Identifying Clay-construction Buildings in a Norfolk Market Town

Malvern TIPPING, United Kingdom

Key words: clay-construction, clay-lump, earth buildings, heritage, history, land management

SUMMARY

Earth buildings form an important part of the built heritage in many places. This is no less true than in East Anglia, where there remains a heritage of those buildings built from timber frame with wattle and daub panels and those built from clay-lump. Through a combination of a lack of identification and a lack of understanding on the part of both built environment professionals and builders, this heritage is being irretrievably destroyed.

There is a need for historic clay buildings to be identified and recorded. Once such buildings have been identified, both built environment professionals and builders need to be given the knowledge and equipped with the skills to treat them in an appropriate manner.

The market town of Diss in Norfolk has a history of clay construction. In particular, parts of the town have a large number of clay-lump buildings. Therefore, Diss is a suitable town for the identification and recording of such buildings and for the dissemination of skills and knowledge. A small group of property professionals was set the task of identifying and recording buildings. Collected data were entered into a database that became the definitive one used by local authorities and others.

The survey succeeded in developing a database of clay buildings in Diss. Knowledge was disseminated to both property professionals and builders. However, some questions of validity arose from inconsistencies in the collection and recording of data. Nevertheless, with refinement, the exercise provides a template for the collection and recording of data with respect to historic clay buildings in other towns and villages throughout East Anglia.

SOMMAIRE

Bâtiments de terre forment une partie importante du patrimoine bâti dans de nombreux endroits. Cela n'est pas moins vrai que dans l'East Anglia, où il reste un patrimoine de ces bâtiments construits à partir de clayonnage et torchis et ceux construits à partir de blocs d'argile. Grâce à une combinaison d'un manque d'identification et d'un manque de compréhension de la part des professionels de l'environnement bâti et des constructeurs, ce patrimoine est en train d'être détruit.

Il y a un besoin pour les bâtiments historiques argile d'être identifiés et enregistrés. Une fois que ces bâtiments ont été identifiés, tous les deux professionnels de l'environnement bâti et les

constructeurs doivent avoir la connaissance et à être doté des compétences pour les traiter de manière appropriée.

Le bourg de Diss, dans Norfolk a une histoire de la construction en argile. En particulier, certaines parties de la ville ont beaucoup de bâtiments de bloc argile. Par conséquent, Diss est une ville appropriées pour l'identification et l'enregistrement de ces bâtiments et pour la diffusion des compétences et des connaissances. On a donné à une petite group de professionnels de l'environnement bâti la tâche d'identification et d'enregistrement des bâtiments. Les données recueillies ont été inscrit dans une base de données qui est devenu l'une définitive, utilisée par les autorités locales et autres.

L'enquête a réussi à développer une base de données des bâtiments d'argile à Diss. Les connaissances ont été diffusées à la fois aux professionnels de l'immobilier et les constructeurs. Cependant, certaines questions de validité se pose des incohérences dans la collecte et l'enregistrement des données. Néanmoins, avec raffinement, l'exercice fournit un modèle pour la collecte et l'enregistrement des données à l'égard de bâtiments historiques en argile dans d'autres villes et villages tout au long de l'East Anglia.

Identifying Clay-construction Buildings in a Norfolk Market Town

Malvern TIPPING, United Kingdom

1. INTRODUCTION

Cittàslow is an international campaign that seeks to support and encourage local enterprise and tradition. Its philosophy is to promote local goods and produce, local uniqueness and environmental protection. It has its roots in Italy, and the term *cittàslow* means *Slow City*. Cittàslow's core values include*:

- Support for local products and businesses
- Community decision making
- Caring for the environment
- Healthy lifestyle and quality of life for all
- Preserving heritage
- Maintenance and development of local distinctiveness and characteristics
- Support of artisan producers through markets and fairs

* Source: Perth & Kinross Council.

The Cittàslow objectives are summarized in its mission statement:

> "The Cittaslow approach involves life at a human scale, respecting and supporting the environment and local traditions and preserving them for current and future generations to enjoy".

