

Burrs, grizzles and chuffs, a story of brick manufacturing in Limerick

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Brick manufacturing in the Limerick area from the late-eighteenth to the early-twentieth centuries is discussed with reference to excavations carried out on two brick manufacturing sites in Coonagh West, Co. Limerick. Cartographic and primary sources are also used to explore the landscape and social context of this industry.

Brick and the buildings that were made from them changed the face of Irish urban areas during the Georgian period of the eighteenth and nineteenth centuries. These balanced, graceful but sometimes austere domestic terraces are often admired and remarked upon, but little has been written about the humble brick from which they were constructed and the brick makers who produced them. During this period bricks were manufactured in temporary kilns called clamps and the bricks produced were of varying quality depending on their position in the clamp during firing. The clamps were long stacks of bricks with channels between which were filled with fuel. There was no permanent structure but the rows of brick were covered in clay to form an outer skin. Burrs were over burnt bricks from near the channels; grizzles were the better grade brick from the outer edges of the clamp but were light in colour and lacked strength while the chuffs were under burnt with hair cracks and were unsuitable for any building.¹

Brick is first mentioned in the Irish records in the form of the taxation of bricks/lime in Kilkenny (1283), Drogheda (1296) and Youghal (1358), though it is not known whether these bricks were locally produced or imports.² The earliest archaeological evidence for brick use is at Carrickfergus Castle, Co. Antrim (1560s).³ It was also used in Bunratty castle, Co. Clare and there is a record of brick manufacturing in Wexford in 1551-2⁴ but it is not until the mid-eighteenth century and into the nineteenth century that its use became widespread. Brick was used in Limerick in the seventeenth century in tall, steep gabled houses known as Dutch houses. Only two examples of these facades survive and are at the rear of John's square.⁵ A century later, in the 1750s, locally produced brick was used in the terrace houses on John's Square built by Edmond Sexton Pery, Speaker of the House of the Irish House of Commons in a partnership with John Purdon.⁶ Brick was used for the kitchen and passage floors, the cellar vaults, the internal partitions, as dry lining on exterior walls and as 'infill for the stone oculi on the facades'.⁷ By 1729, brick

¹ B. H. Knight, *Builders' Materials* (London, 1939) p. 6.

² A. Thomas, *The Walled Towns of Ireland* (Blackrock, 1992) vol. 1, p. 109.

³ S. Pavia, and J. Bolton, *Stone, brick and mortar: historical use, decay and conservation of building materials in Ireland* (Bray, 2000) p. 177.

⁴ G. Lynch and S. Roundtree, *Bricks, a guide to the repair of historic brickwork* (Dublin, 2009) p. 6.

⁵ J. Hill, *The building of Limerick* (Cork, 1991) p. 64.

⁶ *Ibid.*, p. 72.

⁷ *Ibid.*, p. 73.

making had become widespread enough to warrant an Act of Parliament giving advice on brick production.⁸ The Act introduced the first standards for brick size in Ireland which were $9\frac{1}{2} \times 4\frac{1}{2} \times 2\frac{1}{4}$ inches but bricks in contemporary buildings do not conform to them. In 1816 the Corporation of Brick Layers and Plasterers recorded that in the previous year the magistrates had the choice of suspending the Act or putting a stop to all building in Dublin because no bricks of the statute size were being used⁹ and presumably being made. It is therefore not clear how well the act was enforced. The Coonagh West bricks excavated varied in dimensions but averaged between $8\frac{1}{4} - 9\frac{1}{4} \times 3\frac{1}{2} - 4\frac{1}{4} \times 2\frac{3}{4} - 3\frac{1}{4}$ so slightly smaller but deeper than the statute size.

In the nineteenth century brick gained precedence in house construction with the continued building boom of the Georgian period. This period saw the construction of Newtown Pery set out in a grid plan with wide streets, large houses and fine Georgian style terraces of brick. Brick was the favoured building material partially because of its resistance to fire. Building design was also to some extent a response to legislation such as the 1770 Building Act which stipulated that a party wall parapet should be eighteen inches above the roof line to control the spread of fire and the 1774 Building Act which classified terraces into four rates according to size, valuation and social class and specified dimensions and overall appearance.¹⁰ Many fine examples of this period still stand in Limerick such as the Pery Square Tontine terrace (completed 1838)¹¹ and O'Connell Street (originally called George's Street and named such in 1770).¹² Brick was manufactured locally sometimes adjacent to the cities and sometimes further away but usually in areas easily accessible by water transport, for instance brick was transported from Coonagh to Barrington's pier in Limerick.¹³ The decline in construction activity after the Georgian period and the Great Famine led to the demise of local brick production and later brick buildings constructed in the Victorian and Edwardian periods were of imported brick.¹⁴ Brick manufacturing, however, was still carried out in the very early twentieth century but on a much smaller scale at Coonagh West¹⁵ and at Singland to the southeast of the city.¹⁶ By the 1930s, however, local brick manufacturing was completely gone.¹⁷

The area of the Coonagh West brick fields

Two areas of brick manufacturing, tucked into a bend in the River Shannon north of Coonagh Point and the old embankment (of unknown date), were excavated by the author in 2005.¹⁸ They were part of a larger industrial landscape with other brick holes

⁸ The Act was written by Edward Lovett Pearce (1699-1733) Surveyor General of Ireland and architect. Lynch and Roundtree, *Bricks, a guide to the repair of historic brickwork*, p. 8.

⁹ Ibid., p. 16.

¹⁰ D. Lee, *The Georgian House and Garden, a Historic Limerick House* (Limerick, 2001) p. 11.

¹¹ J. McMahon, *The Pery Square Tontine* (Limerick, 1999).

¹² M. Lenihan, *Limerick; its history and antiquities, ecclesiastical, civil and military from the earliest ages* (Cork, reprint 1991) p. 370.

¹³ Hill, *The building of Limerick*, p. 119 and Anon, *Old Limerick* (Limerick, 1976) p. 6.

¹⁴ M. Browne, 'Buildings Materials Industry in Limerick' in D. Lee and D. Jacobs (eds), *Made in Limerick*, Vol. 1 (Limerick, 2003) pp 154-64:159.

¹⁵ At a site 1km to the east of E2080.

¹⁶ O.S. 2nd edition 1903, Co. Limerick sheets 0004 & 0005 6" to 1 mile.

¹⁷ 3rd edition O.S. map SMR, Co. Limerick, sheets 4 (1924) & 5 (1938), 6" to 1 mile, 3rd edition O.S. map SMR, Co. Clare, sheets 62 (1922) & 52 (1923), 6" to 1 mile.

¹⁸ Excavated by the author for TVAS Ireland Ltd during 2005 on the route of the Limerick Southern Ring Road Phase II, Coonagh West, Co. Limerick (NGR 152775 156610) and forms part of the Limerick Southern Ring Road, Phase II, Northern Archaeological Contract.

and manufacturing areas in the vicinity.¹⁹ It is hard to imagine, in this peaceful place, that a full scale industrial activity took place. At the time of excavation the area was very flat and though only 3km from the suburbs of Limerick it felt very removed from it. The area was protected from flooding by embankments and was an ideal location for brick making with the raw materials, clay and water readily available and water transportation within easy access. In fact it is the mighty River Shannon that supplied all these ingredients. The area was also close to the nearby urban centre of Limerick where much of the brick was used.

