented by old ground above the natural subsoil. Phase 2 dated to between the 9th and the 11th centuries; it was situated below the Anglo-Norman earthen bank. Phases 3 and 4 were associated with the Anglo-Norman period; Phase 3 was radiocarbon-dated to AD 1220–1280 (cal. UBA-10223), while Phase 4 layers were found at the bottom of the ditch which enclosed the Anglo-Norman town.
- 1.4 Twenty-three samples retrieved during the excavation on the site were scientifically identified and analysed (McClatchie 2011a; Gilligan 2011a). The results of the analysis have been useful in suggesting land use and management, as well as indicating any changes in such. The remains can also be used to show the microenvironment (local environment) of the site and changes in climate. Additionally, the cereal-types present in the samples are useful in illustrating the diets of those farming the land and wider social and economic practises and trends.
- 1.5 Cultivated grains, including barley and wheat, were identified during the analysis. Oats were also present although it is not clear if they were of the wild or cultivated varieties. Wild fruit in the form of cherries or sloes grew in the vicinity of the site, while ruderal taxa (weed seeds), such as docks and daisies give an indication of the local environments where the assemblage was formed. The general trends are of an early medieval farming system where barley with some oats and wheat were cultivated and harvested close to the site, which was then altered by the construction of a defensive



structure, thus changing land-use in the area. Wood analyses indicate that stands of coppiced hazel and natural copses were present at this time in the wider landscape.

2 Report Compilation

- 2.1 This report was compiled from the results of identification and analysis of archaeobotanical remains retrieved from samples gathered during excavations at Talbot's Tower by Kilkenny Archaeology (O'Drisceoil, *forthcoming*). Two phases of analysis were carried out and the work is collated in this report. Additional to this, previous archaeobotanical reports carried out on medieval sites in Kilkenny are also included in this document, all of which will serve to build up a wider picture of the land-use, land-management, micro-environments and food choices in this period of the city's history. Trends and changes indicated by the analysis results are discussed in this report, which reflect the social and economic influences of the time.
- 2.2 A small amount of wood analyses have also been carried out in the city, albeit not on the Talbot's Tower samples at the time of writing. The results from the reports are included in this document in order to add an additional dimension to the tentative picture of the medieval environment as indicated by the archaeobotanical remains.
- 2.3 Much archaeological and historical work has been carried out in Kilkenny and it has been heavily consulted for this report. It includes the Royal Irish Academy's Historical Towns Atlas (Bradley *et al.* 2000) and the Kilkenny Archaeology Project (KKAP; O'Drisceoil *et al.* 2008). The Kilkenny Urban Archaeology Database (KKUAD) collated during the latter project was also invaluable to this report. The Early Medieval Archaeology Project reports (O'Sullivan *et al.* 2008; McCormick *et al.* 2011) have also been extremely useful. Additional archaeobotanical and archaeology texts, published and unpublished, were consulted; these include website databases such as The Digital Seeds Atlas of the Netherlands, Excavations Bulletin and The National Roads Authority.

3 Methodology; processing, identification and analysis

- 3.1 During excavations on the site of Talbot's Tower, samples of soil from different features were collected and stored in 5 and 10 litre plastic buckets. The soil was then placed in water to allow charred seeds and charcoal to float to the surface. The remaining soil was poured into geological sieves with meshes measuring 1mm, 2mm and 0.25mm to retrieve any other small remains. The flots (floated seeds and charcoal) were then analysed under a microscope at magnifications x7 to x40. Initial identifications were made using a variety of literary and digital sources, including Stace (1997),



Jacomet *et al.* (2006), Van Zeist and Bakker-Heeres (1985) and Cappers *et al.* (2006; <http://seeds.eldoc.ub.rug.nl/>). Further in-depth identification was then carried out by comparisons with the author's reference collection. The retent (soil left after flot removed) was also sorted through and any additional material was taken out.

- 3.2 The results of the seed identification are presented in Tables 1 and 2 in Appendix 1 of this report. The plant remains listed in the table are listed in English, followed by the Latin name. In order to facilitate easy reading of this report, when first mentioned the plants are named in both English and Latin. From then on, all names are written in English. The nomenclature of species is generally arranged according to the *New Flora of the British Isles* (Stace 1997). However, the cereals have been listed at the start of the table to facilitate ease of reading. Table 2 also includes information about the samples, including the phase it was associated with, the size of the sample and the flot, as well as species count. Here divisions have also been made into chaff and grain count.

4 Cereals and Domestication

All of the cereals which are cultivated in Ireland were once wild grasses. They are the descendants of grasses which grew in the area known as the Fertile Crescent, which spans the modern day countries of Iraq, Syria, Turkey and Israel (Figure 1).



Figure 1. The Fertile Crescent (after <https://picasaweb.google.com>).

The wild grasses were naturally enclosed in protective **glumes** or **hulls** and were small and light enough to be dispersed when ripe (Fuller, Allaby, & Stevens, 2010). The botanical term for grass seeds is **caryopses**. About 10,000 years ago, there is evidence that people began to train these wild grass



seeds to grow in size and to remain within the glumes until they are collected during harvest, thus changing the physical appearance of the plants (Hillman 2000). This **domestication** process is based on selecting certain traits in some of the grasses and breeding from these plants; e.g. the offspring of a plant which did not release its grain naturally will tend to behave in the same manner and will create a lineage of plants which retain their seeds after ripening. Secondary steps in domestication include training a grain to grow without its protective glumes which results in a seed that is easier to transform into flour. These processes have continued to the present day and have resulted in various varieties of the most common grains that are still consumed.

Wheat and rye were probably the first cereals to be domesticated. The first domesticated grain was one of the latter and was identified in Aby Hureyra, Syria, dated to c. 9100BC (Hillman 2000). Wheat has been modified a number of times; einkorn and emmer were grown in the prehistoric and early medieval periods. They were still protected by glumes and were therefore time consuming to process. The glumes had to be removed by pounding or charring (further discussed below). Therefore new strains of wheat which were '**naked**' or **free-threshing** were developed, which are known as bread, durum and rivet wheat. These strains are found in different areas as they tolerate different soils and climates (Riehl 2009). Often, a 'devolution' was carried out, whereby a grain such as spelt wheat was bred. This had many characteristics of the naked wheats, but it was developed to re-grow its glumes. In a similar manner, barley was bred to produce various varieties, such as **hulled** (with glumes) and **naked** (without). This was also trained to produce more grains per ear. Two and six-row varieties are the most commonly recorded.

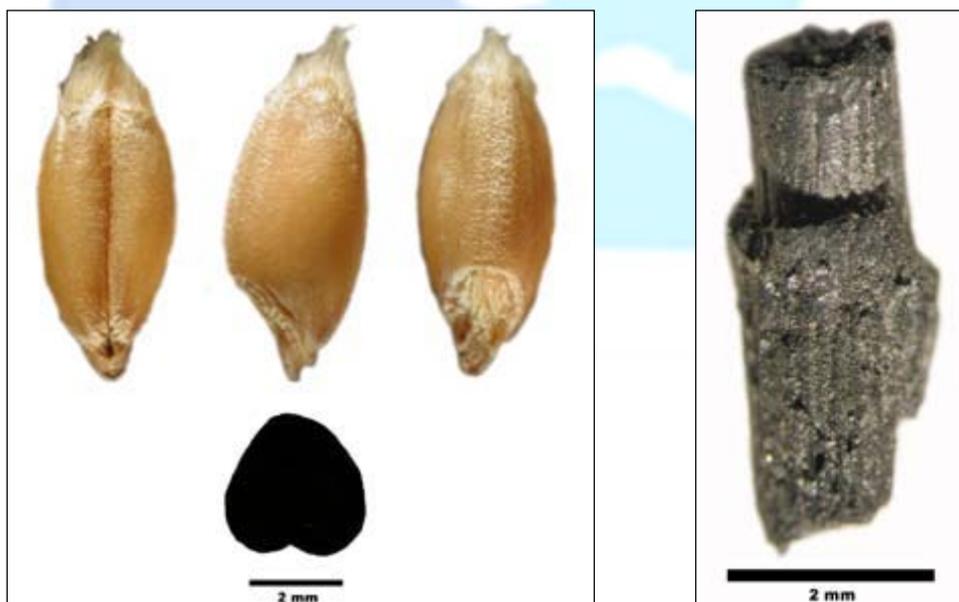


Figure 2. Grain of emmer wheat (glume) and a cereal culm (after Willcox, G.

<http://g.willcox.pagesperso-orange.fr/>)



Cereals are processed in different ways, depending on the variety; the by-products of **crop-processing** (the stages involved in cleaning the grain after harvest and preparing it for consumption) are therefore different. The figure below indicates the differences between domesticated and wild wheat (Figure 2). The **chaff** is the term used to describe these by-products which are removed during processing. It includes **glumes** (papery protective cover sealing a seed), **culms** (the stem of the plant; Figure 3).

Each **variety** of cereal tolerates different soils, climate and farming regime. It is particularly helpful to understand this when assessing an archaeological assemblage as it can indicate the **microclimate** or **microenvironment** of the area, as well as social and economic choices.