Cittàslow came into being when the mayors of four Italian towns, together with the chairman of Slow Food, signed its charter in 1999. In 2003, Ludlow in Shropshire became the first British Cittàslow town. The first annual board meeting of Cittàslow UK was held at the Corn Hall, Diss in the county of Norfolk in March, 2006. It was at this meeting that Diss was admitted as the third member of Cittàslow UK. The two British towns already admitted were Aylsham in Norfolk and Ludlow in Shropshire. By November, 2009, Cittàslow UK had nine market towns as members, including Aylsham, which is also in Norfolk.

The following nine towns in the United Kingdom are currently members of the Cittàslow network:

- Ludlow
- Aylsham
- Diss
- Mold
- Perth
- Berwick-upon-Tweed
- Cockermouth

- Linlithgow
- Sturminster Newton

Cittàslow's participation in Diss arose through the good offices of the Diss Community Partnership. During 2006, Cittàslow was awarded a grant in excess of £140,000 to pursue its objectives in Diss. This funding was provided jointly by the European Union and local councils. As a result, a local office was financed, thereby enabling the promotion of a number of initiatives in Diss. Included amongst these was the Diss Clay Lump Buildings Project.

The *East Anglian Regional Telluric Houses Association* (EARTHA) was founded in 1994. With the aims of promoting the maintenance and conservation of existing earth building and encouraging the revival of earth construction in East Anglia, EARTHA applied in 2007 for funding to enable it to undertake a survey of clay buildings in the town of Diss. EARTHA agreed to place £1,000 into the financing of the survey in return for £4,000 of funding from the Cittàslow Diss Programme. Although the Cittàslow documentation makes reference to clay-lump buildings, Diss also has a heritage of wattle and daub construction. Both types of construction are a lost skill to all but a few specialist professionals and enthusiasts. Therefore, all types of clay construction in Diss and the surrounding areas are under threat due to a lack of knowledge amongst property owners, building trades people and built environment professionals. As a result, many such buildings are being adversely affected, irreversibly altered, damaged or destroyed through the application of inappropriate building techniques, the use of unsuitable materials or a lack of recognition of what these buildings are. Therefore, it is essential that these buildings are identified and recorded so that in future steps may be taken to assure their conservation. It also follows that a change to professional practice needs to be made. With these matters in mind, EARTHA sought Cittàslow funding to help finance the establishment of a database that the local authorities, especially the planning and building control departments, could later use as part of their endeavours to assure the future conservation of these buildings. As part of the bidding process for such funding, EARTHA found that it became necessary to extend its objectives with respect to the Cittàslow Clay Lump Project. Hence, the project was extended to include the dissemination of knowledge on clay construction to local built environment professionals and the training of clay construction techniques to building trades persons.

2. BACKGROUND TO CLAY CONSTRUCTION IN EAST ANGLIA

According to Hurd and Gourley (2000), one third of the world's population lived in unfired clay buildings. However, according to Rael (2008), as many as three billion people, or half of the world's population, live in such dwellings. Earth construction of one kind or another have existed in the British Isles for thousands of years. Half a million habitable clay buildings are thought to remain in the British isles (Hurd and Gourley, 2000). In many parts of the world and in some parts of the British Isles, clay buildings are of monolithic construction. However, in East Anglia, they take two forms: clay-lump; and wattle and daub (Hurd and Gourley, 2000). The term *clay-lump* is an East Anglian one uses to describe what elsewhere is known as *adobe* (Williams-Ellis, 1999). The term *adobe* can be traced from the Middle Egyptian for unfired mud brick, having subsequently passed into Arabic and thence into Spanish.

Subsequently, it became a Spanish-Mexican term that has since become the accepted usuage in most parts of the world (Lewis, 2009). Adobe blocks, made using a bottomless wooden mould, can be traced back to Mesopotamia to around 3,000 BC, and it is known that the technique was adopted by the Romans in some of the drier parts of their empire (Lewis). It is known from Pliny that the Romans were familiar with unfired clay structures in Spain and Africa (McCann, 1995). Examples of hand-formed, rather than moulded, clay-lumps, have been found in Jericho dating back to circa 8,000 BC (Moorey, 1999; Lewis, 2009). Vitruvius shows that unfired bricks of earth and straw were being used by the Romans in the first century A.D. Variants of moulded clay-lump are found in Britain with, for example, chalk rock and clay blocks having been used in Wiltshire and Hampshire, but these are considered a form of masonry construction (Williams-Ellis). However, the true *clay-lump* block only exists in East Anglia.