The changing landscape of the area can be traced in the maps of the eighteenth, nineteenth and early-twentieth centuries. Prior to the construction of the outer embankment the area to the south of the brick fields was marsh with the dry land stopping in an almost straight east-west line (Fig. 2). The land was protected from the Shannon by the old embankment. After the second embankment was built the land swooped around in a large curve and protruded into the River Shannon (Fig. 1). It is not clear in nineteenth-century accounts of their construction, which embankment is being referred to. Cartographic sources also give contradicting evidence, therefore the exact dates of their construction is vague. Spellissy comments that the new embankment must have been under construction prior to 1831 as Henry D. Inglis records that during his travels Mr Barrington and Lord Lansdowne were in the process of building an embankment below Limerick in order to reclaim land. As Mr Joseph Barrington received a baronetage in 1831 this work must have been witnessed by Inglis before this date.²⁰ However, the subtitle of Inglis's book states that his journey took place 'during the Spring, Summer and Autumn of 1834'.²¹ In his accompanying map he has marked 'embankments' in the area between the city and Coonagh though because of the scale of the map it is not clear whether the old or the new embankments were in place. Barrington's Pier was also remodelled in 1830 and had originally been built by Benjamin Barrington, Joseph's grandfather.²² The embankment east of this pier became known as Barrington's bank. Hannan refers to Barrington's construction of the embankment bearing his name and also to his strengthening and consolidation of the bank as far as Coonagh.²³ This implies that he enhanced the existing old embankment at Coonagh and did not construct a new one. Also an 1835 map depicting the area of Barrington's bank indicates that it had not been built by then but was proposed along with an esplanade.²⁴ Lewis states that there were plans in 1837 to build embankments on each side of the river to reclaim 'considerable tracts of waste land'.²⁵ He does not indicate where they were to be built. Finally Eugene O'Curry is said to have worked as an overseer on the construction of the embankment at Coonagh and this was likely to have been in the 1820s as he came to Limerick as a day-labourer after the school he ran closed in 1824. By 1827 he had become a warder in the lunatic asylum²⁶ and in 1834 he joined the staff of the Ordnance Survey.²⁷

¹⁹ On the first and second edition O.S. maps 'Brick Holes' and 'Brick Fields' were marked to the east and north. Another smaller brick clamp was also excavated to the north east in Coonagh East (E. Ruttle *Limerick Southern Ring Road Phase II, E2106, Coonagh East, Co. Limerick, Preliminary archaeological excavation report, unpublished TVAS Ireland report*, (2008).

²⁰ S. Spellissy, *The History of Limerick City* (Limerick, 1998), p. 302.

²¹ H. Ingles, *A Journey Throughout Ireland, during the Spring, Summer and Autumn of 1834*, (London, 1834).

²² Spellissy, *History of Limerick City*, p. 303.

²³ K. Hannan, *Limerick, historical reflections* (Dublin, 1996) p. 83.

²⁴ Limerick, from Parliamentary Representation in Ireland, Limerick City Museum. Inv. 1997.007.

²⁵ S. Lewis, *A topographical directory of Ireland*, (London, 1837) p. 270.

²⁶ L. Walsh, 'Eugene O'Curry in Limerick', in *Old Limerick Journal*, no. 33 (1996) pp 7-8:7.

²⁷ S. Ó Cadhla, *Civilizing Ireland: Ordnance survey 1824-1842: ethnography, cartography, translation* (Dublin, 2006).

Cartographic evidence can be divided into pre and post new embankment construction. The 1787 Grand Jury map of County Clare by Henry Pelham shows the area to the south of the brick fields as mud flats (Fig. 2).²⁸ In 1808 the Laurie & Whittle map also depicts a pre-second embankment landscape.²⁹ In the c.1832 map by Thomas Larcom the bend in the river is gentler and suggests that the second embankment had been constructed.³⁰ It is not until the O.S. (Ordnance Survey) Fair Copy of 1839 that the minute details of the landscape were depicted.³¹ In this the old embankment, to the immediate south and west of the excavated brick clamps, was marked. Also the new embankment and the resultant dry land, though at this time still marshy and undivided into individual fields, were depicted. The earliest representation of the excavated brick field is also shown and a quay and building adjacent to the west of it. The contrast between old land and new land is striking. There is however a contradiction in the evidence. The new embankment is clearly detailed in the 1839 Fair Copy enclosing marshy ground. The map (1837) accompanying the 2nd Annual Report of the Commissioners for the Improvement of the Navigation of the River Shannon shows a pre second embankment landscape with no indication of planned works as in other areas. It seems unlikely that the Commissioners would use out of date mapping but also unlikely that these large embankments were constructed in only two years. Considering all the evidence it is likely that the outer embankment at Coonagh was built in the mid to late 1830s. The first edition O.S. map published in 1841 depicts a similar, but less marshy, landscape as in 1839 (Fig. 1).³² By 1861 however the new embankment north of the quay had failed and been realigned as seen in the Fisher's Stent map.³³ By 1885 the quay had gone out of use, the adjacent building was destroyed and a new cottage had been built to the east of the quay and landside of the realigned embankment.³⁴ By 1903 the once marshy reclaimed land had been subdivided into fields and there was no sign on the map of the once extensive brick manufacturing area.³⁵

Reclamation of land in the Lower Shannon region has been carried out probably since at least the late medieval period.³⁶ There is no significant documentary evidence surviving for the Coonagh area for the period before 1839-40³⁷ and from O.S. cartographic evidence it seems that most of the reclamation work in this area was carried out prior to this, however, similar methods and legal requirements are likely to have been necessary. Schemes, supported by the government, began in the first half of the nineteenth century and seem to have been carried out as needs and opportunities arose.³⁸ In 1832 Captain Mudge, Surveyor of the Admiralty and Mr Rhodes, engineer, carried out a survey of the capabilities of the Lower Shannon and presented it to the Houses of

²⁸ Henry Pelham, Grand Jury Map of county Clare, 1787, Clare County Library.

²⁹ River Shannon, Laurie & Whittle 1808, UK Hydrographic Office, Dy K86/1-3, Clare County Library.

³⁰ Map of the County of the City of Limerick by Thomas Larcom R.E. Basire sc (Lithographer), Limerick City Council Inv. No: 1987.0154.

³¹ O.S. Fair Copy Plan surveyed 1839, sheet 1, Lower Shannon, UK Hydrographic Office, Press 49b, L2353.

³² O.S. 1st edition 1841, Co. Limerick sheets 004 & 005, 6" to 1 mile.

³³ O.S. Fisher's Stent map 1861, Limerick City Museum.

³⁴ O.S. Navigation chart, The Shannon, sheet VII, survey 1841, re-surveyed 1876-7, large corrections 1879, small corrections 1885, UK Hydrographic Office, 1540, 348.

³⁵ O.S. 2nd edition 1903, Co. Limerick sheets 0004 & 0005 6" to 1 mile.

³⁶ M. Healy and K. Hickey, 'Historic land reclamation in the intertidal wetlands of the Shannon estuary, western Ireland' in *Journal of Coastal Research*, Special Issue 36 (2002) p. 370.

³⁷ *Ibid.*, p. 269.

³⁸ *Ibid.*, p. 372.