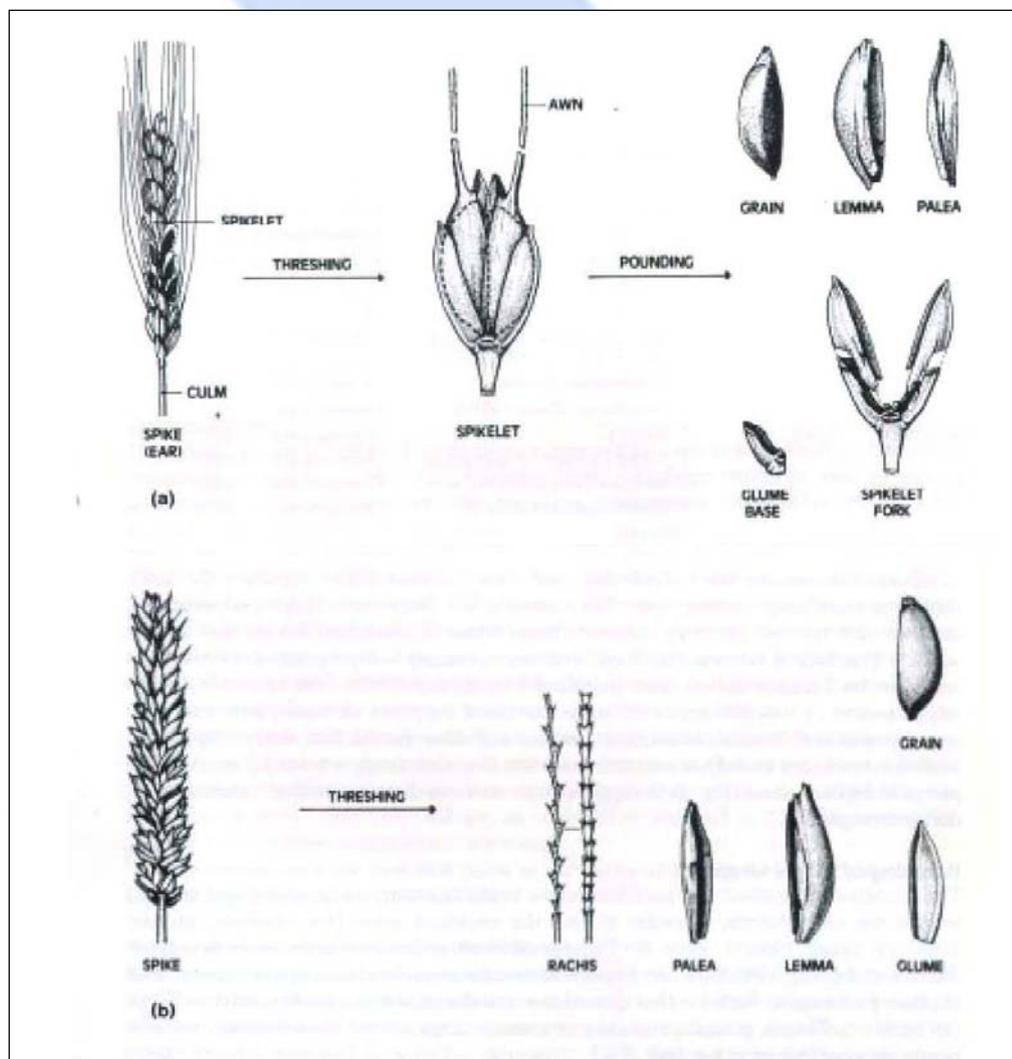


Figure 3. Illustration of by-products produced from processing hulled and naked wheat; (a) is a glume/hulled wheat and (b) is a naked/free-threshing wheat (After Nesbitt and Samuel 1995, 43).



It is interesting to note that many of the grasses which grew alongside the cereals prior to their domestication were imported along with domesticated cereals. They mimic the behavior of cereals in an attempt to survive. Oat was probably one of these weeds which persisted until it was eventually accepted in the early medieval period and cultivated as a crop in its own right. These are known as **segetal weeds** (Nesbitt 2006, 8). This grass has a natural **awn**; a narrow extension from the glumes which allows it to burrow into the ground after dispersal thus ensuring its burial and survival for the next season (Figure 4). These awns do not exist in cultivated varieties. **Ruderal weeds** are those which grow up around a site and can indicate a micro-environment. i.e. the type of land and soil which existed in that area in the past. Some of these plants which we consider as weeds today may have been more important than we realize. They may have been tolerated and gathered alongside cultivated cereals and **legumes** (e.g. peas, beans, vetches etc). Such weeds include **fat-hen** and **docks**.



Figure 4. Wild oat with twisted awn; cultivated oat spikelet containing oat caryopses; cultivated oat

5 Formation of Archaeobotanical Assemblages

Plants formed an important part of life in the past; they were used for food, fodder, medicines, ale and beer, as well as in thatch, bedding for animals and humans, building materials such as wattle and daub, clothing, baskets and string (Swogger 2000, 176). They were both symbolic and part of the daily backdrop of life. Thus it is important to understand that while the methods of identification and analysis used in archaeobotany can be employed to answer both technical and scientific questions, the non-tangible relationships that people had with plants should also be considered.



It is important to understand that archaeobotanical assemblages have been created by human hands. Archaeobotanical assemblages represent a very small part of the plant world which the people would have known and utilised. Grains and seeds are preserved on archaeological sites through a variety of methods; including becoming charred, waterlogged or desiccated. This report is concerned with charred assemblages; these are the result of seeds becoming carbonised under oxygen-poor conditions, which leaves behind carbon skeletons of the seeds (Moffett 2009, 41). This occurs when they are burnt as a result of their interaction with fire.

Typically, because they are the result of people's interaction with them, the most common components of an archaeobotanical assemblage then are cereal crops, chaff and weed seeds (Knörzer (1971 in Fuller, McClatchie and Stevens in press). The most common '*modes of entry*' of seeds, weeds and chaff include food processing, preparation, consumption and storage as well as through fuel, animal dung, building materials and ritual (van der Veen 2007; Matthews 2009). Primarily, seeds which have been charred are retrieved from drying-kilns, hearths, pits, ditches and floors. Kilns and hearths were the location of primary activities concerned with cereal processing, where grains, weeds and chaff were sorted, waste was discarded and the cleaned products dried for storage or further processing, such as grinding for flour or malting for ale production. Pits, ditches and floors show evidence for secondary deposition, as they tend to contain discarded waste from a kiln or hearth. Assemblages retrieved from such contexts tend to be much disturbed after they are deposited, as a result of human activity (Moffett 2009, 42). Such activities include backfilling a ditch or constructing a wall. Because many assemblages are secondary in nature, they cannot be safely used to indicate the environment within which they were found; rather they suggest the environment from which they came, and the processes which resulted in their deposition.

5.1 **Harvesting and Crop-Processing**

The sowing and the harvesting seasons are the most important times of the year for economies dependent on crops. Ploughing takes place in the spring, when the soil is damp after the winter frosts. Until the early medieval period a simple wooden ard-plough and oxen were used to prepare the ground (McCormick *et al.* 2011, 24). The arrival of Christianity may have introduced an improvement to the primitive ard in the form of an iron coulter; this allowed the earth to be cut more efficiently. Another innovation, which may have arrived in Ireland with the Anglo-Normans, was a mould-board, which turned the furrows and allowed for deeper ploughing. These changes meant that soils produced higher yields, because they were deeper and richer in nutrients (Feehan 2003, 23). The change in technology also instigated a change in the weed varieties which grew alongside the cereals (Mitchell 1987, 10). These changes can be reflected in an archaeobotanical assemblage.



Harvesting the crops was an important part of the year. Most crops are sown in the spring time and are harvested during the late summer or early autumn months; however, there are varieties of barley which may have been grown during the winter to supplement the diet (Murphy and Potterton 2010, 311). The process entailed the reaping of the stalks, which was probably done with a sickle. It is not clear whether only the head was removed during the early medieval period; in this case there would have been less weed seeds and stalk/culms to remove during processing. Additionally, animals may have been allowed to graze on the remaining straw over the winter and fertilize the soil with their dung. However, removing the stalk during the harvest would have allowed for material for thatching, bedding and perhaps floor coverings. The cereals were probably gathered as stacks for the next phase of processing; preparing the grains for consumption and storage. It is suggested that hay-making was introduced by the Anglo-Normans and the animals were allowed to graze all year round, although some researchers believe that it may have been a Viking practice (Hall 2011, 124).

Crop-processing is an important process for archaeobotanical analysis as the steps required are carried out across the world and throughout history; it is mainly the machinery which has changed. The by-products of each step are often found in archaeobotanical assemblages, as they are discarded into fires and subsequently found in hearths, floors, pits, ditches and cereal-drying kilns. By understanding each step and the by-products which result from these steps, the stage of processing can be inferred. The main steps were outlined by Hillman (1981; Figure 5), following ethnographical studies of pre-industrial techniques of harvesting and processing in farming communities in Greece. The basic steps include; (1) Threshing (2) Raking (3) Winnowing; this will remove light weed seeds and awns, which may be used as fodder later (4) Coarse sieving: this will remove weed seeds, unbroken ears and straw fragments; the unbroken ears are re-threshed (5) Fine sieving: this will remove small weed seeds and awns (6) Pounding (7) Winnowing to remove lemmas and paleas (8) Coarse sieving: this will remove spikelet forks and unbroken spikelets, which are re-pounded (9) Fine sieving to remove glumes bases, awns, small weed seeds (10) Hand-sorting to removal grain-sized weeds by hand. In Ireland the practice of dousing the ears with fire was also a widespread practice which may have lessened the number of steps (Kelly 2000, 241).

Therefore, an assemblage which contains some small weed seeds and straw fragments are indicative of the by-products of a crop which was only at the first stage of cleaning. Likewise, these steps can also suggest the manner in which the crops were stored. This can be particularly useful for assessing whether crops were being processed at the time of harvest, which infers that a large workforce was available at the time. It also shows whether sites were producing food for themselves or for trade. However, as the assemblage from Talbot's Tower consists of secondary deposits i.e. not in their original place of charring, we can only surmise about what stage of processing was carried out and how they were to be stored. It would appear that some of the assemblage, in particular Phases 1 and



2, suggests some form of crop-processing waste, which is indicated by the presence of chaff and weed seeds.

