Archaeological Excavation Report
E2447- Coololla, Co. Galway

Spade mill and Lime kiln
Draft Archaeological Excavation Report,
Coololla,
Co. Galway

Spade mill and Lime kiln

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Summary

This site was discovered during archaeological testing prior to construction of the new N6 Galway to Ballinasloe road. A post-medieval building was interpreted as a water-powered forge, probably used as a spade mill. The lime kiln at was also post-medieval, with evidence for limestone extraction and firing within the same area. There is no evidence to link the activity at both sites and it is not known whether they were in use at the same time, although in theory both the spade mill and the lime kiln could have been operated by the same people.

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<td>Site type</td>
<td>Post-medieval spade mill and lime kiln</td>
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Acknowledgements

The excavation director was John Tierney and the senior supervisor was Mick Drumm. Field crew included Marcella Loughman, Jason Goreham, Lesley Davidson, Rafal Wolanski, Anita Pinagli and Luke Ryalls. Illustrations are by Ben Blakeman, Lesley Davidson, Enda O'Mahony and Robin Turk. Report compilation was by Anluan Dunne. The project was commissioned by Galway County Council and was funded the National Roads Authority under the National Development Plan (2000-2006). The project archaeologist was Jerry O'Sullivan and the assistant project archaeologist was Martin Jones. Thanks to Dr Colin Rynne (UCC) for information about the site type.
1 Introduction

This report comprises the final excavation report for a spade mill and lime kiln excavated at Coololla, Ballinasloe, Co. Galway. The site was excavated as part of the new N6 Galway to Ballinasloe road scheme (Figure 1) and it was found during archaeological testing within the lands acquired for the new N6 Galway to Ballinasloe dual carriageway road scheme (O’Donoghue et al. 2006). The site included two areas of excavation: a post-medieval spade mill was excavated in Area 1 and a post-medieval lime kiln was excavated in Area 2.

2 Site Location, Topography and Soils

The site was found within the townland of Coololla, c. 0.75 km north-west of Aughrim village. It was situated in an area of gently undulating pastoral farmland with outcrops of limestone (Plate 1). The site was located on soils classified as grey brown podzolics, with associated brown earths, gleys and basin peat. These soils have a moderately wide use range and are good for cereal, fruit and vegetable cultivation (Gardiner & Radford 1980, 97).

The solid bedrock is Middle to Upper Carboniferous Limestones, with Calp Limestones predominating in the area of this site. The Quaternary deposits in the region are undulating glacial drift with some post-glacial peat and alluvial deposits. Trial pitting for the Environmental Impact Assessment report indicated that the subsoil in the area this site at Coololla was sandy till.

The mill or forge building was located alongside the Melehan river which flows through Aughrim village and originally drained the bog (now reclaimed) that once characterised much of the surrounding area. The bog is still visible in parts of the 2nd edition Ordnance Survey map (1887-1913). The river was narrow and winding, with no defined floodplain in the vicinity of the site.

The building was found at chainage 45970 and NGR 178569 228678. A lime kiln was located 160 m to the north-east, at chainage 45860 and NGR 178502 228526. There are no buildings visible in this area on the 1st or 2nd edition Ordnance Survey maps.
3 Background to the Development

The excavation was undertaken by Eachtra Archaeological Projects for Galway County Council and the National Roads Authority. This work forms part of wider archaeological excavation programme undertaken by Eachtra within approximately 15 km of the proposed N6 Galway to Ballinasloe dual carriageway scheme (Contract 4, Figures 1-3).

4 Archaeological and Historical Background

4.1 Late medieval east Galway

The local history of the area around Ballinasloe is well documented thanks in large part to the work of local historian Patrick Egan, whose detailed history of Ballinasloe parish was published in 1960. Much of the information presented below is based on his work.

The Normans built a castle in Ballinasloe in 1245, on the eastern bank of the river Suck. It became the centre of a Norman manor which, along with a manor at Aughrim, was granted to Sir Richard de Rupella in 1253. The castle standing at Ballinasloe today was built by the O’Kelly sept in the 14th century and probably replaced the earlier Norman castle. Irish law and custom prevailed in the area around Aughrim and Ballinasloe from the mid 14th century until the end of the 16th century, with members of the O’Kelly family the direct occupiers of the land in the area during this period. However, the reformation signalled tremendous change in the area. Land and property belonging to the monasteries and the church were confiscated and re-granted to Protestants and others who recognized the English monarch as head of the church. The upheavals of the time are evident in the records for occupancy of Ballinalsoe Castle towards the end of the 16th century. In 1572 the castle was held by the Earl of Clanricard, one of the Clanricard Burkes, who successfully transformed from Anglo-Norman lords to English style landlords (Mulloy 1996, 213). Soon after it was taken over by the crown and in 1579 it was made the residence of the English governor of Connacht Sir Anthony Brabazon (Egan 1960, 40, 69-70).

Not all land was transferred from the Gaelic lords: in 1578 Sean na Maighe O’Kelly accepted land granted to him at Clanmacowen under the surrender and regrant scheme (Egan 1960, 39). However, Feardorcha O’Kelly of Aughrim was less successful and in he was forced to
seek a lease from the Earl of Ormond for land his family had occupied for several hundred years (Egan 1960, 40). In general, by the middle of the 17th century, the Old Irish lordships like the O’Kellys, while still retaining some vestiges of their old privileges, were suffering declining fortunes (Mulloy 1996, 213).