Parliament. In the 1834 session the Marquis of Landsdowne in the House of Lords, who owned Clonmacken house and lands to the east of Coonagh as well as land at Coonagh, and Mr Spring Rice in the Commons succeeded in obtaining an Act (5 & 6 William IV, c. 67) for the improvement of the Shannon from the Atlantic to Lough Derg.³⁹ This Act empowered the Commissioners of the Board of Works to carry out surveys, make plans and estimates for carrying out improvement. In accordance with the provisions of this Act another Act was passed in 1839 (2 & 3 Victoria, c. 61) to carry out the work under the auspices of the Shannon Commission.⁴⁰ The work was to be funded by public money, money levied from the counties and districts adjoining the intended works and investment by proprietors who would gain from the improvements.⁴¹ 32,000 acres of land was drained and the land reclaimed restored to local proprietors without charge.⁴² It seems that the proprietors were not forthcoming in contributing their share of monies for Smyth, referring to the 4th and 5th Annual Reports of the Commissioners for the Improvement of the Navigation of the River Shannon, wrote in 1857 that the cost of the piers was to be part funded by the landowners but only some monies were paid.⁴³ The annual reports from the Commissioners for the Improvement of the Navigation of the River Shannon give an idea of the scale of works.⁴⁴ In 1848 for instance, from Limerick to the Sea, there were 1,200 yards of masonry built, 25,000 cubic yards of excavation removed and constructed into an outer dam.⁴⁵ It is fair to speculate that the embankment at Coonagh was at least part funded by the local proprietors especially when we consider that in 1850 the new land was either owned or leased long term by W. Perry Esq., David Leahy Arthur Esq. and the Marquis of Lansdowne.⁴⁶ The latter two being local landowners. Previous money was given in a loan from 1832-6 for the improvement of the city and port of Limerick⁴⁷ and several other Acts in the nineteenth century allowed the continued improvement of the River Shannon and its navigation channel.

Map evidence of brick works

In the period from the seventeenth to the early-twentieth centuries, approximately 500 brickyards were in operation in Ireland especially near cities and along water transportation routes.⁴⁸ This number had dropped to fifteen in the early-twentieth century and to five in 2000.⁴⁹ In the vicinity of Limerick four areas of brick holes, brick fields and brick yards (the name differs depending on which map sheet the brick field/yard is marked) are marked on the first edition O.S. maps along the northern shore of the River Shannon, and on the Bunratty River between Limerick and Rossmanagher alone. They are located at Clondrina, Coonagh West, Cratloemoyle and Ballinphunta (opposite shore to Rossmanagher castle). Others are marked on the south side of the River Shannon at Conigar, Castlemungret, Bunlicky and Ballykeefee which form a single large brick

³⁹ A. Marmion, *An Ancient and Modern History of the Maritime Ports of Ireland* (London, 1855) p. 473 and George Lewis Smyth, *Ireland: historical and statistical*, vol. 2 (London, 1857) p. 329.

⁴⁰ http://www.nationalarchives.ie/topics/OPW/LH_bground.html.

⁴¹ Marmion, *History of the Maritime Ports of Ireland*, p. 473.

⁴² *Ibid.*, p. 475.

⁴³ George Lewis Smyth, *Ireland: historical and statistical*, vol. 2, p. 344.

⁴⁴ 1st- 9th *Annual Reports of the Commissioners for the Improvement of the Navigation of the River Shannon*, (London, 1840- 8).

⁴⁵ 9th *Annual Report of the Commissioners for the Improvement of the Navigation of the River Shannon*, (1848), p. 2.

⁴⁶ Griffith *Primary Valuation, County of the City of Limerick* (1850).

⁴⁷ Marmion, *History of the Maritime Ports of Ireland*, p. 473.

⁴⁸ Pavia and Bolton, *Stone, Brick and Mortar*, p. 179.

⁴⁹ *Ibid.*, p. 181.

working area (a partial excavation carried out in 2002 at the edge of this brick field as part of the Gas pipeline revealed the remains of a brick clamp)⁵⁰ and at Corcomroe marsh along both sides of the Ballinacurra Creek in Ballinacurra and Ballykeefee.

According to the first edition O.S. map some of the Ballinacurra brick holes and those at Coonagh East were already deemed old by the 1830s. On the second edition map, in 1903, the number had dropped to just two one at Singland where a 'Brick Works' and a building are marked and Coonagh West where 'Brick Field' is marked. The once extensive brick manufacturing industry is recorded on the maps with 'Old Brick Holes' marked at Ballinacurra, these were regarded as old even on the first edition map and brick holes represented as topographic features such as at Castlemungret. No brick- holes, fields, yards, kilns or ground are marked on the third edition maps (1938, Limerick and 1922-23, Clare).⁵¹ Disused sites are marked at Ballinacurra as 'Old Brick Holes' but equally impressive holes were not annotated such as at Singland, and Castlemungret. Other possible disused brick holes not marked on earlier maps can be seen by the River Shannon at Ballymorris, Co. Clare and Cooperhill, Co. Limerick. These are not marked as 'Old Brick Holes' but the cartographic representation bears a striking resemblance to marked examples.

The earliest depiction of the excavated Coonagh West brickfield/brickyard is on two 1839 maps.⁵² There is no sign of them by 1903 but other brick works in the same townland to the east were still in operation and we know from oral tradition that there were some bricks still being manufactured. This is bolstered by Lamplugh *et al.* in 1907 with their comments that clay was used on a small scale to the south of Coonagh Island, at Lansdowne Bridge (possible Clondrina above) and at Cliono (Singland) to the southeast of the city.⁵³ Minor excavations, eight feet deep, to the south of Coonagh were producing bricks of rough quality.⁵⁴ Later we shall see that at least one inhabitant of the townland was still making bricks in 1901.

Listings in the Trade Directories from the late-seventeenth, nineteenth and early-twentieth centuries show that several brick makers such as James Hickey at Russell's Quay and John Moore at Merchants' Quay in 1846,⁵⁵ Isaac Atkinson at Athlunkard Street in 1856⁵⁶ and the Brick and Tile Co. in 1908 were in operation with offices or yards in Limerick city.⁵⁷ Other brick companies such as Ellis & Sons and the Cork Brick Manufacturing Co. Ltd began importing brick in the late Victorian period.⁵⁸ From cartographic evidence it is clear that the excavated sites at Coonagh West had been in operation since at least the early-nineteenth century and had gone out of use by 1903 though another brick work area in the townland was still in operation at this time. However, since Coonagh bricks were used for the construction of Patrick St, Limerick brick working was being carried out in the area from the late-eighteenth century.

⁵⁰ K. Wiggins, 'Conigar (BGE 4/4/1), 02E1814', in I. Bennett (ed.), *Excavations 2002* (Bray, 2002) entry No. 1153.

⁵¹ 3rd edition O.S. map SMR, Co. Limerick, sheets 4 (1924) & 5 (1938), 6" to 1 mile, 3rd edition O.S. map SMR, Co. Clare, sheets 62 (1922) & 52 (1923), 6" to 1 mile.

⁵² O.S. Fair Copy Plan surveyed 1839, sheet 1, Lower Shannon, UK Hydrographic Office, Press 49b, L2353 and O.S. Fair Plan surveyed 1839.

⁵³ G. W. Lamplugh, S. B. Wilkinson, J. R. Kilroe, A. McHenry, H. J. Seymour and W.B. Wright, *Memoirs of the Geological Survey of Ireland, the geology of the county around Limerick* (Dublin, 1907) p. 90.

⁵⁴ *Ibid.*, p. 58

⁵⁵ Slater, *Slater's Munster* 1846, p. 272 (<http://www.limerick.ie/webapps/tradesreg/tradesreg.aspx>).

⁵⁶ Slater, *Slater's Directory*, 1856, p. 305 (<http://www.limerick.ie/webapps/tradesreg/tradesreg.aspx>).

⁵⁷ *Patriot's Handbook* 1908, 11 accessed through Limerick Library web site.

⁵⁸ M. Browne, 'Buildings Materials Industry in Limerick' in D. Lee and D. Jacobs (eds), *Made in Limerick*, Vol. 1, p. 159.