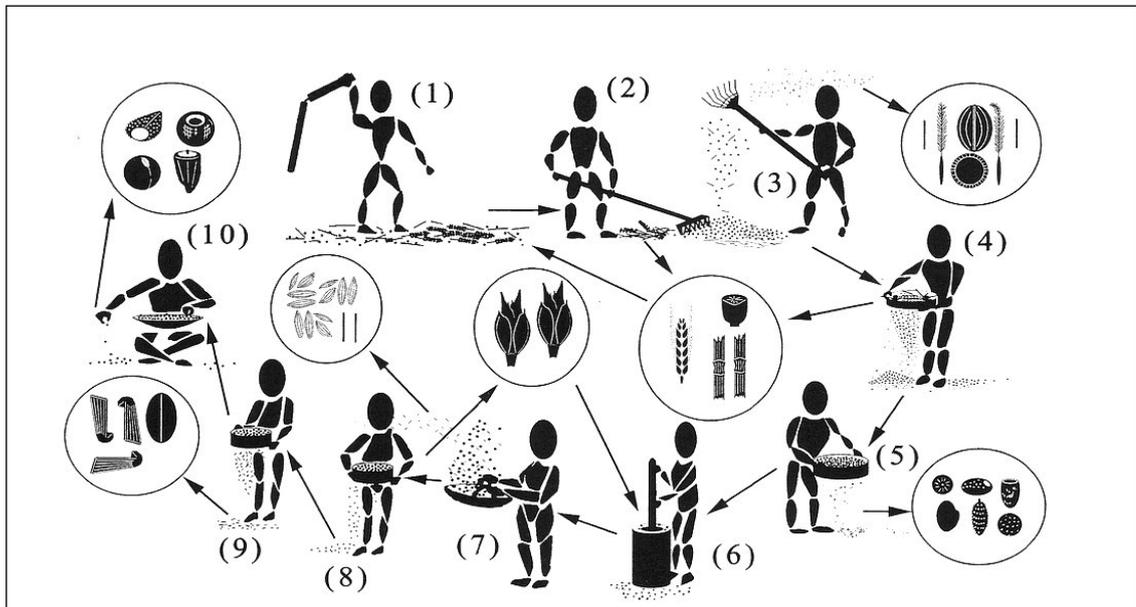


Figure 5. (After Stevens 2003, 63)

5.2 Cereal-drying kilns

Aside from the discarding of crop-waste into domestic hearths, which is seen primary on prehistoric sites, one of the most common archaeological features which produce archaeobotanical assemblages in Ireland is the cereal-drying kiln. These features were used in Britain from the prehistoric period until the post-medieval, but appeared in Ireland in the early medieval period (O'Sullivan and Downey 2005). Their widespread appearance may be associated with the general increase in cereal cultivation during the medieval period (Hall 2011, 125). They were used to dry cereal grains and legumes after the harvest and it is likely that they were located close to the cereal fields. There were a number of reasons drying cereals was necessary and the primary one is the damp climate of Ireland. Drying the grains ensured that no mould, rot or insects damaged them; they could then be stored safely (Monk and Kelleher 2005). Drying cereals with attached glumes, such as barley and oats, made it easier to remove these layers and to grind them into flour. The malting process also utilized the kiln. Malting is the process which produces alcohol, and consists of soaking the grains in water to start germination, and quickly drying in a kiln them to halt further growth (Dinely and Dinely 2000, 140).

Kilns consist of a fire at one end and a drying-chamber at the other; they are attached by a flue (Monk and Kelleher 2005; Figure 6). They were excavated into the ground and became more elaborate over time; they were often stone-lined and thatched. A suggested reconstruction is visible



in Figure 6, below. It is probable that much of the processing was carried out around the kiln and the waste was used to keep the fire lit; burnt grains, weed seeds and chaff are often found in the fire-bowl, while primarily, pure grains and some chaff are found in the drying chamber. The relative frequencies or proportions of grains, chaff and weed seeds can be tracked according to the steps outlined above and the stage of processing can be inferred from the assemblage. Accidental fires have preserved many archaeobotanical assemblages from these kilns. Of course, it is important to remember that not all of the seeds and chaff preserve equally; for example, hulled varieties are protected from the flames and cereal chaff varies in robustness (Boardman and Jones 1990). The wood used to light the fire and the composition of the drying-rack may also serve to alter the seeds found in the assemblage; for example rushes (*Juncaceae* sp.) are often woven into mats upon which to place the cereal, while hazel (with hazelnuts attached) is a common wood found during charcoal analysis (O'Donnell 2009). The skill of drying cereals was noted as one of importance in the medieval period (Kelly 2000, 241) especially in a country which sees as much rain as Ireland.



Figure 6. Reconstruction of medieval cereal-drying kiln (www.nms.co.uk)

6 Results of the Analysis of Remains from Talbot's Tower

The twenty-three samples which were analyzed were dominated by weed seeds, such as docks (*Rumex* sp.) and daisies (*Asteraceae* family), which are indicative of open and disturbed ground



(Tables 1 and 2). A large portion of the assemblage, however, was composed of cereal grains, which indicates the importance of cereal cultivation throughout all phases of the site's history. Naked barley (*Hordeum vulgare*) was the most ubiquitous grain. Oat (*Avena sativa/strigosa*) was also present in high numbers, although it is difficult to assess whether these were of the wild or cultivated varieties. A minimal amount of naked wheat was identified in the samples, with the highest amount visible in Phase 4. Unfortunately, many of the grains were extremely charred and were assigned to the 'Inidentifiable Cereal' category. There was a minimal amount of fragmentary legumes visible; including what was probably a pea (Fabaceae family). Grassy weeds (Poaceae family) were also noted. Wild fruit was represented by sloe/cherry/plum (*Prunus* sp.) fragments and edible leaves were indicated by seeds of the goosefoot family (Chenopodiaceae). The seeds were all charred, which shows their association with a fire. They are likely to have been discarded from a cereal-drying kiln and therefore they can only suggest the micro-environment of the place where they were charred. Tables 1 and 2, which show the results of both of the analyses, are included in Appendix 1.

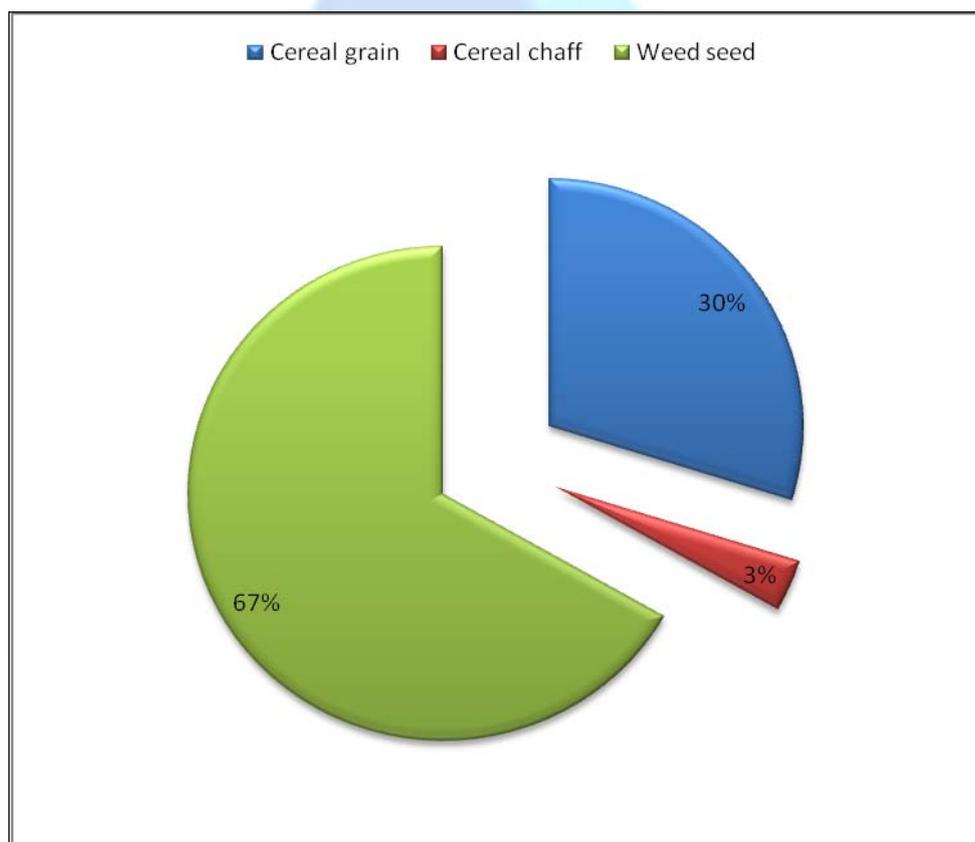


Figure 7. Relative frequencies of cereal grains, chaff and weed seeds in the entire Talbot's Tower assemblage



6.1 Phases 1 and 2

Half of the entire assemblage, which comprised twenty-three samples, was retrieved from the four samples of Phase 1 (Figure 8), which dates to AD 710–890 (cal. UBA-10222). Phase 2 accounted for 41% of the assemblage. The high percentage of cereal grains within the samples indicates that cereal cultivation was important at this time in the site's history.

Grains

Analysis of the samples shows that one fifth of Phase 1 and one quarter of Phase 2 were cereal grains. This means that it is more than likely that cereal cultivation was taking place in the vicinity of the site; their charred nature indicates that they were associated with processing and this tended to take place close to where crops were growing. Barley (*Hordeum vulgare*) was the most common cereal type. A few of these grains could be identified as naked barley; it is also likely that they were of the six-row variety. Barley could tolerate wet and dry soils and climate (Riehl 2009) and it was used to make breads, biscuits and cakes. It was also used as fodder. One of its important uses was for creating malt to produce cakes, drinks and ale. Malt formed part of a tenant's tithe in the medieval period (Kelly 2000, 446).