True clay-lump needs to be made from the chalky, boulder clay formed in parts of East Anglia as glacial deposits. According to Bouwens, this glacial deposit, which sits just below the topsoil, comprises a mixture of sand and gravel, broken and ground chalk, silt and clay in varying proportions (Hurd and Gourley). The main part of the geographic region, which comprises the counties of Norfolk, Suffolk and Essex together with parts of Cambridgeshire and Hertfordshire is a low plateau where these deposits of chalky, boulder clay are up to 60 metres deep (Bouwens). Below Glemsford in Suffolk, the deposit of chalky, boulder clay is 772 feet (235 metres) deep.

Following the Norman Conquest, important buildings, such as castles and churches, were of stone construction, displaying the power and wealth of the new ruling classes. All other buildings remained of timber-frame construction until the re-introduction of fired bricks into East Anglia by Flemish immigrants in the fourteenth century, these having previously been used during the Roman occupation. During the medieval period, most buildings continued to be of timber-framed construction. This form of construction usually relied upon the use of wattle and daub for the infilling of the panels within the timber frame. Different parts of the British Isles had different methods for wattle and daub construction. In East Anglia, the norm was for boulder clay, usually mixed with chopped straw and cattle manure, to be applied so as to cover both sides of lengths of hazel wands fixed upright within the panels. Many fine, early examples of such construction remain extant in situ throughout the region. Two good exposed examples of such East Anglian wattle and daub panels dating from the fourteenth century are displayed in Halesworth Museum. These have been dated respectively as circa 1350 and between 1480 and 1500. They are pictured in Figures 1 and 2 in the appendix. Although adobe was known to the Romans, construction entirely of unfired earth blocks did not arrive in East Anglia until the late eighteenth century. According to Gorffon's treatise of 1772, pisé is a form of unfired earth construction introduced to France by the Romans. The term *pisé* is derived from the French term *pisé de terre*, which means rammed earth. Thus, it is a method of construction that relies upon earth being rammed between shuttering.

Pisé construction also appeared in Russia at the close of the eighteenth century. According to Makhrov (1997), the technique of rammed earth became widespread in Scotland after it had been introduced from France at the end of the eighteenth century. In 1784, a party of seventy

Scots labourers arrived in St. Petersburg under the direction of three of their countrymen to execute rammed earth construction at the Imperial residence of Tsarkoe Selo nearby. In 1793, the Russian architect Nicolai L'vov engaged several of the Scots to construct the first clay houses on his own Nickolskoe estate near Torzhok, a city between St. Petersburg and Moscow (Makhrov). According to Makhrov, in 1793 L'vov was also designing peasant clay dwellings on the Andreevskoe estate a hundred miles east of Moscow which belonged to the brother of the Russian ambassador to London.

Most extant clay-lump buildings in East Anglia date from circa 1790 to circa 1860, which dates more or less coincide with the brick tax. Being unfired, clay-lumps were not taxed. Some commentators point to Gorffon's treatise as being the catalyst for the introduction of unfired earth construction, in the form of clay-lump, in East Anglia. Bouwens suggests that it may have been introduced from France, Spain or Portugal (Hurd and Gourley). Certainly, the Napoleonic wars, which resulted in many British soldiers spending time in these countries, especially in Spain and Portugal, coincided with the early years of clay-lump. According to McCann (2004), the earliest clay lump dwelling is Joseph Austin's cottage at Great Shelford in Cambridgeshire, which he dates as being 1791, but clay-lump was used earlier in dovecotes. Austin was a bricklayer, who had sought to build himself a cheap dwelling out of what were then known as clay bats. The term *clay lump* can first be found in the account of John Denson, published in 1821 (McCann). McCann's work overturns the conventional view of East Anglian clay lump having originated in Norfolk and Suffolk. Instead, it points to the technique having originated in Cambridgeshire and only becoming widespread in parts of Norfolk and Suffolk later, in the 1830s and 1840s. However, as Williams (2007) shows, clay-lump continued to be used in East Anglia until the First World War.