The process of brick manufacturing

The raw material for bricks can be classified as either superficial sediments (found in rivers, estuaries and lakes) or consolidated geological formations (shales and deep clay deposits). Shale or marl is used in modern Irish brick manufacture;⁵⁹ for example the modern brick manufacturers Ormonde bricks in North Kilkenny use shale and 'fire clay' (clay capable of withstanding high temperatures).⁶⁰ The clay used in Coonagh West was a superficial sediment deposited by the Shannon River and was found just below the topsoil. The simplest firing technique was the use of brick clamps where 'green bricks' were fired without permanent structures (used in Coonagh West). This method of firing was still sometimes used in London up to at least 1939 even though permanent kilns were then replacing clamps.⁶¹ Hand methods and clamp firing of brick are still used in India and images from these works give a good idea of what the area of Coonagh would have looked like at this time.⁶² Permanent kiln structures used updraft or downdraft to fire bricks and were more efficient and easier to control, therefore, ensuring more uniform bricks.⁶³ Limerick brick was considered of poor quality⁶⁴ and this can be seen in the Coonagh examples which are often misshapen and poorly fired. It is likely that the brick was used for rough or core brick and not for building facades as the quality of brick from along the Fergus and Bunratty rivers in Co. Clare was considered of better quality. The bricks from Coonagh were transported into Limerick by boat and unloaded at Barrington's Pier on the north shore of the River Shannon.⁶⁵

To make bricks the clay was first extracted. Boate described how this was carried out in the seventeenth century by the digging of large square pits. The uppermost soil was removed to reveal good clay 'which commonly lyeth one or two spits deep'.⁶⁶ The clay was then broken up into very small pieces with a spade and water added. It was worked with spade and feet until 'the whole mass [became] uniform, firm and tough like stiff dough'.⁶⁷ In Coonagh West, the local people speak of their grandmothers digging clay with spades for brick making and a large irregular extraction pit was found on one of the excavated sites. According to the 1729 Act of Parliament, the clay had to be exposed outdoors for four months before moulding. Large areas must have been set aside for this but the process has not left any archaeological evidence.

Material was often added to clay: for example breeze, coke, ashes or organic waste were sometimes added to aid firing. Grog (burnt brick waste or powdered burnt clay), sand or crushed ceramics were added to plastic clay to prevent shrinkage. Oxides were added for colour e.g. manganese and iron. In the case of the bricks from Coonagh turf was added to aid combustion⁶⁸ and the red colour was the result of naturally occurring hematite in the clay.

The clay was hand moulded into bricks using wooden moulds. Hand moulding can either be in a pallet mould which produces a sand-faced brick with moulding striae

⁵⁹ Pavia and Bolton, *Stone, Brick and Mortar*, p. 183.

⁶⁰ www.ormonde.ie.

⁶¹ B. H. Knight, *Builders' Materials* (London, 1939) p. 6.

⁶² <http://www.flickr.com/photos/82075546@N00/4340159145>.

⁶³ Isle of Wight Industrial Archaeological Society website.

⁶⁴ D. Lee, *The Georgian House and Garden*, p. 18.

⁶⁵ Hill, *The building of Limerick*, p. 119 and Anon, *Old Limerick*, p. 6.

⁶⁶ G. Boate, *Ireland's Natural History* (London, 1657) p. 159.

⁶⁷ *Ibid.*, 159.

⁶⁸ S. Pavia, *Archaeometry of the Coonagh West Brick, Co. Limerick: ceramic technology, raw material and provenance* (Unpublished report for TVAS Ireland Ltd, 2009).

(linear, parallel grooves or ridges) on one side where the excess clay was 'struck off with a wooden stick'⁶⁹ or slop moulded. In this method, the mould was wetted instead of sanded. In the former sand was used to stop the bricks sticking to the moulds, water preformed the same function in the latter. Boate describes the moulding as taking place at long tables, by a man, woman and boy working as a team, using wooden hand moulds and sand to stop sticking. A similar scene of unknown date and place can be seen in Fig. 3. Sand impressions were found on many of the bricks from the Coonagh West excavations sometimes on one side suggesting that the green brick was laid on sand.

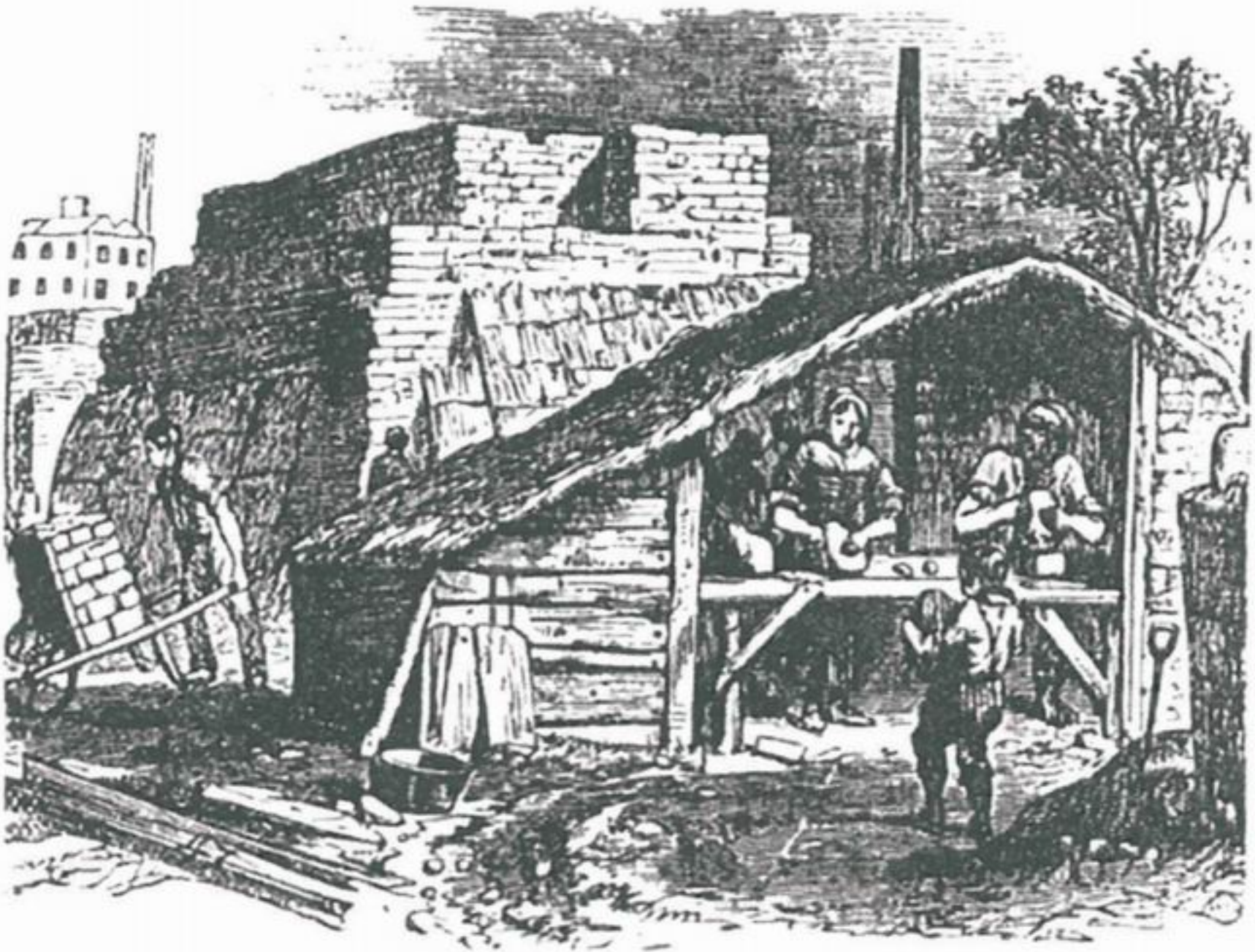


Fig. 3 Bricks being moulded at long tables, note the boy carrying a load in the right foreground (*Courtesy of British Brick Society, Information Compilation vol. 1 1973-1981, 14*)

Bricks were dried before firing by being laid out in the air or in more modern times in heated drying rooms. There were two methods of air drying bricks. They were placed on straw to prevent sticking and turned as they dried resulting in straw sticking to the bricks and leaving impressions. Some of the Coonagh bricks had such impressions. Sometimes the order in which the bricks were turned can be seen from the frequency of straw impressions. Bricks were also dried in hacks (long rows of stacked bricks).⁷⁰ Boate also described this in seventeenth century Ireland where the green bricks were laid out first, for a few days and then stacked in small heaps and then as the bricks went through the

⁶⁹ Pavia and Bolton, *Stone, Brick and Mortar*, p. 188.