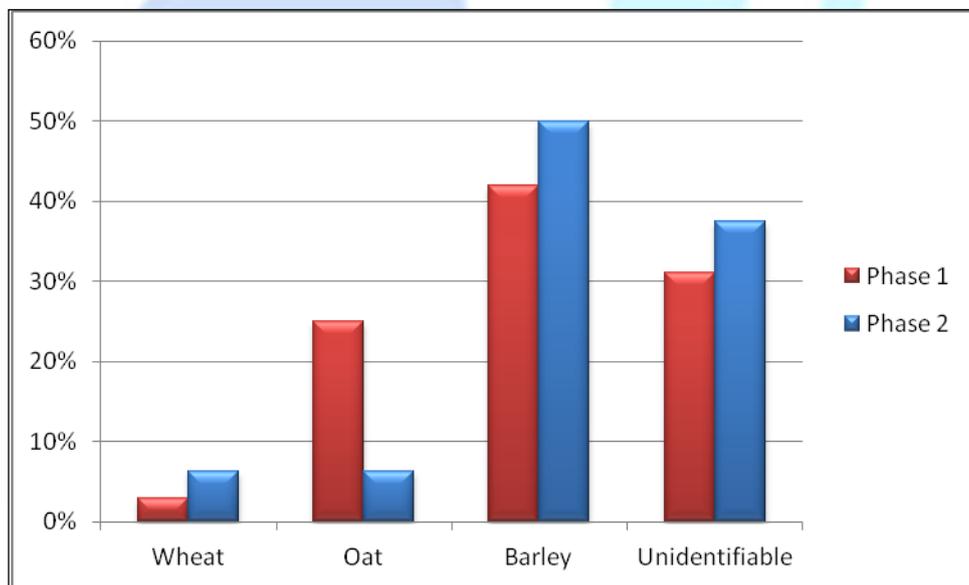


Figure 8. Relative frequencies of components of Phase 1 and Phase 2

Much of the samples were made up of wild/cultivated oats (*Avena fatua/sativa*). It is difficult to identify whether the seeds were those of cultivated oats as the flower bases were not present. The cultivation of oats was not common until the medieval period; however, due to its persistence and similarity in morphology and nutrition to barley and wheat, it is the second most commonly



encountered grain on medieval sites (Kelly 2000, 227) as it is able to grow in damp climates where soil may not be extremely fertile. While oats were listed as one of the lowest ranking cereals in the law tracts (Kelly 2000, 219) they are, in fact, very nutritious and were widely consumed in porridges, stews, pottages and biscuits (Sexton 1998; Monk 2011). Oats were often grown alongside barley as dredge which was used for breads and malt; they were also used as fodder (Murphy and Potterton 2010, 313). The emergence of oats as a ubiquitous grain in the medieval period is suggested by some as linked with the upsurge in kiln construction, as it is much more susceptible to decay than other cereals (Monk 2011, 39). However, a portion must have been wild oats, which were a cereal weed, as there were a large number of twisted awn fragments within the samples which are particular to the wild oat. They serve to burrow a seed into the ground to ensure its survival for the next germination season (<http://alberta.ca/index.cfm>).

Very few grains of naked or free-threshing wheat (*Triticum turgidum/aestivum/durum*) were noted. This type of wheat was high-status; its requirements for dry conditions and mineral-rich soils, as well as its high gluten content which ensured it produced light good-quality bread, meant that this cereal was not consumed by all. It became a more prominent grain during the Anglo-Norman period, which may be associated with both the export economy which they introduced and the social status which became attached to it (McClatchie 2011a).

Chaff

There were only a few culm segments and one barley rachis within the samples, as chaff does not survive well in the archaeological record (Boardman and Jones 1990). However, its presence suggests that crop-processing was taking place close to the site. It may have been carried out at the same time as the crop-harvesting, which may suggest that the samples were formed during the late summer or autumn months.

Legumes

Fragments of a large legume (*Fabaceae* sp.) were present in the samples from Phase 1, while smaller ones were found within both phases. The large fragments were probably peas which would have been important in the medieval diet. They may have been grown alongside the cereals or in gardens closer to the monastery buildings. Legumes were consumed in a variety of dishes, such as pottage and stews, as well as being ground up and used in breads. They could also be dried and stored for winter months when fresh food was scarce. Smaller legumes, such as wild pea (*Lathrus* sp.) and clover (*Trifolium* sp.) may have been used as fodder for animals. However, the seeds of both species are also edible and nutritious. The former grows in damp grassland, which indicates that there were small patches of wet ground in the area (Mabey 2007, 122). Both are also found in hedgerows or grassy verges (Mears and Hillman 2007, 135).



Weeds and wild foods

Weed seeds are those plants which are not cultivated by humans. However, like fat-hen and wild berries, may have been tolerated and gathered for food. The weeds found in the samples are both indicative of cereal cultivation and generally disturbed ground. Many of them may have been present in any boundaries of the monastery lands, which probably consisted of an earthen bank and ditch (Hall 2011, 135). Natural hedgerow may have sprung up alongside the boundaries, which would account for many of the weed varieties encountered in the samples. Wild cherry/sloe (*Prunus* sp.) would have grown in such hedgerow and would have formed a part of the medieval diet. They could have been consumed raw or in desserts to add sweetness to the diet. Hazelnuts (*Corylus avellana*) would also have thrived here; while they could be eaten whole, they were also ground down to form *maothal*, which was a form of muesli consumed with milk, and cheese (Curry 1873, ccclxvi-ccclxvi in Geraghty 1996).

The dock family (*Rumex* sp.) and the goosefoot family (Chenopodiaceae) are both indicative of disturbed ground and may have grown alongside boundaries. Docks indicate a damp microenvironment. The green leaves of both of these families are edible and goosefoot leaves and seeds were widely consumed in the medieval period. The carrot family (Apiaceae) and daisy family (Asteraceae) are also indicative of open and disturbed ground. The latter four families indicate a nutrient-rich environment, which may have been associated with animal dung. This was often used to fertilize arable land.

Wild radish (*Raphanus raphanistrum*) was a weed which infested cereal fields (Geraghty 1996, 38) and it was commonly found alongside barley. It was also a famine food, although there appears to have been no shortage of cereals at the time the Phase 1 and 2 assemblages were formed. Wild oats (*Avena fatua*), as noted above, was a persistent weed which was commonly gathered with the cereal crop and often made its way into food products.

The nutlets of the Juncaceae family are extremely small and fragile. A single seed of *Luzula* sp. (wood rush) survived in one of the samples. This family is similar in appearance to grasses and the species can grow in many soil types but prefer slightly damp places. This could suggest that these plants grew along the edges of the fields, which may not have drained as well as the cultivated plots. A single seed of stinking iris (*Iris foetidissim*) was also noted. This plant is another indicator of a hedgerow or small woodland close to the site.

The contents of the samples were a mix of cereal grains, chaff and weed seeds. Together they indicate that crops were processed here; they were probably charred in a cereal-drying kiln. There is no physical evidence for a cereal-drying kiln within the vicinity of the site; this may have been destroyed by the development of the medieval town. A kiln was uncovered in Friary Street, Kilkenny; this was



probably of a slightly later date, but it indicates that they were used in the town's medieval past (Johnston 2002). However, the charred nature of the seeds indicates their association with a fire; the presence of weeds, chaff and grains suggest that a cereal-drying kiln was the most likely source of this fire. Overall, the microenvironment of Phase 1 and 2, as indicated by the charred seeds, is that they were gathered from of a mixture of open pasture and tilled fields, which were bounded by a hedgerow, or small open woodland, lined with a variety of weeds.

6.2 **Phases 3 and 4**

McClatchie analysed the samples from Phase 3 (2011a), while the author identified the samples from Phase 4. These samples yielded less plant remains than those of Phases 1 and 2. Phase 3 comprised cereal grains, many of which were highly charred and unidentifiable, while Phase 4 produced oat, barley and wheat grains, as well as weed seeds and small legumes.

Grain

Barley was the most common cereal type in the assemblage. This grain continued to be of importance throughout the medieval period and is found on sites of this date throughout Ireland (Murphy and Potterton 2011, 310). It is likely that the grain was grown for either local consumption, in the form of coarse bread and cakes, or for malting. Malted barley is extremely nutritious and may have added essential vitamins to the medieval diet (Katz and Voigt 1986, 30). Barley was also used as animal fodder.

There was one identifiable grain of naked wheat and this is unusual for samples dating to the Anglo-Norman period. The levels of naked wheat increase with the arrival of the newcomers and it is particularly common in their strongholds. In much of Leinster, the cultivation of wheat surpassed that of barley. It was sensitive to bad weather and poor soils, but the rising temperatures of the Medieval Warm Period and the fertile Kilkenny soils would have suited its growth requirements (Hall 2011, 127). The grain was not grown for simple subsistence, but became part of new type of economy which was introduced by the Anglo-Normans. While Ireland had been part of the European and North African trade networks in the early medieval period, it began to play a much larger role in the late medieval period (O'Sullivan *et al.* 2008). The export of grain, and in particular wheat, laid down the foundations of what essentially was the beginning of modern Ireland (Murphy and Potterton 2010).

There was a very small presence of oats. This grain became increasingly common throughout the medieval period and is commonly encountered in archaeobotanical assemblages (Monk 1985/6). By the 13th century it was the second most common grain cultivated in Leinster (Murphy and Potterton 2010, 304). It may have been sown as a dredge alongside barley to guarantee a harvest in case of adverse weather; it has been previously noted that oats can tolerate damp and less fertile soils. They



were used to make coarse and cheap bread, porridges, cakes and often ale; they were also used as horse-feed.

Chaff

There is no chaff present in the samples. Interestingly, there are no awns of wild oats, which coincides with the general increase of cultivated oats in archaeobotanical assemblages of the later medieval period. The lack of chaff suggests that the crops had been cleaned before they arrived into the site. The construction of the ditch and Talbot's Tower (then probably St. Patrick's Tower; Oxford Archaeology 2005, 107) would have changed the way that land was used in this area. It had probably been an open area consisting of fields and hedgerow boundaries; the construction of defenses would have removed some of these fields and boundaries and enclosed the town. It is likely that cereals would have been grown at a distance from the defenses and therefore crop-processing would have been carried out at a distance also.

Legumes

There are small amounts of legumes, although they are not identifiable to species, as there are no hilums on the highly charred fragments. Legumes are resistant to drought, poor soils and badly drained fields, which are common problems in Ireland. Peas and vetches were grown in Ireland prior to the arrival of the Anglo-Normans, but the new system of three crop-rotation ensured that they became a common feature in the medieval fields. They have nitrogen-fixing nodes which enhance soils depleted of nutrients after growing cereal crops (Mahler-Slasky and Kislev 2010, 2479). Legumes formed an important part of the diet and they were also used to feed animals.