4.2 Post-medieval east Galway

In October 1641 an insurrection broke out and heralded the beginning of a war that was to last eleven years. It was fought by a loose amalgamation of the old Irish lordships and what became known as the Old English. In Galway the Earl of Clanrickard, though Catholic and Royalist, refused to join forces with the confederation and had such an influence that the rebellion in Connacht in general lacked coherency. By 1653, however, the country was devastated by Cromwell’s army and the ensuing confiscations and transplantations resulted in a great change of landownership. The Act of Settlement (1662) and the Act of Explanation (1665), passed under the restoration monarchy, generally reconfirmed the adjustments made in landownership after the original Cromwellian settlements. The O’Kellys, who were the main landowners in the area prior to the settlements, were the big losers. They were later forced to sell much of the land they retained in the parishes of Kilcloony and Creagh (Egan 1960, 90-1).

While the misfortunes of the O’Kelly family were linked to the upheavals of the 17th century, there were winners as well as losers. In Ballinasloe and the surrounding countryside, the Trench family were winners. The post-medieval history of the area is inextricably linked with this family of French Huguenots who settled at Garbally in 1631 after arriving from Northumberland in England (Lodge 1838, 98). Frederick Trench purchased Garbally castle and lands, on the western outskirts of Ballinasloe, from a Colonel Carey Dillon. Perhaps the same Carey Dillon was appointed vice-admiral of Leinster in 1668 (Marsden 1908, 754). The office was not necessarily a naval one, some holders merely acted as rate collectors (Marsden 1908, 737) and therefore it is possible that the Colonel and the Vice-Admiral were the same person.

Trench ownership of Garbally castle was confirmed by patent from Charles II (Egan 1960, 107). The estate was added to by his son, also Frederick Trench, in 1678 and the acquired land amounted to the whole parish of Kilcloony and a large area in the parish of Clontuskert (Egan 1960, 133). The acquisition of this land would have been at the expense of the descendants of Sean na Maighe O’Kelly.
In 1691 Ballinasloe and Aughrim took centre stage during a battle for the crown of England. The battle of Aughrim was fought between Jacobite and Williamite forces on 30th June 1691 and it was the bloodiest battle ever fought on Irish soil with up to 7000 soldiers killed. It was bloody and it was decisive: after the battle the city of Galway surrendered without a fight and the Jacobite’s main army in Limerick surrendered shortly afterwards.

As Protestants and Hugenots the Trenches supported the Williamites during the Battle of Aughrim. Family memoirs record that a map of the Jacobite position at Aughrim was given to the Williamite General Ginkel and that the house at Garbally was thrown open to King William’s army and was used as a field hospital (Clancarty 1874). The Rev John Trench, a brother of Frederick, was active on the Williamite side and it is said that he contributed the heel of his boot in the effort to raise the gun which was to kill the Jacobite General St Ruth (Egan 1960, 108).

The third Fredrick Trench succeeded his father in 1704 (Egan 1960, 133) and he became one of the most powerful men in Co. Galway. He acted as High Sheriff of the county from 1703 and became one of the knights of the shire, and therefore the acting member of Parliament for the area. He also added to his estate: in theory the Act of Settlement after the Cromwellian confiscations set aside the barony of Clonmacowen for transplanters from Carlow, Waterford and Limerick. In reality one major grant was made to William Spenser whose son Nathaniel sold his interest to the third Frederick Trench in 1716 (Egan 1960, 94).

The third Fredrick Trench was succeeded by his son, Richard Trench, in 1752. Richard had already sat in Parliament for the borough of Banagher. Through Richard’s marriage to Francis Power the Trench family acquired all the Power estates in the baronies of Leitrim, Dunkellin and Loughrea as well as the Keating estates in Kilkenny, Carlow and Dublin. This brought them ancient titles to Norman and Irish nobility (Egan 1960, 133-4). Richard Trench was succeeded by his son William Le Poer Trench in 1770 who, after his son (another Richard Trench) voted for the Union in 1800, became a Viscount in 1801 and the Earl of Clancarty in 1803 (Egan 1953). His numerous offspring included Richard, the 2nd Earl of Clancarthy, who pursued a diplomatic career (Kelly 1996, 258), Power, who became the last Church of Ireland Archbishop of Tuam, William, Rear Admiral of the Royal Navy and the Venerable Charles le Poer Trench, who was Archdeacon of Ardagh.
In the early part of the 19th century the Trench Family commissioned the English architect, Thomas Cundy I, to rebuild Garbally House, the family seat, after an older house on the site was burned down in 1798. Cundy first exhibited at the Royal Academy in 1795 and became a successful country house architect from c. 1807 (Placzek 1982, 482). In conjunction with the rebuilding of Garbally the cartographic evidence suggests that the Trench family also built Mackney House at the end of the 18th century (Kelly 2004). Mackney House and grounds also underwent a period of extensive development during the early 17th century. Lewis in his *Topographical Dictionary* of 1837 references the estate of Mackney as one of the principal houses in Ballinasloe and it is listed as the residence of Charles le Poer Trench who was brother to Richard, Earl of Clancarty, and acted as his agent.

The responsibilities of estate ownership involved fostering agricultural and industrial modernisation, hoping to improve conditions for the people who lived and worked on the estate as well as increase revenues from the estate. Ballinasloe was developed largely under the auspices of the Trench family. For example, sometime around 1750 Frederick Trench was advertising and giving active encouragement for the development of a linen or woollen industry. Plots were offered along with accommodation and additional farming land (Egan 1960, 134-5). The Trench family also encouraged the Ballinasloe fair as a profitable business. This annual October livestock fair, which is reputedly the largest such fair in Europe and had a national reputation even in the 19th century, created a large amount of prosperity in the town (Egan 1960, 136).