Clay-lump buildings identified in Diss by the survey range across the 1790-1860 period. The Brick Tax was introduced in 1784, increased in 1794 and 1803, and abolished in 1850. Different strategies were used to reduce the effects of the tax. Larger bricks were used until the brick size was standardized by statute. Also, rat-trap bond, although a weaker bond, was often adopted, as it used fewer bricks. Allowing for a few years for practices to adapt, there appears to be a direct correlation between the existence of the Brick Tax and the widespread use of clay-lump in East Anglia. During much of the same period, rat-trap bond, which was a technique of bonding bricks on edge, was used in Diss. Although rat-trap bond is not a clay lump technique, it uses less bricks than other brick bonds, leaving hollow cubes within the middle of the wall. It seems to have been adopted to reduce liability for the Brick Tax. This would suggest that clay-lump construction was also adopted at the time in order to avoid the tax.

Although widespread use of clay-lump in East Anglian dwellings disappeared circa 1860, a decade after the abolition of the Brick Tax, the technique continued in agricultural buildings. With the arrival of the railway in the middle of the nineteenth century, Gaymers moved their cider works to Attleborough, which was then developed as a new town comprising several adobe villages built up to 1860.

Notwithstanding the decline of adobe in East Anglia after 1860, it continued to be used elsewhere beyond the United Kingdom for the latter part of the nineteenth century. For example, there is evidence of adobe having been used in New Zealand by settlers throughout the Victorian period. There are numerous examples of adobe blocks having been used in Australia during the nineteenth century, with several adobe buildings in the state of South Australia having been attributed to German settlers (Lewis). Indeed, at that time in South Australia the term *German Brick* was used to describe an adobe block comprising wet earth, limestone rubble and chopped straw (Lewis).

In 1919, Thetford Rural District Council made a number of attempts to revive the construction of clay-lump houses with some clay-lump local authority housing estates being built around 1919 and 1920. During that period such housing estates were built at Watton and Garboldisham, but these have since been demolished. Another housing estate of that era at East Harling was listed. A clay-lump housing estate also from that period still exists at Blo' Norton. There is putative mention of attempts to restart the technique after the Second World War in Attleborough and Besthorpe

During the twentieth century, adobe saw a revival and was promoted by the authorities, with notable examples in Queensland and Northern Territory. There has been a renewed interest in earth construction in Britain. During 2007, EARTHA established a *New Build* sub-committee with a view to promoting and encouraging new clay lump dwellings in East Anglia. In the meantime, private individuals have already commenced new build schemes. Examples of new build clay lump dwellings in East Anglia are to be found at Horham in Suffolk (Williams), a detached two-storey house at Beeston, near Dereham in Norfolk, and a bungalow at Thorndon, Suffolk, comprising a clay lump inner leaf behind a cavity and an outer brick leaf.

The other principal form of clay construction in East Anglia is wattle and daub. The daub is not entirely of clay, which is a minor part of the matrix of materials that also includes chalk, gravel, straw/fibre and stones. The daub is supported by hardwood sticks that are fitted into the panels, which in turn are fixed into holes and grooves in the timber-frame of the building. Whereas in other parts of the United Kingdom the wattle may be formed primarily by cleft sticks woven horizontally, the norm in East Anglia is for upright sticks, placed within the panels of the timber-frame, to support the daub. These vertical sticks are normally of coppiced hazel and may be either cleft or left round. Other varieties of coppiced timber are known to have been used on some occasions. For example, the wattle taken from the Dragon Hall in Norwich included some poplar which subsequently sprouted in spite of its great age. This technique, using vertical hazel wands, is a very old one in East Anglia with examples from the fourteenth century still extant and with archaeological evidence to suggest that it was in use during Saxon times. The technique relies upon the vertical wands being tied to horizontal, timber ledgers, which are either nailed onto timber-frame or wedged between the timber-frame. The gap between each wattle should be equivalent to the thickness of the individual wands used. As with the formation of clay lumps, the wattle is formed from chalky clay sub-soil having been mixed with small amounts of chopped straw, but with the optional addition of cow dung to assist the workability of the material.

3. METHODOLOGY OF DATA COLLECTION AND RECORDING

The EARTHA committee determined that data needed to be observed and recorded in the field. This meant checking every property in the town of Diss individually and then recording them as being of clay construction where appropriate. It was not possible to enter the properties. Both logistical considerations and a lack of right of entry prevented this. Therefore, each property had to be observed externally from the public highway. In a small number of cases, private access roads were used as places from which to observe premises.