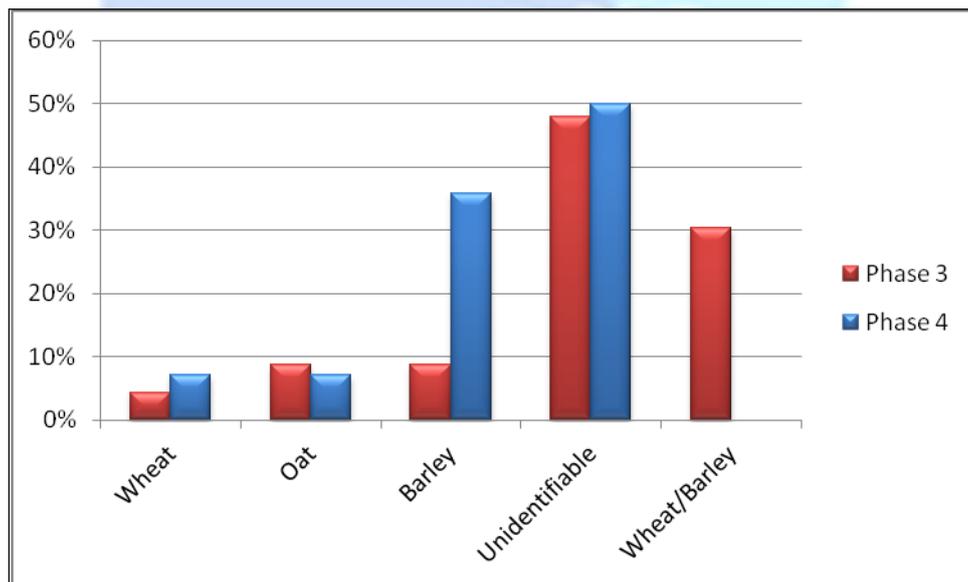


Figure 9. Relative frequencies of components of Phase 3 and Phase 4



Weeds and wild foods

There are fewer weed seeds in the Phase 4 samples. This suggests that the crops were cleaned before arriving at the source of the fire. This may have been a result of the way the landscape had been altered; the site had changed from one of open fields to one of a defensive nature. The seeds noted were associated with waste ground and may have become incorporated during conflagration of the kiln.

The cabbage family (Brassicaceae) was probably introduced to Ireland with the arrival of Christianity and the seeds are cultivated for spices and oils, such as black mustard and rapeseed. However, there are many species which escaped cultivation and grow along waste ground and it is not possible to tell them apart.

The bedstraw family (*Gallium* sp.) is found in wastelands and woodlands, which may indicate that there was some form of woodland growth in the wider area. Some of the species grow in damp grassland, while others are crops of arable land. Cleaver seeds (*Gallium aparine*) travel by catching on to a moving object with bristles and it may have been one method by which these seeds arrived on the site. Dead-nettles (*Laminum* sp.) are a common weed on open but disturbed ground and may have blown into the fire or kiln.

The overall picture of the micro-environment of Phases 3 and 4 is different to that of Phases 1 and 2. The activities being carried on the site have changed landscape has changed and the plant families have subsequently become altered. Crop-processing was carried out close to the kiln in the early medieval period; in the Anglo-Norman it seems to have been taken place elsewhere. The lack of chaff and many weeds and the high presence of barley grains could indicate that the late medieval samples were associated with malting.

7 Discussion of Results

7.1 Early medieval *Domhnach Mór*; the monastery and fields

Phase 1 was radiocarbon-dated to AD 710–890 (cal. UBA-10222) and it is likely that the activities of Phase 1 and 2 were associated with the monastery of *Domhnach Mór*. The exact layout of the monastery is not known. It is probable that it was laid out in a similar pattern to other ecclesiastical or large secular sites in a system which would have included up to three circular enclosures; the central space was used for the most religious activities, such as the church and monks' domestic buildings (Swift 1998). The middle space may have been used for domestic and industrial activities, while the outer enclosure may have been more secular in nature; lay-people may have been allowed to enter this space (O'Sullivan *et al.* 2008). These enclosures may have consisted of both stone walls and ditch



and banks (McCormick *et al.* 2011, 9), especially as Kilkenny is not a particularly stony area. O'Drisceoil uncovered remains of what may have been an enclosing ditch associated with the monastery on Fr. Hayden Road just south of the site of St. Patrick's graveyard (O'Drisceoil 2005 in O'Drisceoil *et al.* 2008, 34).

It seems likely that the lands beyond the religious enclosures were used for pastoral and agricultural activities. Monasteries were extremely instrumental in introducing new agricultural techniques and methods, as well as food-stuffs (Kelly 2000). The Irish translations for many words associated with farming and food indicate Latin, and therefore, Church origins, such as the cabbage family. Wine was also extremely important in medieval church life, both for the Eucharist and for daily consumption as an allowance and for medicinal purposes (Hagen 2010, 22). It was traded through a European network of which there is evidence in Ireland (Comber 2001, 82). It is likely that technology such as cereal-drying kilns, the watermill and ard-share were brought to Ireland by immigrating monks, which would have a huge influence on the economy of the country, which was essentially that of subsistence (Monk *et al.* 1998, 73). Monasteries endeavoured to become self-sufficient (Hagen 2010, 334) and both documentary and archaeological sources suggest a much greater association between monasteries and cultivation, than secular (non-religious) sites. Early medieval sources note that a gardener was listed as one of the seven officers of the church; this is not noted for contemporary kings or lords (Kelly 2000, 250). Water-mills for cereal processing were commonly located close to monasteries, such as that of Nendrum, Co. Down (Rynne 2000 in O'Sullivan *et al.* 2008, 200) and Killoteran, Co. Waterford (Murphy and Rathbone 2006). Island ecclesiastical sites, like Illanloughan Island, imported soil within which they grew vegetables and herbs (Murray and McCormick 2005). They also imported grain but processed it on the island itself, as evidenced by the quernstones which were found there. It is recorded that Irish monks travelled to Europe with their new-found expertise and began to spread ideas about settlement and farming to wandering tribes which had not been previously been educated by the spread of Christianity (Harkins 2007).

There is no indication of how the agricultural and pastoral lands were laid out in this part of Kilkenny, but is believed to have been similar for both religious and secular settlements in the early medieval period (O'Sullivan and Nicholl 2010). Excavations of ring-forts, like Leggetsrath West, Co. Kilkenny (Lennon 2006) and of a newly emerging site-type; the settlement cemeteries, like that of Oldtown, Co. Dublin (Baker 2010) and Raystown, Co. Meath (Seaver 2006), suggest that ditches radiated from the main enclosures, forming smaller enclosed fields. These may have been linear as in the case of Leggetsrath and Raystown, or in a 'petal' shape like those of Oldtown. While these sites were not associated with monasteries, their highly complex organisation suggests that the sites were structured by similar ideas about land management. In a similar manner to monasteries, they had separate spheres for domestic and industrial activities and created a physically ordered world, which



probably reflected the non-tangible rules which governed the life on the site. Evidence of boundary maintenance reinforces this idea (Seaver 2006, 75). Therefore, it can be surmised that there may have been an extensive network of fields radiating from the monastic complex at *Domhnach Mór*, which would have been used for cereal cultivation and pasture. Activities associated with cereal cultivation, such as threshing, winnowing and drying may have taken place in these fields. The clean products were probably brought back to the monastery for storage.

The assemblage gathered from Phase 1 and 2 were subjected to charring, which indicates the use of a fire. The presence of chaff, weeds and grains in the sample from Phase 1 and 2 suggest that a harvest was being dried in a cereal-drying kiln after a damp summer and it not been fully cleaned. The seeds of these weeds are dispersed during the summer/autumn month at the same time as the harvest. It is likely therefore that the assemblage was produced by activities associated with crop-processing. The presence of a *Juncaceae* sp. nutlet would confirm that there was damp land in the area, although the leaves of this plant may also have been woven into a mat upon which the cereals were placed in the drying-chamber. Excavations in Ballyvass, Co. Kildare, have revealed evidence of a mat woven from textiles and straw (Doyle 2009, 55).

It is likely that crop-processing and drying was carried out away from the monastery; accidental conflagrations would have been dangerous in early medieval monasteries where many of the buildings were constructed from wood (Hamlin 1985 in O'Sullivan *et al.* 2008, 126). Additionally, it would have been easier for those who were harvesting the cereals to carry out the process close to where the sheaves were gathered, rather than carry them. It has been noted that many kilns were excavated into pre-existing boundaries or ditches in order to utilise the slope which would have enabled the heat to travel to the drying-chamber (Monk and Kelleher 2005). It is probable that hedgerow would have grown up along the ditches and this may have been one reason for the presence of hedgerow fruit and nuts, such as wild cherry/sloe/plum and hazelnuts. Another alternative is that they were eaten and discarded during activities around the kiln.

7.2 **Comparisons with early medieval assemblages**

Excavations in Kilkenny city have resulted in the creation of an environmental database. Many of the sites were dated to the later medieval period (1100's-1500's), but excavations of Bishop's Palace uncovered a pit dated to 1000-1140 cal. BC (Beta-306021; O'Drisceoil 2011). The results of the analysis were similar to those of Talbot's Tower; there were hulled barley and oat grains present, as well as peas and crop weeds, such as fat-hen. Grassy weeds of the Poaceae family were noted, but there were less than in the Talbot's Tower assemblages. There was no chaff present in the Bishop's Palace samples, but there was a high incidence of fruit fragments, in the form of apple/pear (*Malus* sp. /*Pyrus* sp.) and hazelnut shell fragments. The site of Leggetsrath West is located outside the limits



of Kilkenny city to the north of Talbot's Tower (Lennon 2006). It consisted of a bivallate ringfort which was 54m wide. Charred remains were found in two cereal-drying kilns which had been built into two linear ditches located beyond the outer enclosure. The earliest kiln was dated to 790-1030 cal BC (Beta-205169) and it contained predominantly oat and naked wheat, with less of a presence of barley. The later feature was dated to 1000-1270 cal. BC (Beta-205167) and contained oats and barley, with a few naked wheat grains. These assemblages are somewhat similar to Talbot's Tower; although the differences in chaff and weed seed numbers suggest that crops were cleaned before arriving onto the two latter sites.