The story of the Trench family in Ballinasloe is typical of how Ascendancy estate management fostered a general element of agricultural and rural industrial improvements. This can be seen more locally in the smaller estates in the hinterland of the town. The edge of Coololla townland, including the area that the spade mill was built on, appear to have formed part of the Demesne of Fairfield House, based on Larkin’s ‘A Map of the County of Galway’ dated 1819 (Figure 4). At the end of the 18th century the estate at Fairfield belonged to Samuel Handy. Handy resided at another estate, Brackagh and Coolalough, in Co. Westmeath and it is likely that the Fairfield estate was leased out. Marriage settlements dated 10 June, 1772 for the marriage of Samuel Wesley Handy (the eldest son of Samuel Handy Senior) and Catherine Fleming specify that half of the lands of Coololla (or Coololah) were settled on Samuel Wesley Handy. The documents list the total Handy interest in the area as follows:

….town and lands of Aghrim, Co. Galway, and the Mill and Miller's gardens of said town containing 1,400 acres, and also the tolls
and customs of the markets and fairs of said towns and lands of Aughrim by virtue of a lease of lives renewable for ever….

(Quoted in Fitzgerald Reynolds 1942, 161)

The other main landholder in Coololla (according to Griffith’s The Primary Valuation of Ireland) was George Crowe. A post-medieval house demolished as part of the N6 Galway to Ballinasloe road scheme was reputedly the property of the Crowe family prior to emigration to America (Jones 2004). The Fleming, Handy and Crowe families all appear to be related by bonds of marriage. For example, Samuel Handy, whose son married a Fleming, was designated a guardian of the children of Elizabeth Crowe and William Fleming (Fitzgerald Reynolds 1941, 2002). This suggests that land and property in the entire townland of Coololla was in the hands of one large, extended family.

In 1837, the estate at Fairfield was listed by Lewis as one of the gentlemen’s seats in the vicinity of Aughrim, with a T. Wade, Esq. named as the resident. A Thomas Wade is listed in Griffith’s The Primary Valuation of Ireland as the occupier of ‘House, offices, herd’s, steward’s hos. and land’ which he leased from the Trustees of the estate of Samuel W. Handy. The annual valuation of rateable property for this holding was £425. Wade also occupied other property within the parish of Aughrim (at Doocreggaun, Ballhoolahan and Ballynahown townlands). These were all land that was leased from Lord Clonbrock. The combined annual valuation of these holdings came to £42 and 2 s. The fact that Wade rented land beyond his demesne is perhaps indicative of someone keen to expand revenues from his estate. It seems possible, therefore, that the speculative venture of setting up a spade mill at Coololla could have been carried out with Wade’s encouragement.

5 Results of Excavation

The site was divided into two areas of excavation, with Area 1 being the area of the spade mill and Area 2 the area of the lime kiln (Figure 5). Full descriptive details are provided in the stratigraphic index for the forge (Appendix 1) and the lime kiln (Appendix 2) and in the stratigraphic matrix for the lime kiln (Appendix 3).

5.1 Area 1: the spade mill
The archaeology in this area comprised the reduced wall footings of a rectangular stone structure with an associated millrace and tailrace, found within an area of excavation that measured c. 400 sq m (Figure 6).

5.1.1 The building

The main building (C.23) was rectangular in plan with external measurements of 7.8 m in length by 7 m in width (Plates 2 and 3). The stone walls were 0.7 m wide, and the internal dimensions of the structure were 6.4 m by 5.6 m, producing a total floor area of 35.84 sq m. It was constructed on a series of foundation layers (C.14, C.15 and C.16), mostly made of sub-angular limestone rubble. These probably aided drainage in the building.

Roughly hewn stones were used in the construction of the building. These ranged from 0.1 m to 0.25 m in length. The northern, eastern and western walls were random coursed (Plate 4) but there were square, faced stones at the southern wall where an internal millrace (C.31) ran adjacent and parallel to the wall of the spade mill (Plate 5). The bonding material used in the building was a lime mortar heavily tempered with gravel, which made up c. 30% of the mortar. The building survived at its highest in the eastern wall, near the millrace, where four courses of stone were visible to a height of 0.5 m (Plate 6).

5.1.2 The millrace

Water from the Melehan river fed the millrace (C.25) at the southern part of the site, diverting water from the stream to the spade mill. It was 0.42 m wide and 0.2 m deep. For c. 25 m the millrace ran from south-west to north-east and entered the forge building near the southern end of the eastern wall (Plate 7). It was lined on each side with irregularly cut limestone blocks averaging 0.2-0.3 m in length and only one course high. The millrace continued within the building. The internal millrace (C.31) measured 6.7 m in length and was 0.9 m wide at the top and 0.7 m at the base. It was 0.9 m deep. At the eastern end of the millrace there were two opposing limestone supports for sluice gates, with regular grooves cut into the stone to allow the gate to be raised and lowered (Plate 8). These measured 0.9 m high and were made from dressed limestone. A possible idling channel (C.22) was found running along the centre of the millrace. This was 3.5 m long, 0.36 m wide and 0.2 m deep. It comprised a single line of stones, irregularly shaped limestone blocks and red bricks (averaging 0.25 m long). The stones appear to block the channel so that water could not flow back out from the mill when the water level was low and this feature may have been used to slow or hold the flow of water.
in the millrace. The tailrace (C.13) exited the building in the eastern wall, it was 2.6 m long and aligned north to south. The width ranged from 0.1 m to 0.6 m and it was 0.7 m deep. The entrance to the tailrace was stone-lined and also had a capstone (0.6 m wide).

5.1.3 Other internal features

The interior of the building was covered by a grey, sandy floor surface (C.12), apart from a rectangular area between the wall at the eastern corner and a possible foundation for a work surface (C.27, see below). This floor surface was found 0.2 m below the top of the wall foundations and it was covered by the rubble deposits C.4 and C.6 which probably derived from backfill once the building was no longer in use.

A linear stone structure (C.26) ran at a 45º angle to the internal millrace (C.31). It measured 3.2 m in length, 0.3 m in width, 0.17 m in height and it was aligned east to west (Plate 9). It was composed of limestone and red brick, set in two courses at the eastern end and sloping gradually to the west where there was only one course. The upper course throughout consisted of large, flat, limestone blocks or slabs. These averaged 0.3 in length by 0.2 m in width and 0.07 m in depth. Gaps between the stones were filled by red bricks. The lower course at the eastern end consisted of smaller rectangular limestone cut blocks (0.1-0.15 m long) and complete red bricks. The bonding material was a lime mortar, similar to that used throughout the main structure (C.23). The purpose of this feature is unknown.