The data collectors were members of the EARTHA committee and included three chartered surveyors and one chartered architect together with vernacular builders and a clay products builders' merchant. None of the data collectors was given any formal training for the survey. The majority were only given a briefing on the first day of the data collection. The data collectors were in the main divided into teams of two with the survey being conducted one evening per week over the course of several weeks. The members of each team were rotated randomly each week. Each team was required to complete a data collection pro forma for each property that they identified as being of clay construction.

Each of the data collection sheets had been duplicated from a template prepared by a member of the EARTHA committee. These data collection sheets required the recording of the following:

- The date and names of the data collectors
- The address of the property
- Details of whether clay lump construction or timber-framed construction comprising wattle and daub
- Attachment
- Age
- Roof details including shape and covering
- Chimney details
- External wall covering
- Plinth type
- Window and door details

Those buildings in the town that were of clay-lump construction fell into two categories:

- Those constructed of solid clay-lump walls, which had then been rendered with lime render.
- Clay-lump buildings faced with a veneer of red brick, normally half a brick thick.

Since it was not possible to access the buildings during the survey, two principal techniques were used to identify clay-lump buildings by those data collectors with some knowledge of such buildings. Those clay-lump buildings without brick façades were identified by factors such as the presence of a brick or flint plinth and the positioning of the door and window apertures further from the corners of buildings than would generally have been the norm for other building-types. Those clay-lump buildings with brick façades were identified by observing the thicknesses of the window reveals. That was because the thicknesses of the window reveals in such buildings were known to be thicker than those for standard brick buildings and are known to have an overall thickness of about 350 mm. (Williams, 2007).

Data collectors were also required to make a rough sketch of the front of each recorded property at the bottom of the requisite data collection sheet. Where a number of clay properties existed within a single terrace, data collectors were instructed to record this on a single data collection sheet where possible.

Once all the clay properties had been observed and recorded, the data collection sheets were passed to a paid Information Technology consultant for putting into a digital database. It was from this digital database that the District Council's Planning Department and Building Control Department and other stakeholders would develop their own databases with respect to the properties recorded. In order to make each property identifiable in an easy and reliable way, each had to be recorded on a definitive plan of the town. This definitive plan was plotted at a scale of 1:3,000 onto A1 sheets. The chartered architect on the EARTHA committee arranged for a member of her staff to undertake this task. At an early stage, it became very apparent from inspecting the first draft of the definitive plan that errors existed. For example, a modern retail unit built in the 1980s in the form of a mock malting had been wrongly recorded as being of clay-lump construction, when in fact it had a cavity and standard block inner leaf instead of clay-lump behind the brick facade. To validate the data, Dirk Bouwens, a chartered building surveyor, who is a leading expert on clay-lump structures in the region of East Anglia and who has researched and written about earth structures for many years, was sent out to check the definitive plan in the field.

Clearly, a lack of training and of adequate briefing of the data collectors led to inconsistency in the observation, collection and recording of the data. Also, there was the problem of some data collectors having much less skill than others in identifying, through external visual inspection, clay-lump and timber-framed buildings respectively. This meant that issues concerning validity arose.

Research is said to have validity if the findings accurately reflect what is happening. In the case of this study, both the definitive map and the gazetteer of clay-construction buildings within Diss must accurately represent both the wattle and daub and the clay-lump buildings subject to the survey. Hence, another survey of such buildings in Diss should produce the same results. In order for such surveys to reliably replicate the results, it is important that all observations and recordings of the data are accurate and truly representative of the phenomena. Therefore, in order to improve the validity of the current study, Bouwens, the

leading expert on East Anglian clay-lump buildings, subsequently checked the data collected by the data-collectors against each case recorded on the draft definitive map and the draft gazetteer.