Archaeobotanical assemblages from wider afield were also consulted, both from ecclesiastical and secular sites. Excavations on Illanloughan Island (Plunkett, Bentley and Collins 2005) and Skellig Michael, Co. Kerry (Allen 2011) showed that oats and barley were consumed. There were infrequent grains of wheat also found in the former site. Other ecclesiastical sites, including Clonfad and Ballykilmore, Co. Westmeath, were more similar to Talbot's Tower in their high levels of barley (Stevens *forthcoming*). Interestingly, Clonfad also had high levels of wheat grains, which is unusual for this period and site-type and does not mirror the Talbot's Tower assemblage. Bread wheat, with the bran removed, was regarded as necessary for the Eucharist in English monasteries (Hagen 2010, 256), but perhaps this was a tradition that did not reach Ireland. The absence of rye from the latter three sites is unusual as it would have been an important grain in monastic diets, although perhaps barley and oats served the necessary food requirements. Wild and gathered foods which were found on the monastic sites were similar to Talbot's Tower and included docks, vetch, cabbage family (*Brassica* sp.), garden peas and hazelnut fragments.

Other secular sites which have been excavated have also been found to contain barley, wheat and oats; the latter appears to have been more common. These include Lisleagh II, Co. Cork (Monk 1998), Mackney and Loughbown, Co. Galway (Dillon, Johnston and Tierney 2007). Monk correlated twenty-two early medieval assemblages and found most sites to contain a wide spectrum of cereals and weed-seeds. He noted that barley was generally the most dominant of the cereals (Monk 1985/6, 33). These sites included monasteries, ringforts and crannógs, including Church Island, Co. Kerry, Lisleagh, Co. Cork, and Moynagh Lough Crannóg, Co. Meath, respectively. The presence of seeds belonging to the Polygonaceae family and seeds of fat-hen and dock, as well as fragments of hazelnuts, were also found in the samples which suggests country-wide choices for wild/gathered leaves and seeds in the early medieval period (Monk, Tierney and Hannon 1998, 68).

Oats are commonly associated with ecclesiastical sites and monasteries (Sherley-Price 1956, 256; Kelly 2000, 219). Rules governing the lives of monks in early medieval Ireland record the importance of oat in the diet (Kelly 2000). Medieval stories compound this association, such as that of St. Ciarán who miraculously transformed a bag of oats into valuable wheat, or that of the scholar Aniér Mac



Conglinne who was unhappy with the oat ration he received when visiting a Cork monastery (Meyer 1974 in Murray and McCormick 2005, 75). Oats are extremely nutritious, but have been perceived throughout history as a lesser grain and were listed in the early medieval law tracts as the least valued cereal in a list of seven (Kelly 2000, 244); they therefore were associated with penitential and monastic diets. They were consumed in porridges and gruels; the latter was reserved for monastic meals (Sexton 1998, 77). They were also often grown alongside barley as a dredge and the two were ground together to bake coarse breads and biscuits for the lower classes of society (Stone 2009, 12). Evidence of the latter was discovered at Lisleagh II by Monk (2011).

However, barley was also associated with ecclesiastical sites also. The heavy bread made from barley flour seems to have been related to ascetic diets and, therefore, monks (Feehan 2003, 150). It was recorded that St. Tigernach of Clones lived on barley bread and watercress, although this minimal diet was not condoned (Gwynn and Purton 1912 in Murray and McCormick 2005, 75). Records show that an Anglo-Saxon bishop by the name of Basilus offered his daily fare of barley bread to Emperor Julian (Hagen 2010, 257). The use of barley for malt has been previously mentioned and beer, drunkenness and ecclesiasts are recorded in '*Vitae sanctorum Hiberniae*' (Plummer 1910 in Ó Cróinin 1995, 105) suggesting that ale consumption was not unusual at the time.

Thus, the assemblage from Talbot's Tower is similar to those of other sites in the medieval period. While the frequencies differ, the general choices of food and the processes used to prepare the food are the same. The similarity in assemblages indicates a similar environment across the country; one of a highly organized agricultural landscape interspersed with pastureland and scrubby woodland. This concurs with pollen analyses for the period (O'Sullivan *et al.* 2008, 191).

7.3 **High/late medieval Kilkenny; a change in landscape**

Phase 3 was radiocarbon-dated to AD 1220–1280 (cal. UBA-10223) and Phase 4 comprised the primary layers at the base of the town ditch. Although only separated by a few hundred years from the Phase 1 and 2 layers, these horizons were part of a new system. The Anglo-Normans arrived in Kilkenny in the 12th century and they settled in the land between *Cill Chainnigh* and *Domhnach Mór* as part of a deal with the Bishop of Ossory (Bradley 2000, 2). It is common that the Anglo-Normans settled close to pre-existing ecclesiastical sites as many of these had been founded along trade routes (Murphy and Potterton 2011, 73). Kilkenny was one of the most important inland towns in the early medieval period and this would have drawn the Anglo-Normans. An earthwork castle belonging to the Mac Gilla Pátraic kings of Ossory was present where Kilkenny Castle now stands and it was symbolically built over to signify the Anglo-Norman presence. The latter castle had been constructed by 1173 and the ditch and town walls were constructed early in the 13th century (Oxford Archaeology 2005, 16). It is likely that a small, but perhaps dispersed, settlement had grown up around *Domhnach*



Mór, which was renamed as the borough of Donaghmore. This probably centred around St. Patrick's Church and graveyard. The Dean of St. Patrick's lived in a castle or manor close to the graveyard, but no structure remains today. The archaeobotanical samples were retrieved from outside the walls, below the new rampart and within the ditch and therefore represent refuse disposal. However, it is not clear whether the cereals were cultivated as part of activities associated with Hightown or Donaghmore.

The arrival of both the Anglo-Normans and the Cistercian monks to Ireland ushered in new systems and methods of farming in a similar manner to the first wave of early medieval monks less than one thousand years previously. The changes associated with the former were far-reaching and have left a legacy on the way farming is carried out and how land is organized. They had different ideas as to the ownership and organization of land; they instigated an economy based on profit and export. Their ties with Europe and with England brought Ireland into a new era. While Ireland had been importing products from Europe, including wine and pottery (Comber 2001), it now was exporting grain and grain products. It is this which links the increase in free-threshing wheats to the arrival of the Anglo-Normans. The crop was labour-demanding and resulted in a low yield, but it was of high value on the tables of the rich bishops and noblemen (Kelly 2000, 220). It was exported as malt to Wales in the 13th century (Murphy and Potterton 2011, 414), along with oat malt. Its identification in assemblages suggests a high-status association and can be used to determine the socio-economics of the site. Unfortunately, it is only found in very low numbers in the Talbot's Tower Phase 3 and 4 samples.

The layout of Anglo-Norman lands differed to that of early medieval Ireland. They utilized a system incorporating strips of fields which were set aside for different crops, with common land (Murphy and Potterton 2011, 293). Many settlements were centred around a manor-house with associated barns and malt-houses. Other settlements included moated farmsteads, such as that found at Raheenarran, Co. Kilkenny (www.kilkennycoco.ie). It was often the case that tenants held strips of land in various different fields. The three-crop rotation system is attributed to the Anglo-Normans, which replaced that of the Irish two-crop rotation. The former allowed one field to lie fallow and recover for one year. Legumes were an important part of this system as they add nitrogen to the soil and were a source of protein for those who could not afford meat (Mahler-Slasky & Kislev, 2010). While these were consumed in the early medieval period, their importance in crop-rotation resulted in an increase in their ubiquity. They were used for both food and fodder and it may have been the case that animals were allowed to graze on them while they were growing and the manure was subsequently ploughed back into the soil. Rye is noted as being important in this rotation system (Feehan 2003, 148), although it is not found in large numbers in medieval assemblages.

As noted earlier, the mould-board plough allowed for the ploughing of deeper soils and the extension of arable lands, thus extensively altering the landscape. The plough however had another effect; old



weed populations were replaced by new ones which grew deeper in the soil and were tolerant of the new ploughing systems (Mitchell 1987, 10). Feehan (2003, 22) notes that Europe at this time was undergoing a series of important changes in all spheres of life, including politics and economics. He attributes the increase of Europe's population to these new developments; widespread legume consumption added cheap protein to the diet and the plough brought previously un-farmable land under tillage. It is likely that the population of Ireland increased at this time and the new farming systems cannot be underestimated. Prior to the Anglo-Norman's arrival, oxen were used to pull the plough, but these were large animals and required much care. Horses became the draught animal of choice; they carried out the same work as oxen for half of the cost (Feehan 2003, 22). This introduction may have been associated with the continued cultivation of oats, which were a highly nutritious food for both animals and the poor. The widespread use of horses added a new component to Ireland's farming life; with horses came blacksmiths and the forge. Rabbits and rats were also new arrivals; the former was purposely introduced for food and fur, which was highly prized by the settlers. The farming of this animal had an effect on the physical and social landscape; place-names were altered to indicate the presence of a rabbit warren, such as that of Coneyborough in Dublin. No doubt less tangible changes also occurred with fur perhaps becoming both a valuable commodity and a representation of social status.

All of these changes would have been felt in Kilkenny. This was an important settlement in the Anglo-Norman network. As noted above, it is not clear whether the assemblages retrieved were associated with the new settlement or with the lands of Donaghmore; however, it probably does not matter as they were the result of new farming methods which would have been introduced across much of the south and south-east in the Anglo-Norman strong-holds. The seeds were charred, which indicates the presence of a fire; that of a hearth or kiln. They were both the result of refuse disposal. The lack of any chaff and weed seeds in the Phase 3 samples that these were crops which had been cleaned prior to their arrival in this area. This would suggest two things; they were burnt in a store or burnt as part of crop-processing or malting. If the former was true, it would be likely that there would be a large number of grains and so it is probable that the latter was the case. They may have been accidentally burnt in a kiln and it could have been the case that they had been drying after germination for malting.