A possible foundation for a work surface (C.27) was found at the north-eastern corner of the building. This comprised a single course of stones set in a right angle to form a rectangle when combined with the wall in the corner to the building. All of the stones were limestone apart from a single red brick at the western end. One of the stones was cut but most were rough cobbles that measured between 0.12 m to 0.28 m in length. The floor deposit (C.12) was not found between the wall and the stone foundations (C.27), and the area may have been the base of a raised platform or surface where work in the spade mill was carried out.

A hearth (C.28) was found 0.7 m from the eastern wall (Plate 10). It was 1.05 m long and 2.2 m wide and composed of irregular limestone angular stones, averaging 0.14 m in length. There were red bricks at the back of the hearth. The large chunks flaking off these bricks were possibly the result of repeated episodes of firing and cooling at the hearth. The building material in the hearth was bonded by mortar, which again was heavily tempered with gravel. The
walls were between 0.58 m and 0.69 m thick, with an internal niche that was 0.33 m wide. The floor in this area (C.29) was baked, oxidised clay that was compacted hard, with frequent charcoal chunks. The opening to the hearth was filled by limestone cobbles (C.30).

5.2 Area 2: the lime kiln

A lime kiln was found c. 80 m to the north-east of the spade mill. The lime kiln was a shallow bowl-shaped kiln with a short flue. The area around the lime kiln also included two limestone extraction pits. These features were found within an area of excavation that measured 400 sq m (Figure 7).

5.2.1 The lime kiln

This ‘keyhole’-shaped kiln consisted of a bowl and a flue (C.5) cut into the subsoil (C.2) and directly below the topsoil (C.1). The entire kiln measured 7.5 m long, 5.5 m wide and 1.0 m deep. The bowl was 0.8 m in diameter and the flue, which extended from the bowl towards the east, was 0.7 m long and 0.8 m long. The kiln was stone-lined (Plate 11), with just one course of stones evident during excavation. There were seven deposits within the kiln (C.10, C.12, C.13, C.14, C.15, C.16 and C.17). These were predominantly oxidised clay fills with mortar-like inclusions (Plate 12). One fill (C.15) was lime-rich and similar to mortar. This may represent the product of firings in the kiln, i.e. reduced lime.

5.2.2 Limestone extraction pits

Consignments of stone (such as limestone, marble or chalk) were the main charge used in lime kilns and at the Coollola kiln it is likely that the raw material used was limestone, the local bedrock. Some of this may have been sourced at two limestone extraction pits (C.19 and C.23) that were found in close proximity to the kiln (Plates 13 and 14). These were oval and measured 2.5 m and 1.5 m wide by 0.6 m deep. The pits were sectioned but were not fully excavated. Pit C.19 was found 0.2 m to the north-east of the kiln and pit C.23 was located 1 m to the east of the kiln. The fills of both pits contained topsoil-like material and small limestone pieces.

6 Artefacts

There were no artefacts from this site.
7 Discussion

During excavation the building at Area 1 in Coololla was interpreted as a mill. However, discussion with Dr Colin Rynne, of the Archaeology Department at University College Cork, raised the possibility that the structure is the remains of a water-powered forge rather than a mill. The presence of a hearth reinforces this interpretation, as other mill types did not usually require fire during their operation. These forges were often called 'spade mills' because they were used for making spades, the main implements of cultivation in areas with very small landholdings, particularly in the West and the North. The spade and the associated technique of creating cultivation ridges were vital in permitting the spread of settlement into marginal areas during the post-medieval period in Ireland (Gailey 1982, v).

Most spade mills were small, with usual dimensions ranging from 6.1 m to 9.15 m in length and from 4.57 m to 7.62 m in width. The smallest known spade mill came from Lackagh, Co. Tyrone and measured just 5.18 m by 4.57 m (Gailey 1982, 28). The Coololla building, measuring 7.8 m in length and 7 m in width, fits into the general size range of known spade mills.

Spade mills often simply consisted of a water-powered tilt hammer and a forge and some were still in operation in the early 20th century (Rynne 2006, 268 – 70). The operation of the spade mill is described by Gailey (1982, 10) as follows:

The hydraulic tilt hammer consisted of a pivoted beam, carrying on one end an iron hammer head...Activation of the hammer was by the cams of a cam-wheel hitting against a metal plate fixed in the end of a hammer beam opposite the head. Each cam in turn came into contact with the plate which...was depressed downwards and...its own weight brought the head down to strike on an anvil fixed in the ground below.

The smaller spade mills consisted of the mill building alone, with the tools being finished off in separate forges at sites removed from the mill (Gailey 1982, 31). As only one building was found at Coololla this is probably what happened at this site. The river near the site is very small today, running alongside a field boundary (see Plate 1). It is unlikely that there is enough water there now to run a mill. This suggests that drainage patterns in the vicinity of Aughrim have been significantly modified in modern times. Drainage channels cut through the marshy ground to the east and north of the village are a likely cause of the reduced water volume at the site today.

Most spade mills were 19th century establishments, although there is evidence that their
construction began in some parts in the 1750s (Gailey 1982, 11). The majority of small spade mills originated in the period around 1815 and the economic depression in the wake of the Napoleonic wars meant that several small mills were apparently already out of business by the 1830s (Gailey 1982, 14). This could explain why the building at Coololla is not marked on the 1st or 2nd edition Ordnance Survey maps, and it is not listed in Lewis’ *Topographical Dictionary of Ireland* (1837), it was a failed venture that was not in operation very long.