⁷⁰ *Ibid.*, p. 191.

drying process they were stacked in long rows, which were roofed with straw and green sods. The hacks were many feet long and five or six feet high but only two or two and a half feet wide.⁷¹

The bricks were then fired. In Coonagh West, they were clamp fired without a permanent structure. It seems that broken brick and unburnt clay were used to level the ground. Some of this material was probably the remains of the outer skin of the previous firing. Bricks were laid in parallel rows with fuel packed between. In some benches green brick was placed directly on the ground surface or on a bed of sand and in others it seems that already fired broken and poor quality bricks formed the base of the bench. The direction of rows might have been influenced by the wind direction at the time of setting-out since there was no conformity in the orientation of the clamps on these sites. Evidence from one site indicated that at least ten benches might have been in one clamp.

The direction the bricks were placed on the bottom row of a bench could be determined in places by the position of surviving bricks and also the colour changes caused by oxidation (red) and reduction (black). These terms are explained further in the appendix. More bricks were stacked on top and tilted inwards to prevent collapse therefore the clamp would have been wider at the bottom than the top. Fuel was packed in the channels between the rows. No evidence was found for the fuel type and it is this lack of evidence that suggests that turf was used as it would have burned to a very fine ash. There are also references to Edmond Sexton Pery paying for turf to be delivered to brick yards⁷² in the late-eighteenth century. The channels between the brick rows also acted as draft holes. When the stacking was complete the outside was covered in 'the same clay, whereof the bricks were made, the thickness of two hands-broads or thereabouts'.⁷³

The length of firing depended on the size of the clamp and could last for several weeks. Bricks were not always uniformly fired, as it was difficult to control the temperature, which was in this case between 500-1000°C, and because the bricks were in contact with the fuel fully oxidising conditions rarely occurred.⁷⁴ Localised reducing conditions and the resulting black areas in the bricks were also caused by the added organic material.⁷⁵ The quality of the brick depended on its position within the kiln. Some of the bricks from Coonagh West were so badly fired that they are oxidised red at one end and unfired grey clay at the other. It seems firing techniques had not improved much since Boate's time as he complained of unsuccessful firings through lack of skill or neglect.⁷⁶

Finally the clamp was broken and the bricks removed. Clamp firing could often produce bricks that were under-fired (chuffs) or over-fired (burrs) depending on their position in the clamp relative to the fuel. Many of these wasters were found in a back-filled extraction pit on site E2080. Bricks were sometimes made for a single project though the brick works at Coonagh were more substantial and it is said locally that Coonagh bricks were used in Patrick Street in Limerick, which was in existence by 1780⁷⁷ and was named for Patrick Arthur, builder of Arthur's Quay in 1773. The Arthur's Quay houses were constructed from Coonagh brick by Francis Arthur, son of Patrick,

⁷¹ Boate, *Ireland's Natural History*, p. 160.

⁷² Hill, *The building of Limerick*, p. 73.

⁷³ Boate, *Ireland's Natural History*, p. 160.

⁷⁴ Pavia, *Archaeometry of the Coonagh West Brick, Co. Limerick*.

⁷⁵ Ibid.

⁷⁶ Boate, *Ireland's Natural History*, p. 160.

⁷⁷ P. J. O'Connor, *Exploring Limerick's Past* (Newcastle West, 1987) p. 43.

started in 1771⁷⁸ and completed in 1791.⁷⁹ Between two hundred and three hundred thousand bricks could be produced in a single clamp.⁸⁰ An advertisement in the *Limerick Chronicle* of May 1806 shows one way in which bricks were sold.⁸¹ In this case three clamps of 300,000 well-fired bricks were being offered at Ballinacurra Turnpike. They were convenient to land or water transport and presumably came from the Ballinacura brick works mentioned above and marked on the first edition O.S. map.

It was not possible to estimate how many clamps were located at Coonagh West or which area was the earliest or if the activity spread out over time or if more than one clamp was simultaneously burned. All stages of production occurred there from excavation of the clay to firing. Moulding and drying must have occurred but no trace of these activities survived.

The people

By looking at the nineteenth and early twentieth-century sources it is possible to gain some idea of the inhabitants of the area.⁸² In the early-nineteenth century the proprietor of Coonagh West townland was Daniel Leahy, Esq. who let it to George Sexton, Esq. who in turn sublet it to twelve unnamed tenants.⁸³ Coonagh house had once been the seat of the Sexton family but it had burned in 1831 and been replaced by a thatched house.⁸⁴ It is however still marked on the 1839 Fair Copy map but omitted on the published 1841 edition so its location is known. At least two other houses on other sites have been called 'Coonagh House' over the years. According to the 1829 freeholders list George Sexton Esq. lived in the city of Limerick and held lands at Coonagh while William Sexton Esq. lived in and held land there presumably in Coonagh House.⁸⁵ In the electors list of 1837⁸⁶ George Sexton Esq. is listed as residing in Catherine Street in Limerick while Andrew Sexton Esq. lived at Coonagh and had presumably inherited from William Sexton above. It is possible that the family owned a town house on Catherine Street and had their seat at Coonagh because in 1817 George Sexton was named a freeman of Limerick and 'of Coonagh'.⁸⁷ James and Thomas Sexton Esqs are also listed as living in Catherine Street in 1840⁸⁸ and are presumably related to George Sexton. Coonagh house is described as being in the centre of the townland east of Craggeen castle in 1839-40⁸⁹ but by 1850 this title seems to refer to a house to the west of the castle. It was then inhabited by James Sexton Esq, who then seems to be the head of the family.⁹⁰

⁷⁸ Anon, *Old Limerick*, p. 6.

⁷⁹ Anon, *The Arthur Family*, pamphlet printed by Treaty Press.

⁸⁰ Boate, *Ireland's Natural History*, p. 161.

⁸¹ *Limerick Chronicle*, 3 May 1806.

⁸² Griffith's Valuation, Electors list, Freeholder list, O.S. letters book, 1901 and 1911 census and trade directories, freeman lists.

⁸³ O'Flanagan, *O.S. Field Name Book* 91, Parish of Killeely, County of the City of Limerick 1839-40 (1929) p. 1075.

⁸⁴ *Ibid.*, p. 1077.

⁸⁵ <http://www.limerickcity.ie/Library/LocalStudies/1829FreeholdersinLimerickCityandenvironsCountyoftheCityofLimerick/>.

⁸⁶ <http://www.limerickcity.ie/Library/LocalStudies/1837ElectoralList/>.

⁸⁷ Anon, 'The freemen of Limerick', in *NMAJ*, vol. 4, no. 2 (1944) Appendix 1, pp103-30.

⁸⁸ F. Kinder & Son, *The New Triennial & Commercial Directory, for the years 1840, 41 & 42, of the cities of Limerick, Waterford & Kilkenny* (Limerick, 1840) p. 20.