7.4 **Comparisons with high/late medieval assemblages**

There have been a number of assemblages gathered from Kilkenny which date to the medieval period. Three excavations in Patrick Street, located to the northeast of Talbot's Tower, yielded evidence for cereal cultivation, as well as a wide array of arable and ruderal taxa. Pits in 11 Patrick Street contained charred wheat, oats, barley and rye, as well as legume and cleavers (Johnston 2006/7). Identification of another assemblage from Patrick Street (Dillon 1999/2000) showed high



frequencies of wheat and oats, as well as barley and rye and associated chaff and weeds, such as docks and fat-hen. Samples from a third site on 26 Patrick Street yielded evidence for wheat, barley, oats and rye (Brewer 1999/2000). Barley was found in high numbers here, although less frequently than wheat. There are differences in the variety and content of these samples, as well as differing to Talbot's Tower. This may have to do with the different activities which created them; alternatively the purpose of the crops may have been different. Perhaps areas of the town were designated for certain cereal-related purposes, such as malting and flour-preparation. It is also possible that the Patrick Street assemblages were associated with more domestic purposes than Talbot's Tower.

A medieval cereal-drying kiln in Friary Street was excavated to reveal plant remains also (Johnston 2002). The cereals were dominated by oat, while there was also some wheat and barley, legumes, including peas and vetches, chaff and weed seeds. This assemblage indicates that the kiln was used to dry both an unprocessed harvest and peas for future storage. *Brassica* sp. was also present; they appear to have been ubiquitous on medieval assemblages and may indicate widespread growth, as well as widespread consumption. Interestingly, a large number of oats were found to have germinated, suggesting that they were destined for alcohol production. Oat malt was common in Ireland at the time, although it does not seem to have been well-received by travellers to the country (O'Brien 1923 in McClatchie 2003). Nevertheless, it was exported to Britain in the medieval period (Murphy and Potterton 2011, 414). There was no evidence for germination on any of the grain seeds from Talbot's Tower, although many were highly charred and fragmented and it cannot, therefore, be ruled out. Two excavations at Rothe House, to the north of Friary Street, also resulted in the identification of wheat, oats and barley. This was the home of a prosperous 17th century merchant; however, the excavations also uncovered Anglo-Norman activity. Wheat and oats were found within an associated well; they were highly charred and distorted (Collins 1992/3). Later excavations in the garden produced naked wheat, barley and oat grains (McClatchie 2011c). One pit was filled with general waste, within which charred wheat, oat and barley were found. An associated trench was also found to contain wheat, oat and barley grains, as well as hazelnut fragments. The samples from Friary Street, Rothe House and Talbot's Tower vary in cereal frequency; the former was dominated by oats, the latter was dominated by barley and Rothe House was dominated by wheat. While the presence of wheat in all assemblages reaffirms the increase of wheat attributed to the Anglo-Normans it may indicate different social spheres within the town; it also, as noted earlier, could suggest different areas for different processes. There is no real indication of differences between activities carried out within the town and outside its walls at this time, but analyses of seeds retrieved during future excavations would expand the existing environmental database and allow for more detailed studies in this area.



Excavations in other urban areas showed varying evidence for cereal frequencies also. The assemblage from the medieval levels of Winetavern Street, Dublin, was associated with food waste; wheat and oats were identified, as well as arable weed seeds and weeds that grow in damp wastelands (Collins 1997). Samples from excavations in Cork city showed variation in the composition of the assemblages (McClatchie 2003). Fills from a ditch contained waterlogged seeds, such as rushes and sedges, and a few charred barley, oat and wheat grains. Other features in Cork, such as pits and postholes, contained wheat, barley, oats and flax, as well as vetches and arable weeds. A drain fill, which included cess deposits, was found to contain barley bran, indicating that barley was still consumed in the 13th century, despite its importance in malt and ale production. McClatchie (2003, 398) notes that oats were found in the highest frequencies and indicates that this may have been a cultural choice. While wheat was considered a high quality and valuable crop, it was also a symbol of Anglo-Norman culture, which had essentially been forced upon the country. Non-tangible protests to their presence may have been made by people outside the Pale and the southeast of the country, through their food-choices.

Excavations in Drogheda, Co. Louth, uncovered 13-14th century material which contained oats and barley as well as arable weeds, peas and *Brassica* sp. (Mitchell and Dickson 1985). The lack of wheat in this assemblage mirrors the low frequencies from Talbot's Tower. The high status of Drogheda is confirmed by imported seeds, such as grape and cannabis, which would have been used to make hemp for weaving and rope production. The high frequencies of weeds and chaff to cereals in the assemblage gathered during excavations in Castledermot, Co. Kildare, suggested intensive crop-processing within the town (Brewer 2010). Wheat, oats and barley were found here and the former was the dominant cereal. Many seeds were preserved in damp environments, which was not the case at Talbot's Tower. Oats, peas and cereal chaff were found during excavations at the Anglo-Norman site of Trim Castle (Mitchell and Dickson 1985). The samples from another border castle at Carrickmines contained wheat, oats and only barley also (Lyons 2011). There were low levels of chaff and various weed taxa, like brome grass and dock. The bread-wheat confirms the status of the site, but the presence of the other two cereals shows that consumption continued even in Anglo-Norman strongholds. In a similar manner to the Friary Street assemblage, many of the oat and barley grains had germinated suggesting that they had been destined for alcohol production.

Moated sites were an Anglo-Norman settlement-type which consisted of a defended house and outbuildings enclosed by a ditch, which may have been filled with water (O'Connor 1998). Excavations in one such site at Carrowreagh, Co. Wexford, showed that oat and wheat were the main crops cultivated here; the grains were found within features located in the structure and it is probable that they were stored there and were charred when the structure accidentally burnt down (Johnston and Tierney 2004). Other seeds which were found were those of arable weeds, like wild radish and corn-



cockle. It is suggested that this site may have formed part of a large network of grain production sites for export in order to fund campaigns for the English crown (Johnston and Tierney 2004, 81). Two structures were excavated on a moated site in Mondaniel, Co. Cork, and cereal grains were retrieved from both (Quinn 2003). Charred wheat and oats were found close to a hearth in the first structure, while both were also found in the second structure. Sheep and goat pellets were associated with the second structure and it may have been used for animal storage.

Therefore, the samples found in Talbot's Tower are reflective of many other sites in the Anglo-Norman period. The difference in content of some of sites compounds the fact that the activities dictate what is charred for posterity. It is important to remember that the samples only reflect the activities, rather than the whole picture.

8 Wood analyses from Kilkenny excavations

There have been a number of wood analyses carried out in Kilkenny; unfortunately, these are primarily associated with early modern and post-medieval deposits (c. 16th-19th centuries). However, excavations as part of the River Nore Drainage Scheme revealed evidence for riverside management and exploitation in the medieval period. The Nore would have been an important natural resource throughout the history of Kilkenny (Bradley 2000, 1). Its navigability and route to the coast allowed for national and international trade, which would have been an essential factor in elevating Kilkenny's status to that of a wealthy city in the medieval period (Doyle and O'Meara 2003). Excavations in John's Quay/Mayor's Walk uncovered four sites of activity; one of the sites was radiocarbon-dated to the medieval period (AD 1163 – 1278 cal. UB-6052; Doyle and O'Meara 2004). It is likely that the other sites were associated. The sites comprised riverside revetments and post-and-wattle structures, which indicate management of the river and its banks at this time. The woods identified on the sites were worked to form stakes, sails and rods (O'Donnell 2004a). The species varied in each site and they included oak, ash and hazel. Different species were chosen for certain tasks, depending on their durability and pliability (O'Donnell 2007, 31). Oak is often used for structural elements as it is a particularly strong wood; hazel is more pliable and easily woven into hurdles and fences. Additionally, each species tolerates different environments, which indicates that they were spread across the landscape providing a wide resource-base for the inhabitants of medieval Kilkenny. O'Donnell noted evidence for woodland management in the form of coppiced hazel, suggesting that a copse nearby may have been chosen for this task. However, there was a greater amount of non-managed wood suggesting that natural woodland was more freely available to the people in this area. It is likely that some of the woods were worked where they were felled, especially in the case of oak, which is a large and dense wood. It may have then been stored in piles for easier employment (O'Donnell 2004b).



Excavations at John's Bridge as part of the same Drainage Scheme revealed evidence for a multi-period site which dated from the prehistoric to the post-medieval (Doyle 2004). Two types of medieval structures formed by timbers and associated with a pier were retrieved. The first structure consisted of oak posts which had grooves along the sides; one had an iron shoe (O'Donnell 2004b). The second consisted of a raft-like foundation upon which the pier had been constructed. Some of the timbers slotted into one another by means of dowel holes and pegs. Other groupings of worked wood were also present and they had been employed in a similar manner. The construction of a pier on the river indicates the latter's importance in the medieval period. The pier may have been used for the movement of products, including food and perhaps wood itself, along the river. It would also have granted access to the river for the fisherman of the town (Doyle and O'Meara 2004, 5).

These sites are located to the northeast of Talbot's Tower and it is likely that the woodland resources were located close to both areas. The presence of woodlands in the local area has also been indicated by the archaeobotanical analysis and it fits well with the general picture of Ireland in the medieval period. All aspects of the landscape would have been employed and used together. One example is that of the cereal-drying kiln where firewood is an essential element of the process. It is likely that the wood which fuelled the fire or cereal-drying kilns, which may have been located on or close to the site of Talbot's Tower, was sourced in the local area. A wide use of environmental resources is indicated by the environmental analyses; the identification of hazelnuts in the samples from Talbot's Tower and the use of hazel in river management systems show how resources were used for a variety of purposes. The analyses indicate how tied to the landscape people were. The mixture of wild and managed foods and woodlands suggest a structured system which was probably managed by both social knowledge and legal enforcement.

The charcoal samples gathered from Talbot's Tower are currently under analysis on behalf of Kilkenny Archaeology and will be collated in a final excavation report at a later date (O'Drisceoil *forthcoming*). Additionally, the charcoal recovered during the flotation of samples gathered during excavations of pre-Anglo-Norman levels in Bishop's Palace are currently under analysis ; they will also add to the existing database of environmental knowledge about the area in the past (O'Drisceoil *forthcoming*).