On the other hand, a forge at Coololla is mentioned in *The Primary Valuation of Ireland* (a survey by Samuel Griffith carried out between 1848 and 1864), perhaps referring to the spade mill, which was a water-powered forge. A John Curley lived in Coololla and leased a house, offices, a forge and four acres of land (Appendix 4). John Curley settled in Aughrim in the 1850s and set up a blacksmith’s forge in the village. A John Curley was also listed in *Slater’s Directory* (1894) as the blacksmith in Aughrim village (Scannell and Cooke 2005, 4). The forge was in operation until the 1960s, run by three successive generations of the family (MacLochlainn 1980, 29-30).

There is also a possibility that a corn mill occupied by Robert Stanford and listed in Griffith’s *Valuation* is the building that was excavated at Coololla. Spade mills were occasionally set up in buildings that had previously been used as ‘corn, flax, textile, log wood and paper mills’ (Gailey 1982, 30). However, this is unlikely as it suggests that the building was not yet converted into a forge/spade mill by the time Griffith’s surveys were carried out.

There are no artefacts from the excavation to indicate most closely its period of use. There is evidence to suggest that several spade mills were set up as speculative business ventures and that there was not enough business in the locality to support them in the long term. As a consequence the life-span of many small spade mills was short, with some perhaps surviving no more than a decade (Gailey 1982, 14; McCutcheon 1980, 260). This may explain why records for the Coololla spade mill are difficult to trace. As the building survived only as sub-surface remains it is likely that the stone from the spade mill was reused in other buildings and field walls once operations at the mill ceased.

The lime kiln at Coololla Area 2 was a small, earth-cut, bowl kiln. Lime kilns were fired at high temperatures to produce calcined lime or quicklime (CaCO$_3$ + heat $\rightarrow$ CaO + CO$_2$). The process was only permanent if temperatures exceeded 900ºC, and once the fire in the kiln was lit it required several days of burning before the limestone was calcined. Quicklime is an
alkaline crystalline solid. It is caustic but it has several uses: in building work as a bonding agent (an ingredient in mortar), in render, in whitewash, and as fertiliser. Rynne (1999, 29) notes that most small lime kilns were probably used only intermittently for the production of small quantities of lime for agricultural purposes. As the Coololla kiln was small (the bowl was just 0.8 m in diameter), it is likely that it was used for the production of agricultural lime. This suggestion is reinforced by the absence of slaking pits in the vicinity of the kiln (lime for building works was generally mixed with water to form hydrated or slaked lime).

Agricultural lime was used in Ireland from the mid 17th century (Ó Drisceoil 2005, 204) and by the late eighteenth century Arthur Young commented on the frequency with which lime was used as manure or fertiliser for improving land (e.g. Young 1780, 124-5). Lime kilns continued in use into the 20th century.

The two areas of excavation at Coololla are therefore linked by the theme of small-scale agricultural activity in post-medieval times. The spade mill was used to manufacture tools for cultivation and the lime kiln was used to enhance the products of cultivation. It is even possible that the same people worked at both the spade mill and the lime kiln, as both could be operated on an *ad hoc* basis. For example, many mills were only run seasonally, when water levels were high (Gailey 1982, 31), leaving labourers available to work the forge in the winter and the fields in the summer.
8 Bibliography

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Egan, P.K. 1960 *The Parish of Ballinasloe. Its history from the earliest times to the present day*. Dublin, Clonmore and Reynolds.


Griffith, R. *The Primary Valuation of Ireland*. (Survey carried out between 1848 and 1864.)


Young, A. 1780. *A Tour in Ireland*. Dublin.

**Websites**

[www.ballinasloe.org](http://www.ballinasloe.org)

[www.buildingsofireland.ie](http://www.buildingsofireland.ie)
9 Figures

Figure 1: Discovery series OS map showing the route of the new N6 Galway to Ballinasloe road (Contract 4) and the location of all excavation sites.
Figure 2: The route of the new N6 Galway to Ballinasloe road (Contract 4) overlaid on the 1st edition OS map (Sheet 87)
Figure 4: Extract from 1819 map of County Galway by W. Larkin.
Figure 5: Areas of excavation Coololla, Co. Galway (E2447)
Figure 6: Stone foundations of the spade mill at Area 1, Coololla, Co. Galway (E2447)
Figure 7: Post-excavation plan of the lime kiln at Area 2, Coololla, Co. Galway (E2447)
10 Plates

Plate 1: View of the surrounding landscape taken during excavation - facing north-west.

Plate 2: General pre-excavation view - facing north
Plate 3: Post-excavation view of building C.23 - facing south-west.

Plate 4: Random coursed stone used in construction of main building.
Plate 5: Faced stones in southern wall near the mill race, with sluice supports visible.

Plate 6: Post-exavcation view of building C.23 - facing south.
Plate 7: Post-excavation view of building C.23 - facing north-west.

Plate 8: View of millrace, with detail of ‘idling channel’ and sluice at south-east - facing south-east.
Plate 9: Millrace, sluice supports and linear stone structure C.26 - facing south-east.

Plate 10: Detail of hearth C.28.
Plate 11: General view of N end of lime kiln - facing north-west.

Plate 12: Mid-excavation of lime kiln - facing north.
Plate 13: Limestone extraction pits C.19 and C.23 - facing east.