4. DISSEMINATION OF THE KNOWLEDGE TO BUILT ENVIRONMENT PROFESSIONALS

A planned conference at which knowledge about local earth-building would be disseminated to built environment professionals did not take place. There had been logistical constraints preventing such a conference taking place. However, a very limited number of built environment professionals had attended lectures at EARTHA annual general meetings prior, during and after the Cittàslow Clay Lump Project. During the Cittàslow Clay Lump Project, EARTHA did convene a number of new-build sub-committee meetings at the village of Bressingham in the county of Norfolk, about eight kilometres to the west of the town of Diss. These sub-committee meetings were open only to built-environment professionals and builders and each meeting was normally attended by about twenty people. Since the remit was to focus on how new clay-lump buildings could be developed throughout the region, the discussions and those participating were by no means confined merely to the town of Diss. However, some of those participating were from Diss and its environs. Nonetheless, knowledge about earth construction with respect to the wider geographic region was disseminated.

As part of the Cittàslow Clay Lump Project, EARTHA commissioned the printing of leaflets and pamphlets explaining both the project and the region's heritage of earth construction. This literature was to be sent to architects and other built environment professionals practising within the region in order to disseminate the knowledge. Furthermore, copies of the output produced by the study are to be lodged in the main Norfolk county historical archive as a resource for researchers in the future.

Both Clay lump buildings and wattle and daub buildings were not confined to Diss when those traditional forms of construction were in vogue. These forms of construction were common in other towns and villages throughout much of the region. Much of that built heritage remains. However, it often remains unrecognized. Furthermore, where such construction is identified, there remains much ignorance amongst both built environment professionals and builders as to the most appropriate means of conserving it. It is imperative that clay structures are properly identified in other towns and villages throughout the region so that those structures may be properly conserved. Accordingly, it would be appropriate for surveys of clay structures to be conducted in those other towns and villages. EARTHA now has the skills, albeit ones which in the light of the Cittàslow Clay Lump Project should be honed, with which to undertake such surveys. Therefore, District Councils should be targeted with copies of the Cittàslow Clay Lump Project documentation and the output of the Diss survey to demonstrate what EARTHA could achieve in other towns and villages. With the agreement of those District Councils, appropriate funding from either Cittàslow or elsewhere should be sought in order to facilitate other surveys.

EARTHA contributed to the funding of the Cittàslow Clay Lump Project. EARTHA's funds are not unlimited. Therefore, EARTHA should consider tendering for business from Local Authorities to undertake clay building surveys in appropriate towns and villages within their respective districts. The EARTHA committee has already identified the small towns of Hingham and East Harling as being suitable for such surveys. Since Local Authorities may outsource their work, EARTHA should consider seeking the payment of fees in return for using its expertise to conduct such surveys of clay buildings. Hence, surveys of other towns and villages need not then be a burdensome drain on EARTHA's finances.

5. EQUIPPING BUILDERS WITH THE TECHNICAL SKILLS

Eight builders from Diss, comprising a large proportion of those operating from the town, attended an earth construction training day convened by EARTHA at Hall Farm, North Lopham. Those attending this course were instructed by two EARTHA committee members, respectively a chartered architect and an earth-builder, in techniques appropriate for both wattle and daub structures and clay-lump structures. The chartered architect was Sarah Roberts, who designed the new clay-lump bungalow at Thorndon. The earth-builder was Richard Hyde, who prior to retirement had spent most of his working life repairing and restoring earth structures in the county of Norfolk. The instruction given at the course was in the techniques of both wattle and daub construction and clay-lump construction. Course participants were instructed in both new earth construction and the conservation of existing earth structures.

Since the earth construction training day, some of the participants are known to have undertaken earth construction work. Such work has not been confined to the town of Diss, but has also been undertaken in other districts of the county of Norfolk and in the adjoining county of Suffolk. One of the architects and one of the surveyors sitting on the EARTHA committee have each since collaborated with some of these builders with respect to earth structures beyond the boundaries of Diss. Such collaboration has included work to be undertaken on an existing clay-lump building as far afield as Reedham situated far across the county of Norfolk.