9 Conclusions

This report attempts to describe the medieval landscape in the vicinity of Talbot's Tower, and the activities through which archaeobotanical remains were deposited here. This has been attempted through the collation of archaeobotanical evidence retrieved from the site. A synopsis of wood analyses carried out on medieval timbers is included to suggest wider landscape use and exploitation of natural resources at this time.



Excavations at Talbot's Tower were carried out by Kilkenny Archaeology from 2007-2010, which resulted in the discovery of four phases of medieval land-use around the site. Two Phases (1 and 2) pre-date the Anglo-Norman levels, when the land was probably owned by or associated with the monastery of *Domhnach Mór*, while Phase 3 and 4 are associated with the Anglo-Norman period; the latter consisted of levels within the ditch that enclosed the Anglo-Norman town.

Archaeobotanical analyses of plant remains retrieved during the excavations have been useful in suggesting land use and management, as well as activities carried out in the medieval life of the site. Cultivated grains, including barley, wheat and oats were also present, as well as wild fruit in the form of cherries or sloes. Ruderal weeds, which may also have been gathered and eaten, such fat-hen and docks and daisies were identified.

It is probable that crop-processing was carried out close to the site in the early medieval period, while hearths or cereal-drying kilns may have been located on or close to the site in both early and late medieval periods. The micro-environment of Phases 1 and 2 is tentatively suggested to be that of a mixture of open pasture and tilled fields, which were bounded by a hedgerow, or small open woodland, lined with a variety of weeds. Some damp areas and nutrient-rich patches are also suggested. This environment had been altered by Phases 3 and 4 with the construction of defences in the 13th century. It can be suggested that the site was probably more open and disturbed land, with less hedgerow and wild plants than the earlier period. However, wood analyses suggest the presence of both managed hazel stands and natural copses in the wider area. There is no real indication of differences between activities carried out within the medieval town and outside its walls, but analyses of samples gathered during future excavations in Kilkenny would serve to expand the existing environmental database and allow for more detailed studies in this area.



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National Museum of Scotland: www.nms.co.uk

National Roads Authority: www.nra.ie





11 **Appendix**

			Context no.	75	75	75	86
			Sample no.	1.5 litre sample	2.5 litre sample	3.0 litre sample	...
Botanical name	Plant part	Common name					
GRAMINEAE							
<i>Triticum</i> spp.	Grain	Wheat		...	...	...	1
<i>Hordeum vulgare</i> L.	Grain	Barley		1	1	1	2
<i>Triticum</i> spp./ <i>Hordeum vulgare</i> L.	Grain	Wheat/Barley		...	...	...	2
<i>Triticum</i> spp./ <i>Hordeum vulgare</i> L.	Grain fragment	Wheat/Barley		...	1	...	...
<i>Avena</i> spp.	Grain	Oat		...	...	...	3
<i>Avena</i> spp.	Grain fragment	Oat		...	...	5	8
cf. <i>Avena</i> spp.	Grain fragment	cf. Oat		...	1	...	...
Cerealia	Grain fragment	Indeterminate cereal		...	...	...	7
			Total	1	3	6	23

Table 1. Plant Remains from Phases 1 and 2 of Talbot's Tower (after McClatchie 2011a)



Context			[075]	[075]	[075]	[075]	[404]	[404]	[405]	[406]	[406]	[406]	[407]	[072]	[072]	[074]	[327]	[328]	[351]	[356]	[356]	TOTALS	Relative Frequency	Ubiquity
Sample No.			38	40	41	42	31	32	33	36	35	37	34	13	12	15	9	11	18	20	22			
Period			1	1	1	1	2	2	2	2	2	2	2	4	4	4	4	4	4	4	4			
Volume sampled			5l	5l	5l	10l	5l	5l	5l	5l	5l	5l	5l	5l	5l	5l	5l	5l	5l	5l	5l			
Volume of flot			20ml	15ml	20ml	200ml	30ml	10ml	12ml	20ml	20ml	2ml	30ml	20ml	7ml	10ml	5ml	15ml	1ml	2ml	80ml			
Weight of flot			18.33g	6.56g	7.42g	174.32	20.71g	5.77g	6.61g	17.65g	15.87g	3.85g	30.5g	22.35g	1.39g	0.51g	1.10g	2.7g	0.56g	1.15g	25.92g			
Botanical Name	Other	Plant part																						
Poaceae <i>Triticum turgidum L./aestivum L./durum Desf.</i>	Rivet/bread/durum wheat	caryopsis caryopsis fragments			1		1											1				4	1.14%	36.84%
Total																								
<i>Avena sativa L. /Avena strigosa Schreb. s.l.</i>	Oat cf	caryopsis caryopsis fragments			1	2			1	1					1							5	1.42%	26.32%
Total																								
<i>Avena sp. L. / Bromus sp. L.</i>	Wild oats or Brome grasses	caryopsis caryopsis fragments awn fragments				1 2 25			1				2									132	37.61%	47.37%
Total																								
<i>Hordeum vulgare L.</i>	Hulled Barley (symmetrical) (assymetrical) cf	caryopsis caryopsis caryopsis caryopsis fragments rachis	1		1		1				1		2	1							2	36	10.26%	63.16%
Total																								
Identifiable Cereal grain		caryopsis grain fragments	[3]	[1]	[3]	[3]	[1]		[1]	[1]	3	[3]	[1]	[2]	3	[2]	[1]			[1]		29	8.26%	73.68%
Total																								
Identifiable Cereal chaff		Culm nodes culms					1		2													11	3.13%	26.32%
Total																								
Indeterminate Poaceae	Grasses	caryopsis fragments	7		3	33	26		4	12	3		6		2							96	27.35%	5.26%
Total																								
Betulaceae <i>Corylus avellana</i>	Hazel-nut	fragments							2													2	0.57%	5.26%
Total																								
Chenopodiaceae <i>Chenopodium sp. L.</i> <i>Chenopodium album L.</i>	Fat hen	seed seed				1																1	0.28%	15.79%
<i>Atriplex sp. L.</i>	Orache	seed	1																			1	0.28%	
Total																								

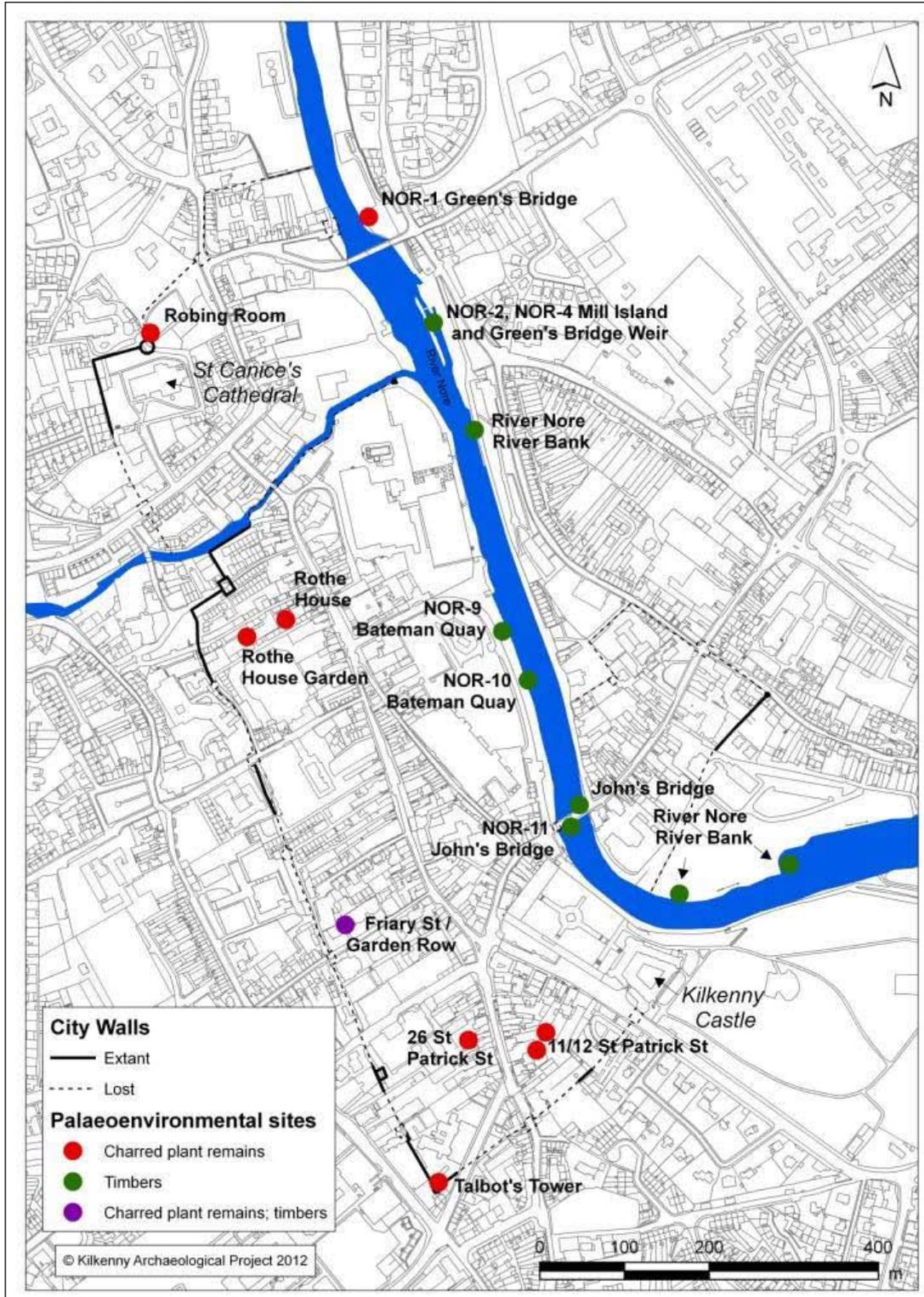


Figure 10. Excavations in Kilkenny City from which archaeobotanical and wood/charcoal remains have been analysed (after O'Driscóil *et al.* 2008)