Plate 14: Post-excision shot of the kiln and the adjacent limestone extraction pits - facing north.
11 Appendices

Appendix 1: Stratigraphic Index Coololla Mill
Appendix 2: Stratigraphic Index Coololla Kiln
Appendix 3: Stratigraphic Matrix Coololla Kiln
Appendix 4: Griffith’s Valuation
## 11.1 Appendix 1: Stratigraphic Index Coololla Mill

<table>
<thead>
<tr>
<th>Context No.</th>
<th>Area/GS</th>
<th>Drawing No.</th>
<th>Type</th>
<th>Dimensions (metres)</th>
<th>Description</th>
<th>Finds</th>
<th>Environmental material</th>
<th>No samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Site</td>
<td>-</td>
<td>Topsoil</td>
<td>Site</td>
<td>Dark brown, soft silty loam. Occasional subangular and rounded limestone pebble inclusions. Overlies (003A).</td>
<td>Frequent post-medieval,</td>
<td>No</td>
<td>No samples</td>
</tr>
<tr>
<td>2</td>
<td>Site</td>
<td>-</td>
<td>Glacial till</td>
<td>Site</td>
<td>********</td>
<td>No finds</td>
<td>No</td>
<td>No samples</td>
</tr>
<tr>
<td>3A</td>
<td>Site</td>
<td>-</td>
<td>Alluvium</td>
<td>Site</td>
<td>Mid brown, firm, clayey silt. Occasional sub-rounded limestone small – medium pebbles. (003A) overlies all features. (003B) underlies all features.</td>
<td>No finds</td>
<td>No</td>
<td>No samples</td>
</tr>
<tr>
<td>3B</td>
<td>Site</td>
<td>-</td>
<td>Alluvium</td>
<td>Site</td>
<td>********</td>
<td>No finds</td>
<td>No</td>
<td>No samples</td>
</tr>
<tr>
<td>4</td>
<td>All quads</td>
<td>7, 11</td>
<td>Backfill deposit</td>
<td>1.60 x 5.50 x 0.60</td>
<td>Light brown with grey motting, stiff, sandy silt. Occasional angular medium pebbles and moderate large angular, sub-angular, sub-rounded stone inclusions. Overlies (012), underlies (005).</td>
<td>No finds</td>
<td>BS3</td>
<td>BS3</td>
</tr>
<tr>
<td>5</td>
<td>N quads</td>
<td>7,11</td>
<td>Backfill deposit</td>
<td>1.20 x 5.50 x 0.40</td>
<td>Mid brown, soft, sandy silt. Moderate red brick inclusions. Overlies (004), underlies (006).</td>
<td>No finds</td>
<td>No</td>
<td>No samples</td>
</tr>
<tr>
<td>6</td>
<td>N quads</td>
<td>7,11</td>
<td>Backfill deposit</td>
<td>5.0 x 1.70 x 0.40</td>
<td>Dark brown silt. 80% angular, sub-angular and sub-rounded stones of which 70% limestone, 8% redbrick, 2% slate. Overlies (005), underlies (003A). Mid orangish brown, very soft sandy, clayey, silt. Frequent angular and sub-angular coarse gravel inclusions. Overlies (012), underlies (003A).</td>
<td>No finds</td>
<td>BS1</td>
<td>BS5</td>
</tr>
<tr>
<td>7</td>
<td>NE quad</td>
<td>7</td>
<td>Oxidised clay/silt</td>
<td>0.86 x 0.58 x 0.11</td>
<td>Dark brown silt. 80% angular, sub-angular and sub-rounded stones of which 70% limestone, 8% redbrick, 2% slate. Overlies (005), underlies (003A). Mid orangish brown, very soft sandy, clayey, silt. Frequent angular and sub-angular coarse gravel inclusions. Overlies (012), underlies (003A).</td>
<td>No finds</td>
<td>BS7</td>
<td>BS8</td>
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</table>