⁸⁹ O'Flanagan, *O.S. Field Name Book* 91, Parish of Killeely, County of the City of Limerick 1839-40 (1929) p. 1077 and O.S. Fair Copy plan.

⁹⁰ Griffith, *Primary Valuation, County of the City of Limerick*, (1850), *Slater's Directory* (1856) p. 292
<http://www.limerick.ie/webapps/tradesreg/tradesreg.aspx>.

In the mid-nineteenth century James was also the immediate lessor of the area of land where the brick kiln sites were located and he leased it and 'offices, yard and gar' to William Gromwell.⁹¹ William Gromwell however does not seem to have rented a house and is not mentioned as renting anywhere else so one of the 'offices' (a term used for outhouses and sheds) must have been a house. No mention is made of brick making in the valuation but the brick yard is clearly marked on the accompanying map. James Sexton was also the immediate lessor of the land to the north, retained by himself, and the area further north where a brick hole is located and leased to Thomas Sexton who may have been his brother. James Sexton was listed in the Slater's 1856 trade directory as nobility, gentry and clergy⁹² and Thomas Sexton presumably the same individual as mentioned above as part of the civil establishment in Bassett's 1875, 1877, 1880 and 1884 trade directories.⁹³

In 1850 the area of reclaimed land to the south and west of the old embankment was owned by W. Perry Esq. and leased, with a house to Mrs Black. Perry also leased a house and yard to John Hickey who also leased land in the townland from the Marquis of Lansdowne. A John Hickey is listed as a forty shilling freeholder in the list of 1829 (registered 1819) with George Sexton as the landlord. It was not possible to determine whether John Hickey had changed the fields he was renting or whether Sexton had expanded his land holdings. In 1850 a William Perry is listed as renting on Sexton Street a house, offices and yard from Mary Shannon though since this individual is not listed as an esquire it is possibly not the same gentleman. Though the immediate lessors and inhabitants of the townland could be established who actually owned, operated and worked at the brick fields in the 1850s could not.

Since the clamps would have to have been tended for weeks at a time it is likely that workers lived on site. As well as the two cottages marked on contemporary maps other temporary dwellings may have been constructed for the firing period, which, were so badly constructed that no trace remains. According to local tradition at some time people lived in mud houses along the embankment of the River Shannon. A building account made by Pery for John's Square records that he paid for reeds for workers shelters, presumably for roofing.⁹⁴ This suggests temporary structures were erected and probably for the firing period. That brick manufacture was a family affair is suggested by the description in Boate of a man, woman and boy working shaping the bricks at long tables.⁹⁵ Lynch describes the process as being carried out by a father, who was the brick moulder, with a team of six including children each with their own jobs. Work could start as early as five in the morning and continue until seven at night with three to four thousand bricks being made in a day.⁹⁶ It was the children's job to carry the clay from the clay dumps, where it had been worked and exposed to the elements, to the moulder. The number of children employed in this work in Ireland in the nineteenth century is

⁹¹ Griffith, *Primary Valuation, County of the City of Limerick*, (1850).

⁹² Slater's *Directory*, (1856), p. 292.

⁹³ Bassett's *Directory of the City and County of Limerick 1875-76* (Limerick, 1875-6) p. xiii; W. Bassett, *The Limerick Directory and Principal Towns in the County of Limerick 1877-8* (Limerick 1877-8) pp vi, vii; W. Bassett, *Limerick City & County and Principal Towns of Clare, Tipperary and Kerry Directory 1880-1* (Limerick, 1880-1) p. 79 and p. viii; W. Bassett, *The Limerick City & County, Etc., Etc., Directory, 1884* (Limerick, 1884) p. 47 and p. 103. <http://www.limerick.ie/webapps/tradesreg/tradesreg.aspx>.

⁹⁴ Hill, *The building of Limerick*, p. 73.

⁹⁵ Boate, *Ireland's Natural History*, p. 160.

⁹⁶ G. Lynch, *Brickwork, History, Technology and Practice*, Vol. 1 (1994) p. 18.

unknown but for comparison consider that in Britain, in 1871, there were between twenty and thirty thousand of them aged between three and sixteen years employed mostly in the Midlands.⁹⁷

Though there is no direct evidence but considering that brick making was often a family business it is tempting to postulate that the John Hickey who occupied a house and yard in the vicinity of the Coonagh West brick works in the 1850s was related to James Hickey a brick maker with an address at Russell's Quay in 1846 and 1856.⁹⁸ John Hickey was also listed as a farmer in the freeholders (1819) list but since brick making was a seasonal activity and often the secondary occupation it may be possible that he was both.⁹⁹ Brick makers in Britain also tended to expand their operations into lime burning, brick laying and other related trades.¹⁰⁰

In 1901 only one brick maker, John Kenevane, was named in the census of that year for Coonagh East and Coonagh West¹⁰¹ but by 1911 he was no longer a brick maker but listed as an agricultural labourer (Kinivan) in the census and continued to live with his brother-in-law Michael Enright who owned the property.¹⁰² The Enrights were new to the townland as they were not mentioned in Griffith's Valuation of 1850. By 1911 the other families, with the exception of the Hickeys, associated with the land where the brick kilns were located the Gromwells, Blacks, Perrys and the Sextons were gone from Coonagh West and no one is listed as a brick manufacturer or worker in the census of that year. The Hickeys had become the dominant family in Coonagh West occupying four of the six dwellings with between five to nine rooms in 1901.¹⁰³ Land ownership changes in late-nineteenth and early-twentieth centuries are reflected in the surnames of the landowners and the fact that the occupiers were often now also the landowners.

From its height in the Georgian period brick making in the Limerick area has left its mark not only in the buildings of the period but also on the landscape of the low lying river planes. The regularly shaped brick holes where the clay was extracted are, today, often rectangular shaped marshy areas attracting abundant wildlife. As for the brick clamps themselves and the burrs, grizzles and chuffs that were discarded, above ground, not a trace remains but below the surface they decay into the river mud from which they came.

Appendix The Coonagh West sites

The two areas of brick manufacturing discussed here were found during excavation (licence numbers E2080 and E2089).¹⁰⁴ They formed two discrete areas and the latter relates to the irregular shaped 'Brick Field' as marked on the O.S. Fair Copy Plan (surveyed 1839) and first edition O.S. map of the area (Fig. 1). E2080 was immediately outside the border to the south-east suggesting that these brick clamps were either later or went out of use earlier than 1839. An extensive area of long, parallel depressions in the

⁹⁷ A.H. Stamp, 'The brick children', *British Brick Society, Information, Compilation Volume 1973-1981* (1988) p. 40.

⁹⁸ Griffith, *Primary Valuation, County of the City of Limerick* (1850), and Slater's *Munster* 1846 and 1856.

⁹⁹ M. Beswick, 'Dual Occupations' in *British Brick Society, Information*, no. 39 (1986) p. 13.

¹⁰⁰ *Ibid.*, p. 15.

¹⁰¹ Census of Ireland 1901.

¹⁰² Census of Ireland 1911.

¹⁰³ Census of Ireland 1901.

¹⁰⁴ Excavated by the author for TVAS Ireland LTD during 2005 on the route of the Limerick Southern Ring Road Phase II, Coonagh West, Co. Limerick (NGR 152775 156610) and forms part of the Limerick Southern Ring Road, Phase II, Northern Archaeological Contract.

area between and to the north of the sites marked where clay was extracted for brick manufacture. These are clearly visible on aerial photographs taken during fieldwork (Fig. 4). The two brick firing areas are located on the outer extremities of the 'Brick Field' area and close to water transport. E2089 is adjacent to the River Shannon and a quay while E2080 is beside a channel that followed the line of the old embankment westwards to the quay adjacent to E2089. At the time of the excavation, such a channel stopped a short distance to the south of the location of the quay and a back filled section continued to the quay.