A new development comprising 114 low-cost, environmentally-friendly residential units has been scheduled to commence in January, 2010 between Diss and the nearby village of Roydon (Budd, 2009). Rather than using clay construction, these units are to be built from Hemcrete (Budd), which is a proprietary product created from lime and hemp. Usually, hemp-based construction relies on a composite of hydraulic lime, sharp sand and mineralized hemp. The Diss Hemcrete development continues a local tradition of using cheap forms of construction based upon manufacture on site, which also results in a breatheable and environmentally-friendly built environment. The difference is that presently the hemp is transported from outside the locality rather than sourced locally as the clay was. However, Diss is at the head of the Waveney Valley, which during the nineteenth century had a tradition of widespread hemp growing. There is no reason why the valley should not produce the raw material again. Moreover, there is no reason why the relatively similar skills should not be

interchangeable between clay-lump and Hemcrete construction. This is especially so, since the manufacturer of Hemcrete produces blocks in both Hemcrete and unfired clay. In which case, it should be possible to sustain the technical skills amongst the builders both to properly maintain the existing stock of clay-lump buildings and to support the growing clay-lump new-build movement.

6. CONCLUSIONS

Following the conclusion of the Cittàslow Clay Lump Project, the Local Authority now has a definitive map identifying clay buildings generically and a gazetteer that identifies both clay-lump buildings and wattle and daub buildings within the boundaries of the town of Diss. Such buildings will now be flagged up whenever either planning or building control applications are made with respect to those buildings. Accordingly, it should now be easier for the Local Authority to ensure that those buildings are, if appropriate, conserved and for it to advise others how they might best proceed with such buildings.

A large proportion of the builders operating in Diss now have the technical skills with which to play their role in the conservation of the town's clay-building heritage. However, more needs to be done to impart the knowledge to built environment professionals.

Given the arguments put forward by McCann, it would be useful to date precisely those clay-lump buildings remaining in Diss. It would be interesting to ascertain if McCann's argument about the dates at which clay-lump techniques were widely adopted in Norfolk and Suffolk can be borne out in Diss. If all the clay-lump properties in Diss could be accurately dated to within a few years, this could be achieved through the statistical analysis of counts over time. Such a study would be more valid if those clay-lump buildings in the town no longer standing could be identified and dated. Alternatively, in the event of McCann's hypothesis being disproved, it would be equally interesting to ascertain if a correlation exists between the period during which the Brick Tax was levied and that during which the use of clay-lump was most widespread in and around Diss.

Beyond seeking to add to the knowledge of the history of earth structures in Diss, EARTHA now has the capacity to undertake other clay-building surveys and to disseminate the knowledge following its conclusion of the Cittàslow Clay-lump Project. However, before other surveys are conducted, EARTHA needs to ensure that all those conducting the surveys are properly briefed and trained in order to achieve consistency and validity.

REFERENCES

Allan, J., Murphy, J., Kelly, T., 1996. Emissions in the heavy clay industry. *Key Engineering Materials,* **118**, 249-256.

Bouwens, D., 1988. Clay Lump in South Norfolk: Observations and Recollections. *Vernacular architecture,* **19**, 10-18.

Budd, R., 2009. Villagers' worry over homes plan. *Diss Express.* p. 5. 18 Dec 2009. Diss: Anglia Newspapers.

Donley-Reid, L.W., 1990. The Power of Swahili Porcelain, Beads and Pottery. *Archeological Papers of the American Anthropological Association,* **2**(1), 47-59.

Hurd, J. and Gourley, B., 2000. Terra Britannica: A Celebration of Earthen Structures in Great Britain and Ireland. London: Earthscan/James & James.

Keefe, L., 2005. Earth Building: Methods and Materials, Repair and Conservation. Abingdon, Oxon: Routledge.

Lewis, M., 2009. Australian Building: A Cultural Investigation Available: www.http://mileslewis.net/australian-building/pdf/earth-stone/earth-stone-adobe.pdf University of Melbourne.

Makhrov, A., 1997. Earth Construction in Russia: A Scottish Connexion. *Architectural History,* **40**, 12-12.

McCann, J., 1995. Clay and Cob Buildings. Princes Risborough: Shire.

McCann, J., 1987. Is Clay Lump a Traditional Building Material? *Vernacular architecture,* **18**, 1-16.

Moorey, P., 1999. Ancient Mesopotamian materials and industries: the archaeological evidence. Winona Lake: Eisenbrauns.

Rael, R., 2008. Earth Architecture. New York: Princeton Architectural Press.

Williams, C., 2007. Earth block walling in the UK: the cost of sustainable construction. M.Phil edn. University of Plymouth.