Permalink: http://eachtra.ie/index.php/journal/e2447-coololla-co-galway/
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<th>Context No.</th>
<th>Area/GS</th>
<th>Drawing No.</th>
<th>Type</th>
<th>Dimensions (metres)</th>
<th>Description</th>
<th>Finds</th>
<th>Environmental material</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>SE quad</td>
<td></td>
<td>Rubble/collapse deposit</td>
<td>1.20 x 0.28 x 0.20</td>
<td>Large limestone blocks (0.17 average size) concentrated adjacent to sluice gates, internal to mill race 031. Overlies (022), underlies (004).</td>
<td>No finds</td>
<td>No samples</td>
</tr>
<tr>
<td>12</td>
<td>All quads</td>
<td>11</td>
<td>Original/1st phase floor surface</td>
<td>5.50 x 5.90 x 0.12</td>
<td>Light grey, firm, silty, medium-coarse sand. Frequent angular, sub-angular and sub-rounded coarse pebbles, various lithologies. Overlies (014), underlies (003A), (005).</td>
<td>No finds</td>
<td>No samples</td>
</tr>
<tr>
<td>13</td>
<td>SE of site</td>
<td>15, 18</td>
<td>Tailrace</td>
<td>2.60 x 0.60 x 0.10</td>
<td>Linear shape in plan. Narrow channel lined with large angular, subangular and sub-rounded limestone cobbles. Capped with larger angular limestones, average 0.60m. Overlies (003B), underlies (003A)</td>
<td>No finds</td>
<td>No samples</td>
</tr>
<tr>
<td>14</td>
<td>SW quad</td>
<td></td>
<td>Hardcore/foundation deposit</td>
<td>0.70 x 0.58 (visible in slot) x 0.27</td>
<td>Mid brown, firm sandy silt. 80% large subangular limestone blocks/hardcore laid in roughly 2 courses. No mortar. Overlies (015), underlies (012).</td>
<td>No finds</td>
<td>No samples</td>
</tr>
<tr>
<td>15</td>
<td>SW quad</td>
<td></td>
<td>Hardcore/foundation deposit</td>
<td>0.70 x 0.58 (visible in slot) x 0.27</td>
<td>Large subangular limestone blocks. Irregularly set. Overlies (002), underlies (014)</td>
<td>No finds</td>
<td>No samples</td>
</tr>
<tr>
<td>16</td>
<td>NE quad</td>
<td></td>
<td>Foundation deposit</td>
<td>0.32 depth</td>
<td>Mid brown, firm silty clay. Moderate angular, sub-angular and sub-rounded medium pebble inclusions. Overlies (002), underlies (027)</td>
<td>No finds</td>
<td>No samples</td>
</tr>
<tr>
<td>17</td>
<td>S quads</td>
<td>11, 12</td>
<td>Fill of “idling” channel, [022]</td>
<td>3.30 x 0.18 x 0.12</td>
<td>Very light brown, firm, sandy silty, clay. Frequent angular and sub-angular coarse pebble inclusions. Overlies (022), underlies (018).</td>
<td>No finds</td>
<td>No samples</td>
</tr>
<tr>
<td>18</td>
<td>S quads</td>
<td>11, 12</td>
<td>Fill of “idling” channel, [022]</td>
<td>4.60 x 0.34 x 0.30</td>
<td>Mid brown, silty sandy, clay. 20% coarse angular gravels. Overlies (017), underlies (004).</td>
<td>No finds</td>
<td>No samples</td>
</tr>
<tr>
<td>20</td>
<td>SE quad</td>
<td></td>
<td>Collapsed/dumped rubble deposit</td>
<td></td>
<td><strong>Cancelled</strong> - this deposit the same as (006)</td>
<td>No finds</td>
<td>No samples</td>
</tr>
<tr>
<td>21</td>
<td>SE quad</td>
<td></td>
<td>Oxidised fill of hearth, [028]</td>
<td>0.45 x 0.30 x 0.05</td>
<td>Mid yellow sandy silt. 20% small charcoal flecks. Overlies (029), underlies (006).</td>
<td>No finds</td>
<td>SS2</td>
</tr>
<tr>
<td>Context No.</td>
<td>Area/ GS Drawing No.</td>
<td>Type</td>
<td>Dimensions (metres)</td>
<td>Description</td>
<td>Finds</td>
<td>Environmental material</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>----------------------</td>
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<td>---------------------</td>
<td>-------------</td>
<td>-------</td>
<td>------------------------</td>
<td></td>
</tr>
<tr>
<td>22 S quads</td>
<td>“Idling” channel</td>
<td>3.50 x 0.36 x 0.20</td>
<td>Linear narrow, shallow channel with line of roughly set large limestones and redbrick at SW; internal wall of (023) at NE. U-shaped profile. Overlies (002), underlies (018)</td>
<td>No finds</td>
<td>No samples</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23 All quads</td>
<td>Mill structure</td>
<td>7.80 x 6.70</td>
<td>Square shape in plan. Walls are 0.70 wide. 80% random coursed limestone blocks, 20% lime mortar. Overlies (002), underlies (003A)</td>
<td>No finds</td>
<td>No samples</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24 SE quad</td>
<td>Layer of stones</td>
<td>1.20 x 0.64 x 0.15</td>
<td>Single course of angular and sub-angular limestone cobbles; 0.12-0.15 average. Overlies (004), underlies (003A)</td>
<td>No finds</td>
<td>No samples</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25 SW quad</td>
<td>Mill race entrance</td>
<td>25 x 0.42 x 0.25</td>
<td>Linear shape in plan. A narrow channel lined on either side by irregular limestone blocks, 0.30 average. 1 course only. Overlies (003B), underlies (003A)</td>
<td>No finds</td>
<td>No samples</td>
<td></td>
<td></td>
</tr>
<tr>
<td>26 S quads</td>
<td>Diagonal wall</td>
<td>3.20 x 0.30 x 0.17</td>
<td>Linear shape in plan. 1-2 courses limestone flat slabs and redbrick (85/5). Bonded with lime mortar. Overlies (012), underlies (004).</td>
<td>No finds</td>
<td>No samples</td>
<td></td>
<td></td>
</tr>
<tr>
<td>27 NE quad</td>
<td>Possible work surface footing</td>
<td>2.0 x 0.72 x 0.35</td>
<td>Right angle of limestone and redbrick abutting wall of 023 at N, and E. Bonded with lime mortar. Overlies (016).</td>
<td>No finds</td>
<td>No samples</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28 SE quad</td>
<td>Hearth</td>
<td>2.20 x 1.65 x 0.40</td>
<td>Funnel shaped, random coursed limestone and redbrick structure. Bonded with lime mortar. Interior of structure lined with lime mortar. Filled by (006), (021), (029).</td>
<td>No finds</td>
<td>BS10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29 SE quad</td>
<td>Oxidised clay “floor” of hearth, 028</td>
<td>0.97 x 0.30 x 0.05</td>
<td>Reddish, yellow, hard clayey silt. Frequent small flecks of charcoal inclusions. Overlies (012), underlies (021)</td>
<td>No finds</td>
<td>No samples</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 SE quad</td>
<td>Cobbled surface in hearth area</td>
<td>0.77 x 0.90 x depth unknown</td>
<td>Mid greyish brown, compact, fine-medium sand. 60% sub-rounded and flat limestone cobbles, 0.10-0.14 average size. Overlies (012), undelays (029).</td>
<td>No finds</td>
<td>No samples</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Context No.</td>
<td>Area/ GS</td>
<td>Drawing No.</td>
<td>Type</td>
<td>Dimensions (metres)</td>
<td>Description</td>
<td>Finds</td>
<td>Environmental material</td>
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<td>-------------</td>
<td>-------</td>
<td>------------------------</td>
</tr>
<tr>
<td>31</td>
<td>S. quads</td>
<td>Millrace internal to the building</td>
<td>6.70 x 0.90 x 0.90</td>
<td>Linear mill race. 5 courses of square faced limestone, random courses. 30% lime mortar. 2 cut limestone sluice gates at E end. Overlies (003B), underlies (003A).</td>
<td>No finds</td>
<td>No samples</td>
<td></td>
</tr>
</tbody>
</table>

SS = Soil sample  
BS = Brick sample  
[ ] = Cut  
( ) = Fill
### Appendix 2: Stratigraphic Index Coololla Kiln