A clamp is a temporary brick kiln and internally was made up of rows of unfired bricks set in benches laid parallel to each other. The outside of the kiln was covered in clay to form an outer skin. Benches were usually built of previously fired bricks and the 'green' unfired bricks were placed on them¹⁰⁵ but evidence from one bench on site E2089 suggests 'green' bricks were sometimes placed directly on the ground surface. Evidence for the brick clamps took two forms: 1. bands of red (oxidised) and black (reduced) in the alluvium. These bands are caused by the differential heating during firing- during firing, if enough oxygen is present oxidising conditions occur and allow carbon and sulphur in the clay to oxidise and diffuse as gas. If not enough oxygen is present reducing conditions exist, this also causes black cores in bricks. 2. The remains of the brick benches themselves where a single course of unbounded brick remained in linear features called benches. What follows is a brief description of each site.¹⁰⁶

Site E2080

This site (61 m by 45 m) lay in the southern area of a field of rough pasture and immediately to the north of a water channel (Fig. 5). The excavation revealed several phases of brick-making activity including clay extraction, firing and possible storage. The area was divided into the north-east (clay extraction area), the central area and area K (firing area), the southern area (firing and possible storage area) and the western end (possible storage area).

The north-eastern area, clay extraction brick-hole

A large, angular, irregular shaped pit (maximum 10 m by 5 m and 1 m deep) was found in the north-eastern area of the site. The pit was backfilled filled with loose red bricks which were probably wasters (low quality bricks unsuitable for use).

The central area, brick clamps remains

This area was defined by the large rubble and topsoil spread and an area of burning at the western end. The area measured 42 m east to west by 26.50 m. Excavation of trenches 2, 3, 7 and 8 found that several levels of kiln activity overlay each other throughout the area. Evidence for the firing activity usually took the following order: unoxidised alluvium, slightly reduced layer, black reduced layer and red oxidised material. In places above the reduced alluvium was yellow, hard but crumbly alluvium, which had hardened in extreme heat. In other areas of the site this level was often oxidised to red. Loose and non-heat-affected sand was sometimes found associated with the final firing. Firing levels were sealed by a destruction layer of clay and brick rubble.

¹⁰⁵ Lynch and Roundtree, *Bricks, a guide to the repair of historic brickwork*, p. 5.

¹⁰⁶ F. Reilly, *Limerick Southern Ring Road Phase II, E2089, Coonagh West, Co. Limerick, Final archaeological excavation report*, (unpublished TVAS Ireland report, 2010) and F. Reilly, *Limerick Southern Ring Road Phase II, E2080, Coonagh West, Co. Limerick, Final archaeological excavation report*, (unpublished TVAS Ireland report, 2010).

Trench 8

At least three separate, overlying firings were identified in the east of the trench and two in the west. The western firings may be contemporary with the later two events in the east of the trench but it is not possible to be definite since the deposits were cut by a U-shaped pit.

Trench 3

Four phases of kiln activity were found in this trench each separated from the next by a destruction/preparatory layer of clay and brick rubble.

Trench 2

Three phases of firing were identified in this area.

Area K

A 13 m by 10 m area was excavated by hand in an attempt to determine the full area of a single firing (Fig. 6). Evidence for brick benches were found running west-north-west/east-south-east through the area. At least one earlier phase was evident in trench 7, represented by oxidised material and possibly a third by a reduced layer and sand layer.

No brick benches were found but because of differential heating of the ground surface, alternating bands of reduced and oxidised earth indicated where the benches had been. In the main phase of activity the locations of two areas of benches were visible, separated by an unburnt strip. The linear impressions and colour changes were orientated in a west-north-west to east-south-east direction. The locations of ten benches were found in the eastern half of the area with the locations of bricks visible in six of them. The benches were between 0.30-0.40 m wide and narrower than the strips between, which were 0.50-0.70m wide. The longest bench was just over 6 m long though there were no definite terminals. The faint traces of five benches were visible on the western side of the unburnt strip with brick impressions visible in only one.

*Southern area, firing and possible storage area*Trench 4

This trench was excavated to investigate whether any features were associated with the water channel to the south of the site. Since brick is a bulky commodity it is likely that it was transported by water. A substantial layer of redeposited alluvium with occasional brick fragments covered the natural alluvium at the lowest level throughout the trench. This material was likely dredged up from the water channel either during cleaning of the channel itself or to build up the area for brick manufacture. The south-facing section showed at least four and possibly five or six phases of firing. Unlike in other areas, many layers of ash survived. The entire area was covered in the topsoil and brick rubble mix. One linear brick feature was found on this layer. This deposit is of interest because some of the bricks used were so badly fired that they are oxidised red at one end and unfired grey clay at the other.

The western end, possible storage area

The site as a whole was mostly defined by the extent of a brick rubble and topsoil mix. This spread of material was absent from the western end of the site where brick features were found set into alluvium. These features were: three narrow parallel cuts with associated brick features and fills, three brick settings and one large linear spread of rubble.

The best preserved of the brick settings was one course high (1.30 m by 0.80 m and 0.09m deep). The bricks were set in two almost square features and as with the other

brick features they had sunk into the alluvium. This area might have been where the fired bricks stacked in rectangular or square towers were stored ready for transportation by road (visible on the 1st edition map) or water. An 11.40 m long spread of rubble continued from this area northwards and may have been a causeway leading to other brick firing areas and brick-holes to the north through a once water-logged area.

Site E2089

This excavated site (110m x 15m-50m) lay within the area marked 'Brick Yard' in the nineteenth century maps whose western boundary was defined by a boundary ditch. Evidence for brick clamps on this site was found to the east of this infilled boundary ditch (3m to 5.80m wide) which ran from the southern corner of the site in a north-north-westerly direction for 55m where it kinked slightly to the north and continued outside the area of the excavation.

The main area of firing activity was in the central area which measured 17m by 12m. Like E2080 evidence for the clamps took the form of bands of red (oxidised) and black (reduced) bands on the alluvium. Unlike E2080 the bases of the brick benches themselves sometimes survived. Evidence for twenty eight brick benches organised in six clamps and at least two phases of activity was evident. Thirteen benches consisted of set bricks, where the bottom course had not been removed. The other fifteen were represented by reduced and oxidised discolouration on the ground surface.

Phase 1

Evidence for five clamps was found in this phase (Fig. 8). Clamp 1 was the most easterly clamp in the central area and had seven parallel benches orientated east west. The remains of three brick benches survived and reduced and oxidised linear features indicated the location of four more benches. Two methods of placing the bricks in benches could be identified: bricks were laid perpendicular to the direction of the bench on the long faces with the gap between infilled with other, often more fragmentary, brick or bricks were laid end-to-end, parallel to the direction of clamp orientation on the northern face and perpendicular on the southern. Some of the bricks between were placed diagonally. The benches were placed typically 0.56 m apart. It is unknown whether any of the benches surviving reflect their original length but the minimum suggested was 4.80m. The average width was between 0.40m and 0.50m.

Clamp 2 (Fig. 7) was located immediately west of Clamp 1 and was oriented roughly north south. The four western benches had brick *in situ* while the most easterly bench was visible as an oxidised and reduced linear pattern. Bricks in the benches were placed in a different pattern to, and were more complete than, those in clamp 1. Two parallel rows of bricks were placed on the eastern side with bricks on the western face placed perpendicular to them. The benches were approximately 0.55 m apart. At the southern end of three benches bricks had been set along the short end of the bench. These bricks narrowed the gap between benches to approximately 0.36 m and formed the sides of draft holes. The protrusion of one of these bricks on the western side of the most western bench suggested that another bench once lay to the west. It is unknown whether any of the benches surviving reflect their original length but the minimum suggested was 6.40m. The average width was between 0.42m and 0.50m.