Williams-Ellis, C., Eastwick-Field, C. and Eastwick-Field, E., 1999. Building in Cob, Pise, and Stabilised Earth, reprinted ed. Shaftesbury: Donhead Publishing.

BIOGRAPHICAL NOTES

Malvern Tipping graduated from Portsmouth University with B.Sc. Urban Land Administration in 1986 and is presently a part-time research student at Anglia Ruskin University, UK. His main research interests are in areas of valuation and sale-and-leaseback. However, he has also sat for several years on the main committee of EARTHA (East Anglian Regional Telluric Houses Association). He is a professional member of the Royal Institution of Chartered Surveyors (RICS) and is a director of Tipping Estates Limited and other companies. His areas of experience include valuation, property investment and development.

CONTACTS

Mr Malvern Tipping
Tipping Estates Limited
Uggeshall
Beccles NR34 8BE
UNITED KINGDOM
Tel. + 44 1502 578784
Fax + 44 1502 578784
Email: tipping@globalnet.co.uk

APPENDIX

Figure 1: Wattle and daub (circa 1350)

Figure 2: Wattle and daub (1480-1500)

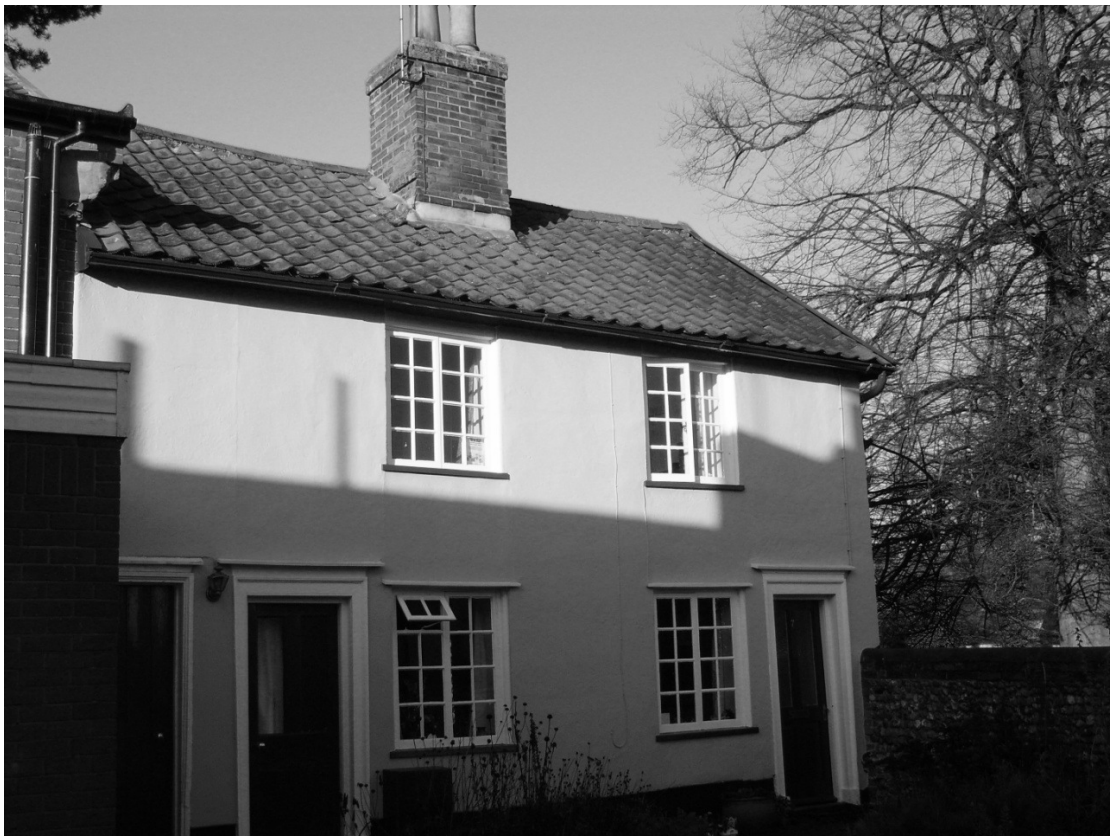

Figure 3: A row of lime-rendered traditional clay-lump cottages in the centre of Diss.