<table>
<thead>
<tr>
<th>C. No.</th>
<th>Type</th>
<th>Dimensions (metres)</th>
<th>Description</th>
<th>Environmental material</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Topsoil</td>
<td></td>
<td>Dark brown, firm, silt loam. Occasional rounded and subangular medium limestone pebbles and small stones.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Subsoil</td>
<td></td>
<td>Sorched area within the lime kiln</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Hearth</td>
<td></td>
<td>Mid yellow brown, loose silt. Frequent large angular to rounded stones (0.10 x 0.10 x 0.05 m). Frequent small to medium angular stones. 10% small angular pebbles. Moderate fragments of burnt clay, well sorted. Occasional white stoney mortar/sand, well sorted in upper level.</td>
<td>SS1</td>
</tr>
<tr>
<td>4</td>
<td>Kiln fill</td>
<td></td>
<td>‘Keyhole’-shaped cut with gradual break of slope top, gradually sloping sides at the west, steeply sloping sides at the east. Imperceptible break of slope base. Base is concave in profile. Filled with C.12, C.13, C.14, C.15, C.16 and C.17, cut into subsoil C.2.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Cut of kiln</td>
<td>7.5 x 5.5 x 1.0</td>
<td>Mid grey, friable silt. Occasional small subangular limestone inclusions, concentrated at top of deposit. Overlays C.12, underlays C.11.</td>
<td>SS2</td>
</tr>
<tr>
<td>10</td>
<td>Kiln fill</td>
<td>1.70 (length) x 0.10 (depth)</td>
<td>Light brownish grey, loose, sandy clay. Occasional angular and subangular small stone inclusions. Overlays C.10, underlays C.1.</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Redeposited glacial till</td>
<td>2.60 (length) x 0.04 (depth)</td>
<td>Light brownish grey, loose, cohesive clay. Occasional angular and subangular small stone inclusions.</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Fill of kiln C5</td>
<td>4.80 (length) x 0.20 (depth)</td>
<td>Mid-dark grey, loose. Angular and subrounded pebbles. Underlays C.10.</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Oxidised clay fill of kiln C5</td>
<td>0.70 (length) x 0.20 (depth)</td>
<td>Underlays C.16.</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Oxidised clay fill of kiln C5</td>
<td>0.40 (length) x 0.16 (depth)</td>
<td>Brown, compacted clay silt. Moderate red oxidised clay and mortar inclusions. Underlays C.1.</td>
<td>SS4</td>
</tr>
<tr>
<td>15</td>
<td>Mortar fill of kiln C5</td>
<td>0.50 (length) x 0.20 (depth)</td>
<td>Whitish, grey mortar and limestone mix. Underlays C.1.</td>
<td>SS5</td>
</tr>
<tr>
<td>16</td>
<td>Fill of kiln C5</td>
<td>0.42 (length) x 0.26 (depth)</td>
<td>Grey, moderately compacted sand. Moderate oxidised red clay and occasional mortar inclusions. Overlays C.13.</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Fill of kiln C5</td>
<td>0.76 (length) x 0.18 (depth)</td>
<td>Light yellowish brown, compacted silty clay. Frequent possible ash inclusions. Underlays C.1.</td>
<td>SS6</td>
</tr>
<tr>
<td>18</td>
<td>Kiln deposit</td>
<td></td>
<td>Interface between kiln fills and kiln cut, fired clay of kiln edges</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Cut of pit</td>
<td>2.83 x 1.8 x 0.65</td>
<td>Oval limestone extraction pit</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Kiln fill</td>
<td></td>
<td>Greyish brown with orange flecking, moderately compacted sandy; silty clay. Grey sand inclusions.</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Fill of pit C19</td>
<td></td>
<td>Small limestone pieces. Underlays C.22.</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Cut of pit</td>
<td>6.5 x unrecorded x 1.25</td>
<td>Oval shaped cut with gradual break of slope top at one side, sharp at the other, sides gradually sloping at one side, steeply sloping at the other. Break of slope base imperceptible at one side, rounded at the other. Base is concave in profile. Filled with C.24.</td>
<td></td>
</tr>
<tr>
<td>C. No.</td>
<td>Type</td>
<td>Dimensions (metres)</td>
<td>Description</td>
<td>Environmental material</td>
</tr>
<tr>
<td>-------</td>
<td>--------------------</td>
<td>---------------------</td>
<td>--------------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>24</td>
<td>Fill of pit C25</td>
<td>6.5 x unrecorded x 1.25</td>
<td>Deposit resembles topsoil (C.1)</td>
<td></td>
</tr>
</tbody>
</table>

SS = Soil sample  
C = Context
11.3 Appendix 3: Stratigraphic Matrix Collolla Kiln
### Appendix 4: Griffith's Valuation

#### Coololla, Co. Galway

<table>
<thead>
<tr>
<th>Name</th>
<th>Description of Tenement</th>
<th>Area</th>
<th>Land</th>
<th>Buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trustees of Samuel W. Handys, George Phelan, and Ann</td>
<td>House, forge and land</td>
<td>34 2 17</td>
<td>13 0 0</td>
<td>13 0 0</td>
</tr>
<tr>
<td>Patrick Hurley, Patrick Cunningham, Robert Standford</td>
<td>House and forge, and land</td>
<td>6 2 38</td>
<td>2 3 0</td>
<td>0 10 0</td>
</tr>
<tr>
<td>John O'Gara, Patrick Cunningham, Robert Standford</td>
<td>House, forge, and land</td>
<td>9 1 0</td>
<td>4 0 0</td>
<td>0 10 0</td>
</tr>
<tr>
<td>John O'Gara, Patrick Cunningham, Robert Standford</td>
<td>House, forge, and land</td>
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<td>House and land</td>
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<td>Water</td>
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