Clamp 3 was located west of clamp 2 and survived as two brick benches and two reduced and oxidised linear features. There was a suggestion of three other benches between them. In the surviving benches complete and near complete bricks were placed end-to-end along the northern face of both benches and perpendicular on the opposing

face. Two rows of smaller bricks filled the interior. It is unknown whether any of the benches surviving reflect their original length but the minimum suggested was 3.50m. The average width was between 0.37m and 0.46m.

Clamp 4 was located north of clamp 2 and was recorded as reduced and oxidised patterns of five possible benches orientated east west. Clamp 5 consists of three linear bands of reduction and oxidation to the south of clamp 1. They were orientated roughly north south.

Phase 2

Clamp 6 was located in the eastern part of the area and only above clamp 1. This phase was sealed from phase 1 by brick rubble and grey clay which was used to make a flat surface for firing. Some, if not all, of the material may have been the remains of the outer skin of the under lying clamp.

The clamp consisted of the remains of four benches which were orientated approximately north-south. The better preserved benches show a double row of end-to-end placed bricks parallel to the direction of the clamp on the eastern face with bricks set perpendicular to them on the western. Complete bricks were used though many were fire-cracked. Where brick did not survive the line of the benches could be followed by the colouration of the ground. The benches were approximately 0.60 m apart. At the southern end the gap between the benches was reduced to 0.30m by the placement of bricks to narrow the draft hole as in clamp 2 above.

Clamps and associated features in the northern area

An area of firing activity approximately 25m by 15m was located in the northern part of the site. Trench 3 was excavated in an east west direction through this area. One long area of burning was recorded in the bottom of the trench section (Phase 1) with a very small secondary patch noted at the western end (Phase 2). Phases in this area do not correspond to phases in the central area.

Bench width dimensions are comparable with other excavated examples for example at Clare Abbey, Co. Clare benches in the best preserved brick clamp measured between 0.35-0.45m in width¹⁰⁷ and one at Congar, Co. Limerick which measured approximately 0.40m wide.¹⁰⁸ The pattern of the layout of the bricks in the benches in clamp 2 and 6 are also comparable with that in Clare Abbey.

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¹⁰⁷ K. Taylor, 'Post-medieval brick clamp 04E0027', in I. Bennett (ed.), *Excavations 2004* (Bray, 2004), Entry No. 0144 accessed through www.excavations.ie 24/04/2010 and K. Taylor, N18 Ennis Bypass, 04E0027, *Preliminary Archaeological Report, Site AR120, Clare Abbey, Co. Clare*, (unpublished TVAS (Ireland) Ltd report, 2004) and G. Hull, 'Brick kilns' in *Archaeology Ireland*, vol. 19, no. 4, Issue 74 (2005) pp 31-3.

¹⁰⁸ K. Wiggins, 'Congar (BGE 4/4/1), 02E1814', in I. Bennett (ed.), *Excavations 2002* (Bray, 2002) Entry No. 1153.



Fig. 4 Aerial view of the sites and brick holes (*Courtesy of Markus Casey*)



Fig. 5 View of site E2080 (*TVAS (Ireland) Ltd*)



Fig. 6 View of Area K site E2080, note red and black discolouration due to heating
(TVAS (Ireland) Ltd)



Fig. 7 View of clamp 2 site E2089, showing base of brick benches with
test trench running through it (TVAS (Ireland) Ltd)

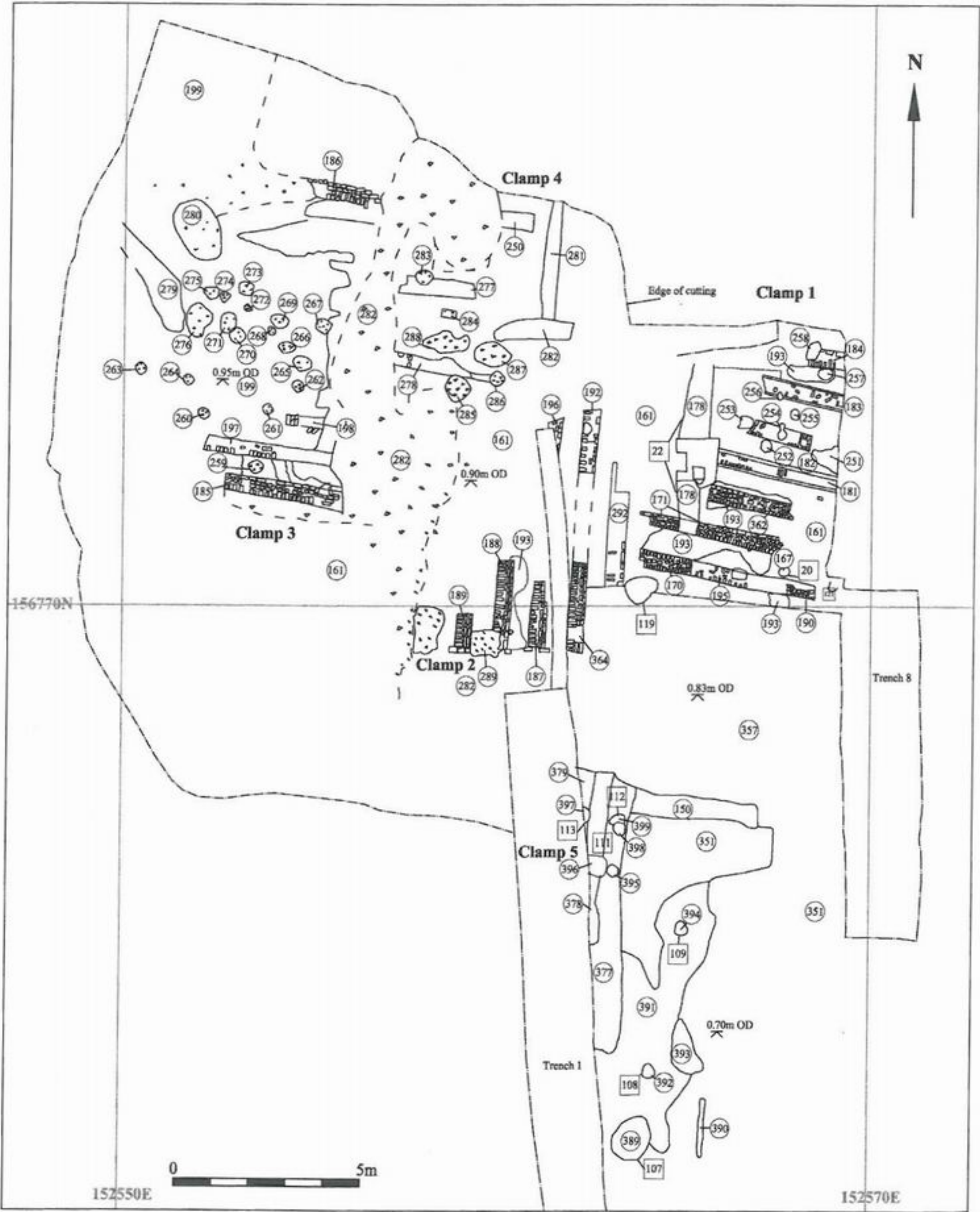


Fig. 8 Plan of phase 1 site E2089 (TVAS (Ireland) Ltd)